エチオピア連邦民主共和国
工業団地開発公社
エチオピア投資委員会

エチオピア国産業振興プロジェクト
（投資促進・工業団地開発）
第 2 フェーズ

第 2 フェーズ業務完了報告書

2022 年 6 月

独立行政法人
国際協力機構（JICA）

日本工営株式会社
有限会社ミンテックコンサルタンツ
株式会社 JIN

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略語表

BLIP	Bole Lemi Industrial Park
BLSIC	Bole Lemi Smart Industrial City
CMT	Cut, Make and Trim
CoE	Center of Excellence
COVID-19	Coronavirus
C/P	Counterpart
CRTC	Computer Refurbishing and Training Center
DMF	De-manufacturing Facility
EIC	Ethiopian Investment Commission
EIPP	Ethiopia Industrial Promotion Project
GTP	Growth and Transformation Plan
HQ	Headquarters
ICT	Information and Communication Technology
IP	Industrial Park
IPDC	Industrial Parks Development Corporation
IPS	Industrial Project Services
JCC	Joint Coordinating Committee
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
MINT	Ministry of Innovation and Technology
NDA	Non-disclosure Agreement
O&M	Operation and Management
OSS	One-Stop Service
PEHA	Public Enterprises Holding and Administration
R/D	Record of Discussion
SOP	Standard Operation Procedure

1. 業務実施の概要

本プロジェクトの概要は、以下の通り。

1.1 協力概要

1.1.1 プロジェクトの目的

本プロジェクトは、エチオピアにおいて工業団地開発・運営能力の強化、外国投資誘致活動・手続きの改善を行うことにより、エチオピアの産業振興と雇用創出に寄与することを目的として活動を実施した。

1.1.2 実施期間

第 1 フェーズ：2017 年 2 月～2019 年 5 月（28 ヶ月）

第 2 フェーズ：2019 年 10 月～2022 年 6 月（33 ヶ月）

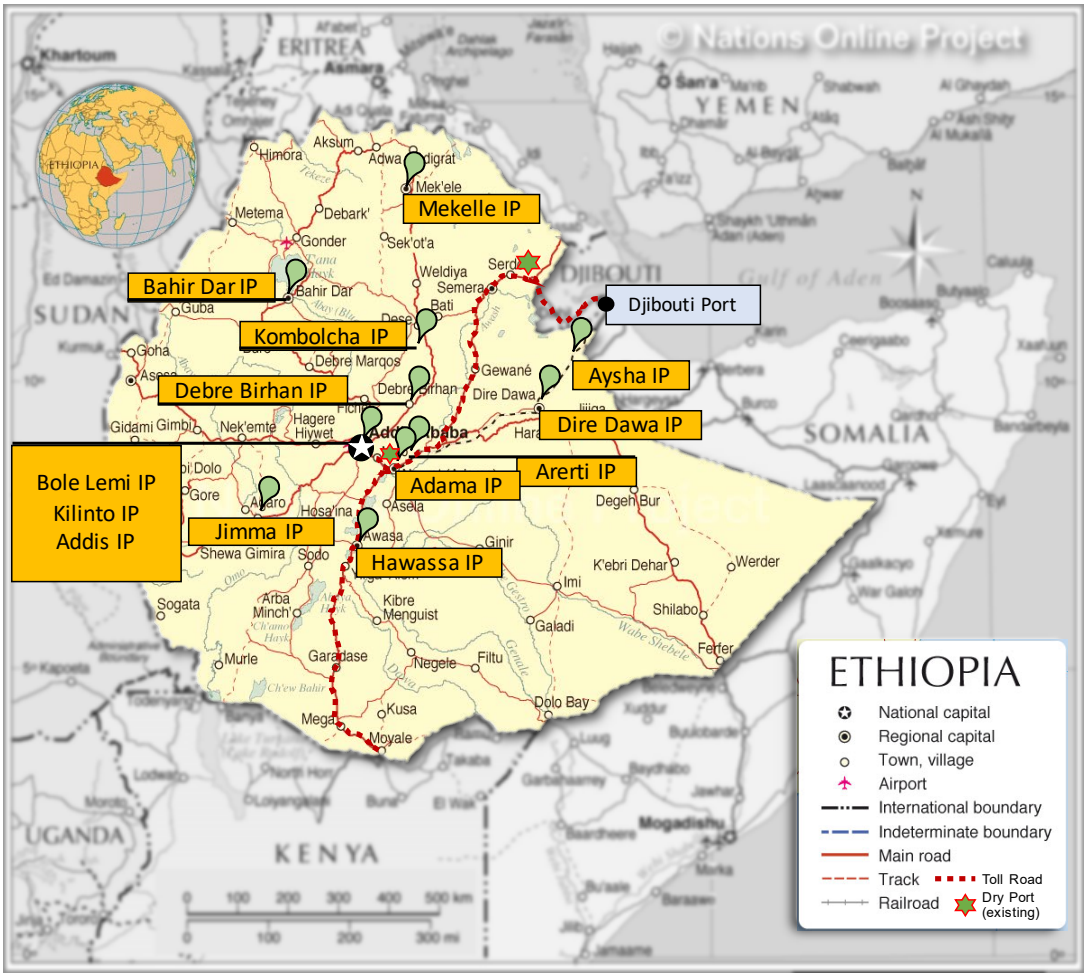
1.1.3 協力相手先機関

1. 工業団地開発公社（Industrial Parks Development Corporation: IPDC)

2. エチオピア投資委員会（Ethiopian Investment Commission: EIC)

EIC に対する第 2 フェーズの支援については、2019 年 3 月、第 1 フェーズ終了直前に実施した Joint Coordinating Committee（JCC）で、EIC 副長官から、本プロジェクトを含め、EIC を支援する全てのドナーに対し、コストパフォーマンスを含めた支援実績（成果・達成度）を確認・評価した後に検討する、とのコメントがあった。そのため、2019 年 10 月の第 2 フェーズ開始時は、EIC からの評価結果および支援要請に係る連絡を待ちつつ、前フェーズから継続中の活動を含め、今フェーズ開始後に IPDC と協議・合意した支援内容を中心に業務を行った。なお、EIC については、上述した前フェーズの支援実績の評価に関する連絡はなかったが、2020 年 6 月の新長官就任後、支援要請があったことから、JICA も交えた協議で支援内容を合意した後、支援を再開した。

1.1.4 対象地域



出典：EIPP チーム

図 1：プロジェクト対象地図

第 2 フェーズでは、治安問題による行動制限により、アディスアベバ市内に限定し、主にボレレミ工業団地への支援に注力した。

1.2 協力の必要性・位置づけ

1.2.1 現状及び問題点

エチオピアは、2025 年までに中所得国となるという「ビジョン 2025」を掲げ、本プレジェクト開始前は年平均約 10%の高い経済成長率を維持していた。しかし、新型コロナウイルスの世界的感染拡大に伴い、同国でも 2020 年 3 月に初の感染者が確認されて以降、世界経済の低迷とともに同国の経済成長も悪化の一途をたどっている。

エチオピアの製造業は、その多くは同国の政策に沿った輸出志向型であり、原材料も輸入に依存している。コロナ禍では市場ニーズの激減に加え、材料および燃料の高騰を受け、内陸国として近隣諸国に比べても輸送距離が長いエチオピアは、より深刻な経済打撃を受けている。

同国関係機関からは、経済問題の打開への具体的な対策が求められており、既に誘致されている産業の支援ならびに現状に合った企業誘致が急務とされている。

1.2.2 相手国政府国家政策上の位置づけ

本事業は、2025 年までに中所得国入りを目指すエチオピア政府の「Vision 2025」及びその実現のための GTP（Growth and Transformation Plan）2 の内容に基づいて実施されるものである。GTP2 では、品質・生産性・競争力の強化、成長の原動力としての国内民間セクターの転換、人材育成等が、戦略的柱として定められており、本事業はこれらの実施促進を行うもので、エチオピア政府の国家政策に沿ったものである。

1.3 協力の枠組み

1.3.1 第 1 フェーズにおける業務実施項目

第 1 フェーズでは、以下の項目について業務を実施した。

(1) 投資誘致戦略の確認・改善

a) 投資誘致戦略の概要の確認
b) 民間企業の投資動向の確認

(2) 投資誘致体制・機能の強化

(3) 投資家向け情報発信の強化

a) 投資家向け情報の整理
b) 広報ツールの作成・更新
c) 日本企業向け投資活動の促進

(4) ワン・ストップ・サービス（OSS）の実施促進

a) OSS実施状況の確認
b) OSS改善ニーズの把握
c) OSSの改善

(5) 工業団地開発の規制に係る制度の運用

a) 工業団地入居企業のためのStandard Operation Procedure（SOP）（旧名：Standard Operation Manual（SOM）の作成
b) 二国間クレジット（Joint Crediting Mechanism: JCM）スキームを通じたエコ工業団地

(6) 工業団地事業の改善

a) IPDCの事業実態の確認
b) 工業団地事業の改善策の提案
c) IPDCの事業推進能力の強化

(7) 工業団地開発計画の強化

a) 全国マスタープランの策定支援
b) 地域経済貢献・雇用創出の実施支援

(8) 工業団地開発プロセスの強化

a) 工業団地開発プロセスの確認及び課題の抽出
b) 工業団地開発ガイドラインの作成
c) 建設業者・コンサルタントとの契約内容の改善
d) 関係機関との連携体制の構築

(9) 工業団地管理運営の強化

a) 工業団地管理運営体制の改善
b) オフサイト・インフラ整備機関との標準契約内容の見直し及び維持管理マニュアルの作成
c) 入居企業向けアフターケアサービスの実施支援

(10) 工業団地プロモーションの促進

a) 工業団地プロモーションの支援
b) 工業団地プロモーション用パンフレット作成支援

(11) 環境配慮型工業都市（案）の策定支援

(12) 本邦・第三国研修

a) 本邦・第三国研修プログラムの作成
b) 研修プログラムの実施

1.3.2 第 2 フェーズにおける業務実施項目

当初計画として、第 2 フェーズは第 1 フェーズのモニタリング業務と位置付けられていた。しかし、先方政府からの要請に従い、第 2 フェーズも引き続き継続支援を行うとともに、現状に即した新規支援の要請を受け、対応することとした。なお、第 2 フェーズ開始当初は、対 IPDC 支援に注力することを前提に現地・国内での作業計画を立て、業務に当たった。

しかし 2020 年初頭に発生した新型コロナウイルスの世界的感染拡大（以下コロナ禍）に伴い、同年 3 月にエチオピアでも感染が確認され、同月 11 日付で JICA 事業関係者の渡航見合わせに関する方針が発表された。これにより、日本人専門家は現地傭人と連絡を取りながら遠隔での活動実施を余儀なくされた。コロナ禍による工業団地への影響を踏まえ、IPDC の新たなニーズや調査実施方法への影響も考慮しつつ活動計画を見直した。

また、2020 年 6 月と 7 月に EIC 長官および IPDC 社長がそれぞれ交代したことを受け、両機関トップとの協議、JICA（本部・事務所）および JICA 産業振興プロジェクト関係者との調整を踏まえ、支援業務内容の見直しを行った。各機関との協議に関する経緯および具体的な支援内容は、以下記載する 1.3.3、1.3.4 の通りである。

1.3.3 IPDC に対する運営・技術強化支援

2020 年 8 月 11 日に IPDC、JICA（本部・エチオピア事務所）とのオンライン会議を実施した（議事録については別添資料 1-1 を参照）。その際、IPDC から EIPP に対して新たな支援が要請された。IPDC の支援ニーズに基づき JICA と協議を行い、その結果を踏まえ、前フェーズからの継続業務を含む対 IPDC 支援内容案を取りまとめ、2020 年 11 月 9 日に IPDC に送付した。これに基づき、以下の業務を実施した。

(1) ボレレミ工業団地開発計画に関わる技術支援 【前フェーズからの継続】

a) Bole Lemi Smart Industrial City（BLSIC）開発計画の最終化（都市部（工業団地以外の住宅および商業用地）の測量、管理棟を含めた工業団地の緑化事業に係る枠組み、住宅地の開発ガイドライン作成、商業ゾーンに係る事業計画策定を含む）

b) ICT パークに関わる開発基準などの整備指標の策定

c) Digital Ethiopia 2025（ICT 普及による DX「デジタル・トランスフォーメーション」化）の実現に向けた、ICT パークが担う役割の検討・提案

(2) IPDC 既存アセットの有効活用による財務改善支援【新規】

a) IPDC が民間活力を通じて既存アセットを活用するための事業推進計画案に係る策定支援

- Gaizo 地区の用地活用（GAIZO プロジェクト）
- ボレレミ工業団地旧管理棟群の活用（工場労働者の基礎的研修および IPDC スタッフの能力強化を視野に入れた研修センター（Center of Excellence: CoE）の設置計画を含む）
- 国内工業団地入居企業向け支援枠組み

b) 民間活力を公募するにあたっての諸手続き（公有地の民間利用に関わる申請書類および公募資料の作成）に係る支援

c) 物流パーク実施戦略策定支援（施設運営、資金計画、実施運営体制の検討・提案、環境社会配慮の手続きなど）

(3) ボレレミ工業団地の収益化ビジネスの検討および助言【前フェーズからの継続】

a) ボレレミ工業団地の収支バランスの確認および助言（ICT パークの地価分析・料金設定を通じた収益化ビジネスに関する提案、入居希望者への説明を含む）

(4) ボレレミ工業団地における One Stop Service（OSS）の運営支援【前フェーズからの継続】

1.3.4 EIC に対する運営・技術強化支援

2020 年 8 月 4 日に EIC、JICA（本部・エチオピア事務所）および EIPP 間でオンライン会議を実施し、EIC から支援が必要な分野が示された（議事録は別添資料 1-2 参照）。EIC からの要請内容に基づき、JICA 関係者と協議の上、2020 年 11 月 11 日に EIC、JICA、政策対話プロジェクトとともに再びオンライン会議を実施し、EIPP による対 EIC 支援として、以下業務を行うことで合意した（議事録についは別添資料 1-3 を参照）。

(1) 工業団地の規制枠組み（regulatory framework）に関する支援【新規】

(2) 工業団地の輸出額（目標値／実測値）のギャップに関する分析と提案【新規】

上記各 C/P 機関との協議・合意後、EIPP は対 EIC 支援を再開した。

1.3.5 協力終了後、提案計画により達成が期待される目標

エチオピアの工業団地における投資家へのサービスが向上する。

1.3.6 外部要因

(1) 協力相手国内・国外の事情

a) 政権交代等政府内部事情により GTP2、産業振興に関連する関係機関の権限・実施体制が大幅に変更されない。

b) 周辺国を含めた政情の悪化や自然災害等により政治経済環境の急激な変化が起こらない。

c) 国際経済において大規模な景気後退が生じない。

(2) 関連プロジェクトの遅れ

a) 投資促進、工業団地開発について、世界銀行による CJC Project によって支援されているボレレミ 2 やキリント、その他エチオピア政府による重点工業団地の開発計画が、中断しない。

1.4 業務実施実績

上記 1.3 の業務実施計画に基づいたコンサルタント業務計画とその実績については、表 1 の通りとなった。

表 1：コンサルタント業務計画・実績

団員名	従事MM							
	2019年9月30日 - 2020年12月31日		2021年1月1日 - 2021年12月31日		2022年1月1日 - 2022年6月30日		合計	
	計画	実績	計画	実績	計画	実績	計画	実績
テディ　正典	2.56	2.56	2.95	2.60	3.35	2.50	8.86	7.66
金子　和代	2.72	2.72	2.65	2.45	3.35	2.80	8.72	7.97
永井　実	1.30	1.30	4.30	4.30	3.00	3.00	8.60	8.60
谷口　豊	1.85	1.85	3.05	3.05	2.50	2.10	7.40	7.00
渡辺　昭文	0.45	0.45	0.40	0.40	0.35	0.00	1.20	0.85
生形　嘉良	0.25	0.25	0.25	0.25	0.00	0.00	0.50	0.50
柴山　千晶	0.00	0.00	1.00	1.00	3.35	3.75	4.35	4.75
合計	**9.13**	**9.13**	**14.60**	**14.05**	**15.90**	**14.15**	**39.63**	**37.33**

出典：EIPP チーム

2. 業務実施報告

2.1 IPDC に対する運営・技術強化支援

2.1.1 ボレレミ工業団地開発計画に関わる技術支援

a) Bole Lemi Smart Industrial City（BLSIC）開発計画の最終化

BLSIC を最終化し、印刷・製本化されたものを 2019 年 9 月、IPDC に提出した。BLSIC にはボレレミ工業団地内の持続的な住宅開発についての計画が言及されており、IPDC は他の工業団地にもこの住宅開発の方針を適用する意向を示した。そこで、コロナ禍の影響も踏まえつつ、設計・建築段階のプロセスと手続きについてより具体的に記載している住宅開発ガイドライン作成を支援し、ドラフトレポートを 2020 年 8 月に IPDC に提出した。IPDC 内の住宅部門およびマスタープラン部門など関係部署との協議やコメントを反映し、2021 年 8 月、「Mixed Residential Area Design Guideline for Bole Lemi Smart Industrial City（住宅ガイドライン）」を以下の構成の通り最終化し、IPDC に提出した（別添資料 2-1 参照）。

1.業務の名称	Mixed Residential Area Design Guideline for Bole Lemi Smart Industrial City
2.対象 C/P 機関	IPDC
3.活動期間	2020 年 1 月から 2021 年 3 月
4.活動目的	工場労働者向けの住宅地開発に対し、魅力的な都市の実現を目的として職住近接のみならず、健康・社会福祉を付加価値として開発ガイドラインにも取り入れ、更に実施モニタリング方法についても言及した。
5.調査・提言内容	セクション 1：序章 セクション 2：枠組み セクション 3：開発ガイドライン セクション 4：街区ガイドライン セクション 5：建築ガイドライン
6.成果品	ガイドライン
7.活動状況	特に労働者向けの住宅供給に関しては、IPDC は 10 年間の戦略プランの柱として位置付け、本ガイドラインを用いて入居企業および民間デベロッパーとの連携を進めている。
8.特記事項	特になし

更に、環境配慮の観点から、2019 年 4 月、新管理棟へのグリーン・スマートビルディングの導入に関する提言を取りまとめ、以下の内容にて IPDC へ提出した（別添資料 2-2 参照）。

1.業務の名称	Green Smart Building
2.対象 C/P 機関	IPDC
3.活動期間	2018 年 12 月から 2019 年 4 月まで
4.活動目的	建設された新管理棟を、環境と美観に配慮したグリーン・スマートビルディングとして生まれ変わらせるための外装設計を実施した。
5.調査・提言内容	▪ グリーンスマートビルのコンセプト ▪ 外装設計（壁面緑化、壁面ディスプレイ、スマートセキュリティ、照明、情報システム）

	▪ 概算費用算出 ▪ 実施と普及に向けた提言
6.成果品	報告書（含む外装設計と事業費）
7.活動状況	IPDC は本提案に沿って実施を試みたが、予算が調達できず、現在ドナーなどの協力を求めている。
8.特記事項	第 1 フェーズで出された要望を第 2 フェーズで実施した業務。

b) ICT パークに関わる開発基準などの整備指標の策定

ICT パークは、エチオピアがアフリカの ICT ハブになることを目的とし、2010 年に「エチオピア ICT ビレッジ」として立ち上げられた。当初はイノベーション・技術省（Ministry of Innovation and Technology：MINT） の管轄であったが、後に IPDC に移管された。そのような経緯から、EIPP は ICT パーク 戦略計画および実施ガイドラインの策定を支援した。実施に際し、ICT パークを訪問し ICT パークマネージャーと協議を重ね、2019 年 5 月、IPDC へ ICT 開発ガイドラインを作成・提出した（別添資料 2-3 参照）。

1.業務の名称	ICT Park Development Guideline
2.対象 C/P 機関	IPDC
3.活動期間	2019 年 12 月から 2020 年 4 月まで
4.活動目的	ICT パークの開発計画（見直し）を含めた事業実施マニュアルの策定。
5.調査・提言内容	▪ PSTLE（政治、社会経済、技術、法律、環境）による現状分析 ▪ 開発計画 ▪ 実施に向けた契約管理と工事監理ガイドライン
6.成果品	ガイドライン
7.活動状況	本報告書は IPDC・ICT パーク部署の承認を得て、業務実施のガイドラインとして使用されている。
8.特記事項	特になし

上記報告書の作成過程で、一連のプロセスを通じて関係省庁から必要なデータの入手に努めたが、その際、一部機関からは機密性を理由に必要なデータや情報の共有を断られるケースもあり、入手が困難であった。入手した情報のレビューを行った後、ICT 関連のビジネススキームを検討するとともに、ICT パーク運営の観点から分析を行った。最終的に、Smart Industrial City として工業団地と一体運用することにより、ICT パークを縫製業から IT を主体とする Hi-Tech および航空産業への転換の起爆剤とすることを提案した。

その頃、ICT 分野については、エチオピア政府は首相府主導の下、MINT、EIC、Ethio-telecom なども加わり「Digital Ethiopia 2025」を策定していた。そのため、ICT パーク 戦略計画策定にあたっては、これら関係機関とも調整し「Digital Ethiopia 2025」や「Home Grown Economic Reform Agenda」に沿うよう配慮した。

その他 ICT 関連業務として、コンピューターの再生・研修センター（Computer Refurbishing and Training Center: CRTC）を IPDC に統合することのメリットとデメリットについて調査を行った。CRTC は政府系機関で、これまで複数の省庁の

管轄下に置かれていた。調査にあたっては、解体施設を含む CRTC-DMF（Demanufacturing Facility）の現状を確認し、電子廃棄物処理の将来性、エチオピア全般および工業団地への貢献度と見通しについて調査した。更に、電子廃棄物処理が環境にもたらす恩恵について比較分析を行い、電子リサイクル産業の金銭的便益を特定した。これら調査結果を以下構成の報告書にまとめ、2019年9月、IPDCに提出した（別添資料2-4参照）。

1.業務の名称	To transfer E-waste management facility from CRTC to IPDC
2.対象C/P機関	IPDC
3.活動期間	2019年7月から2019年10月まで
4.活動目的	多くの自立していない工業関連機関および施設がIPDCへの吸収を検討されており、その一つとして電子廃棄物を担当するCRTCおよび同期間が保有するDMF（De-Manufacturing Facility）が挙げられた。本調査では、IPDCが同機関および施設を吸収した際のメリット・デメリットを検討・提示するものである。
5.調査・提言内容	▪ E-waste（電子機器廃棄物）の世界 ▪ CRTE-DMFの現状 ▪ このパートでは、CRTE-DMFの目的、組織構造、既存の物理的資産とインフラについての紹介 ▪ DMF活用およびE-waste事業の今後の展望
6.成果品	報告書
7.活動状況	「負の影響が大きい」ことを提示・合意し、IPDCは本調査結果を用いて今後の対応を政府と協議した。 EIPP支援が打ち切られたため、上記協議の結果は不明。
8.特記事項	特になし

c) Digital Ethiopia 2025（ICT普及によるDX「デジタル・トランスフォーメーション」化）の実現に向けたICTパークが担う役割の検討・提案

ICTパークの実現を促進する目的として、「Digital Ethiopia 2025」をレビューし、その実施に際しICTパークが担うべき役割を明確にした。レビューの結果、「Digital Ethiopia 2025」が掲げている以下4つの柱のうち、ICTパークは柱②と柱③の役割を担うことが望ましいと提案した。

柱①：農業からの価値の創出

柱②：製造業の新たなグローバルバリューチェーン

柱③：IT対応可能なサービスセクターの構築

柱④：観光競争力の推進力としてのデジタル

IPDCの要請を受け、ICTパーク戦略計画を作成し、その中でICTパーク関連事業の重点分野を特定した。EICおよびMINTと連携し、目標、目的、アクションプランなどの整合性を取り、各機関がそれぞれ作成していた文書を統合した。2021年4月、最終化した文書「The Role of the ICT Park in Digital Transformation（ICTパーク戦略計画）」をIPDCに提出した（別添資料2-5参照）。

1.業務の名称	The Role of the ICT Park in Digital Transformation
2.対象C/P機関	EIC, IPDCおよびMiNT

3.活動期間	2020年6月から2021年3月まで
4.活動目的	エチオピア政府のDX化に係る政策（Ethiopia Digitalization 2025）に則り、ICTパークをその原動力として位置付け、その実現・実施に必要な開発コンセプト、誘致計画などの事業戦略計画を策定した。
5.調査・提言内容	▪ ICTパークの起源と現在の位置付け ▪ ICTパークと国家政策目標との整合性 ▪ エチオピアのICTエコシステム ▪ テクノロジーパーク開発の成功例からの教訓 ▪ デジタル・トランスフォーメーションの推進役としてのICTパーク ▪ 提言と実施ロードマップ
6.成果品	報告書
7.活動状況	首相府で開催された「デジタル・トランスフォーメーション」会議において、実施機関であるEICおよびMNNTは、同報告書の内容に基づき発表を行った。 EICは監督機関としてIT関連投資家への紹介資料としても活用している。
8.特記事項	特になし

Bole Lemi Smart Industrial City内におけるHi-Tech Industrial Park（EIPP提案）およびAerospace Industrial Park（エチオピア航空からの要望の受入れ）との連携は、同国製造業に新たな高付加価値を生み出すことが期待できる。両サイトは、建設済みの高速道路を挟んだ隣接地であることから、アンダーパスを建設することで敷地間をシームレスで行き来できるように実際に整備された。

2.1.2 IPDC既存アセットの有効活用による財務改善支援

a) IPDCが民間活力を通じて既存アセットを活用するための事業推進計画案に係る策定支援

IPDCは他国事例紹介も含め、工業団地運営事業における収益向上を含めた財務改善方法の検討・提案をEIPPに要請した。それに対し、第1フェーズでは、カンボジア国プノンペン工業団地へのOJT派遣を通して工業団地運営に係る具体的な事例を紹介し、直接学ぶ機会を設けることでIPDCの能力強化を実施した。一方、第2フェーズでは、IPDCが保有しながら十分活用されていないアセットを特定し、IPDCの開発リスク（資金および運営など）低減に寄与する民間活用の検討・提案を行った。

<u>Gaizo地区の用地活用（Gaizoプロジェクト）</u>

IPDCは収益を創出し産業とのリンケージを構築するために、十分に活用されていない同機関が所有している用地を最大限活用する方法を模索していた。このような経緯から、IPDCからEIPPに対し、アディスアベバ市北部のAddisu Gebeya地域近隣に位置するGaizo地区について、フィージビリティスタディを行うよう要請があった。これを受け、EIPPは、（1）IPDCが収益を最大化できる土地利用方法、（2）民間・IPDC双方の利益に資する実現可能なプロジェクト／ビジネス活動、（3）対象プロジェクトの開発・実施に係るビジネスモデル

案、（4）近隣地元住民の集客も見込める、生活様式に合った商業施設のアイデアなど、を含むビジネスプラン案を作成した。2019 年 10 月 25 日に IPDC へのプレゼンテーションを実施し、同上層部の合意を得た。ドラフト文書を作成し、2019 年 12 月に IPDC に提出した。同文書は作業グループで議論された後、IPDC 取締役会に複数回提出されたのち、2020 年 10 月に以下の通り最終化された（別添資料 2-6 参照）。

1.業務の名称	Business Plan for Industrial Park Oriented Entertainment Center
2.対象 C/P 機関	IPDC
3.活動期間	2019 年 9 月から 2020 年 10 月まで
4.活動目的	IPDC の財務改善に寄与するべく、同機関がアディスアベバ市内に保有する空地に、工業化関連施設（教育センターなど）および住民達が活用できる商業施設を、官民連携事業としての実現・実施を念頭においた計画およびビジネスモデルを提案した。
5.調査・提言内容	▪ 用地・地価分析 ▪ 開発計画および運営管理方法（含む財務分析） ▪ 官民連携事業に係る規範・規制 ▪ 事業実施戦略と事業計画
6.成果品	報告書（事業提案書）
7.活動状況	本調査結果を用いて IPDC-CEO 社長がアディスアベバ市長と本事業の実施について協議した。
8.特記事項	特になし

上記ビジネスプランは Gaizo 地区に限定したものではあるが、IPDC は自身が所有する別の場所についても、各々の条件に合わせ活用することを希望していた。そのため、Gaizo 地区を対象としたプロジェクトの他、「”Welosefer” High-density Mixed-Use Building」プロジェクトについても初期段階としての提言を取りまとめ、2020 年 10 月に IPDC へ以下の報告書を提出した（別添資料 2-7 参照）。

1.業務の名称	A Technical Proposal for “WELOSEFER”High-Density Mixed-Use Building Project
2.対象 C/P 機関	IPDC
3.活動期間	2020 年 8 月から 2020 年 11 月 *注：第 1 フェーズでコンセプト案は策定済み*
4.活動目的	IPDC の財務改善に寄与するべく、同機関がアディスアベバ市内に保有する空地に、IPDC 関連施設（本社機能など）および住民達が活用できる商業施設を、官民連携事業としての実現・実施を念頭においた計画およびビジネスモデルを提案した。
5.調査・提言内容	▪ 用地・地価分析 ▪ 開発計画および運営管理方法（含む財務分析） ▪ 官民連携事業に係る規範・規制 ▪ 事業実施戦略と事業計画
6.成果品	報告書（事業提案書）
7.活動状況	この調査に基づき、IPDC は同開発計画の推進のため、対象地域にフェンスを設置した。
8.特記事項	特になし

ボレレミ工業団地旧管理棟群の活用

ボレレミ工業団地内に新管理棟が建設されたことにより、IPDC は BLIP-I にある旧管理棟群の活用方法を検討していた。これを受け、EIPP は同施設を活用した研修センター設立に係る事業計画策定を支援した。CoE（Center of Excellence）はエチオピアの産業振興を最終的な目標に掲げ、研修プログラムの策定、インフラ設計、人材育成と IPDC の収益創出の双方を目的としており、それに関する以下報告書を、2020 年 1 月、IPDC に提出した（別添資料 2-8 参照）。

1.業務の名称	Business Plan for Center of Excellence for Eco-Industrial Development
2.対象 C/P 機関	IPDC
3.活動期間	2019 年 7 月から 2020 年 1 月まで
4.活動目的	IPDC の既存アセット有効活用による財務改善を目指し、同機関職員研修および入居企業向け工場労働者の基礎訓練場として、Bole Lemi 工業団地の旧管理棟を活用することを目的とした調査・計画書。
5.調査・提言内容	▪ 既存アセットの評価および研修・訓練のニーズ分析 ▪ 必要研修プログラムの概要提案 ▪ 事業計画（含むレイアウト計画、概算事業費、財務分析）
6.成果品	報告書
7.活動状況	IPDC は、本計画の実施に向けて始動し、以下「Road-Map to Set-up Center of Excellence (CoE)」の支援につながる。
8.特記事項	特になし

また、具体的な研修プログラムのコンポーネントについても、IPDC および同組織の下で研修プログラムの実施を責務とする IPS（Industrial Project Services）と協議した。その結果を踏まえて、CoE の設立に向けたロードマップを以下の構成でまとめ、2020 年 3 月に IPDC へ提出した（別添資料 2-9 参照）。

1.業務の名称	Road-Map to Set-up Center of Excellence (CoE)
2.対象 C/P 機関	IPDC
3.活動期間	2020 年 2 月から 2021 年 3 月
4.活動目的	CoE の実現に向けて、社内関係者への説明・協議・調整を行い、それらの結果をロードマップとしてまとめた。
5.調査・提言内容	▪ CoE の概要および必要性 ▪ CoE のプログラム内容 ▪ CoE 設立のロードマップ
6.成果品	報告書
7.活動状況	建物改修も含めたドナーの協力を求めている。
8.特記事項	特になし

国内工業団地入居企業向け支援枠組み

IPDC 副社長（工業団地運営管理担当）より、工業団地の国内入居企業に関する支援方法について、海外の事例も紹介しつつ提言するよう要請があった。それ

を受け、2021 年 4 月にキリントおよびアダマ工業団地で、同年 9 月に Addis Industry Village で国内企業への聞き取り調査を実施し、事業で直面する課題を特定した。その結果を踏まえて主要な課題を分析し、国内入居企業への支援枠組みに関する提言を取りまとめた。IPDC との一連の協議と彼らから受領したコメントを反映した上で、2021 年 11 月に下記の「Local Companies: Challenges and Supporting Framework for Industrial Parks」を最終化し、IPDC に提出した（別添資料 2-10 参照）。

1.業務の名称	Local Companies: Challenges and Supporting Framework for Industrial Parks
2.対象 C/P 機関	IPDC
3.活動期間	2020 年 12 月から 2021 年 11 月
4.活動目的	コロナ禍により、IPDC による FDI の新規誘致・活動維持支援がほとんど効果を望まれていない状況下で、既に入居している国内産業の製造活動支援の可能性を示唆する調査を実施した。 本調査では、入居企業が直面している課題を調査し、IPDC が対応可能な解決策を検討・提案した。
5.調査・提言内容	▪ 入居企業の現状と直面している課題 ▪ 入居企業が直面している課題の改善策 ▪ IPDC に向けた今後の対策提案： *金融緩和*、*市場確保*、*インフラ整備*、*物流・通関の改善*
6.成果品	報告書
7.活動状況	IPDC は本調査結果を踏まえて、入居企業関係者を含む関係機関と具体的な対応検討に向けた協議を実施した。解決策のうち、IPDC が自身の権限で実施可能な事項に対しては具体的なアクションを取った。
8.特記事項	特になし

b) 民間活力を公募するにあたっての諸手続き（公有地の民間利用に関わる申請書類および公募資料の作成）に係る支援

上記 2.1.2 a)で Gaizo プロジェクトの報告書を提出した後、Gaizo 地区の土地所有に関する問題が解決した時点で、引き続き必要な公募資料・入札図書の作成支援に取り組む予定としていた。合わせて、公用地の民間活用による類似事業を調査し、参考事例の情報収集を行った。

c) 物流パーク実施戦略策定支援（施設運営、資金計画、実施運営体制の検討・提案、環境社会配慮の手続きなど）

ジブチへ向かう東部回廊沿いの物流パーク建設候補地について調査を行った。IPDC が特定した複数候補地から、EIPP はセベタ、インドデ、モジョ、アダマ、ディレダワの 5 ヶ所を提案し、2019 年 9 月、IPDC に対し以下報告書を提出した（別添資料 2-11 参照）。

1.業務の名称	Preliminary Study on Suitable Site for Logistics Parks
2.対象 C/P 機関	IPDC
3.活動期間	2019 年 9 月から 2019 年 10 月

4.活動目的	多くの工業団地が開発され、機能していない状況下で、政策によって更に工業団地開発の計画が挙がっている状況下で、工業団地の活動を支える物流ハブの必要性が IPDC 内で協議された。IPDC の支援要請を受け検討した内容を取りまとめ、報告書を策定した。
5.調査・提言内容	▪ エチオピアにおける物流状況 ▪ 候補地の選定と評価
6.成果品	報告書
7.活動状況	IPDC 社長の意向により、物流ハブの開発は実施しないこととなった。
8.特記事項	特になし

2.1.3 ボレレミ工業団地の収益化ビジネスの検討および助言

a) ボレレミ工業団地の収支バランスの確認および助言

BLIP-I および II の将来収支を予測するため、エクセルを用いた計算書を IPDC 副社長（IP 運営管理担当）に提示し、合意を得た。本件作業に必要な情報は内部情報が含まれることから、IPDC との間で機密保持契約（Non-disclosure Agreement: NDA）を締結し、同工業団地の直近の年次会計報告やレンタル工場契約書、建設コストなど必要な情報を入手した。最終的には、同エクセルファイルを IPDC 担当者自身が更新できるようにレクチャーした。

同時期に、BLIP に隣接する ICT パークの土地評価と価格設定を緊急に検討する必要に迫られていた。IPDC からの要請を受けて、EIPP は現地を視察し、既存インフラの整備状況や周辺の地価を調べるとともに、IPDC のキャッシュフローを分析するのに必要なコスト（基礎インフラ、建築物、運営費など）のデータを入手した。これらを基に、「ICT Park Land and Property Valuation」を作成し、2021 年 4 月に提出した。翌 5 月に IPDC に対しプレゼンテーションを行い、追加のコメントを受領した。これらを反映・更新した上で、2021 年 6 月に以下報告書を IPDC に再提出した（別添資料 2-12 参照）。

1.業務の名称	ICT Park: Land and Property Valuation
2.対象 C/P 機関	IPDC
3.活動期間	2020 年 9 月から 2021 年 6 月まで
4.活動目的	ICT パークを MINT から引き取った IPDC は、企業誘致に際し、工業団地と同様の政策価格でなく、運営事業の持続性を鑑みた同用地および物件の適切な賃貸価格の値付けが必要としていた。そのため、国内外の同類施設の動向を踏まえ、ICT パークの賃貸価格を検討・提案した。
5.調査・提言内容	▪ ICT パークの施設概要および立地条件 ▪ ICT パーク運営の収支分析・評価 ▪ 周辺各国における類似施設の開発動向 ▪ ICT パークの事業財務分析 ▪ 提言 *事業運営の継続性確保のためには適切な賃貸料金の設定と徴収が必須*
6.成果品	報告書

7.活動状況	IPDC は、この調査結果で提案された賃貸価格を用いて、入居希望企業と交渉を実施している。
8.特記事項	特になし

その後のフォローアップとして、同文書に添付されているキャッシュフロー分析に用いたエクセル計算書の使い方について、2021 年 7 月に IPDC 関係者にレクチャーした。また、同年 10 月には ICT パークマネージャー、翌 11 月には ICT パークの関係機関に対しプレゼンテーションを行った。更に、ICT パークの事業継続性の観点から算出した料金設定に基づき、入居希望企業に対してその妥当性を説明し、契約締結に向けた支援を実施した。

2.2 EIC に対する運営・技術強化支援

2.2.1 工業団地の規制枠組み（regulatory framework）に関する支援

エチオピア政府は FDI 誘致政策のツールとして工業団地開発・運営に多大な資金を投じてきたが、その事業が国内経済開発への寄与を含め、どのような成果をもたらしたかをモニタリングするとともに、その投入が妥当であったかを検証し、定期的に事業方針を見直す必要があった。そのため、工業団地の規制監督機関である EIC にとって、監督業務の実施体制構築および強化は喫緊の課題であった。加えて、規制監督に関する EIC 職員の能力向上や、情報収集・集計・共有の方法についても緊急に対応する必要があった。そのため、EIC は規制監督業務に関する現状の調査・分析と、経済（生産、輸出）、社会（雇用、生産性）、環境（水衛生、廃棄物処理）の視点から改善策の提言を行うよう、2020 年 8 月に行われた EIC、JICA、EIPP 間のオンライン会議で EIPP に要請した。

なお、この工業団地の規制枠組みについては、後述の輸出額ギャップの調査分析が本業務の一部として含まれることから、その成果を受けて提言をまとめる必要があった。同調査の終了を待って 2021 年 8 月、EIC に対して構成案を提示し、今後の進め方について協議した。しかし、輸出ギャップ調査分析の実施過程において、EIC から付加価値率（Value-added rate）に関する調査分析が追加要請されたため、関連する調査および報告書の更新を行った結果、同調査の最終報告書提出が 2022 年 4 月まで遅延された。2022 年 5 月時点で提出した報告書に対するコメントを得られなかったため、規制枠組みについては、調査団の見解をまとめた Introduction Report として、同月、EIC に以下報告書を提案した（別添資料 2-13 参照）。

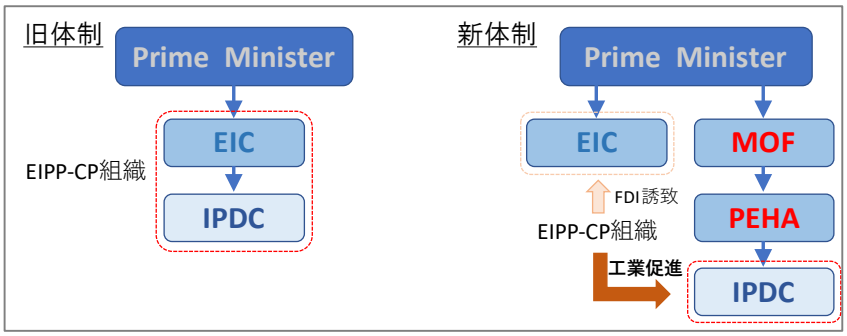
なお、付加価値率が調査項目に追加された背景として、エチオピア国立銀行から 30%をターゲットとした規制が示され、その数値の妥当性を検証する必要があったことが挙げられる。本調査の結果として、回答の協力を得た 2 社の契約形態が CMT（Cut, Make、Trim）であったため、90%を超える付加価値率となり、指標としての妥当性は低いことを報告書で示した。

1.業務の名称	Regulatory Framework for Industrial Parks
2.対象 C/P 機関	EIC
3.活動期間	2021 年 2 月から 2022 年 4 月
4.活動目的	エチオピア政府として FDI 産業誘致に寄与した優遇措置の効果を検証すべく、監督機関である EIC は「規制枠組み」の提案を EIPP に要請した。
5.調査・提言内容	▪ 工業団地運用・製造活動に係る既存の法制度

	▪ FDI 製造業に対する優遇措置を含めた投資環境 ▪ 規制枠組みの概要案 ▪ 調査・分析・モニタリング方法に対する考え方
6.成果品	基礎報告書
7.活動状況	特になし
8.特記事項	規制枠組みは、「経済効果」のみならず、「社会的影響」および「環境的影響」も踏まえ、総合的な評価が必要であり、この構成を EIC に提案し、承諾を得た。そのうち、「経済効果」に関しては、別途実施している輸出ギャップ分析調査と連動しているため、同調査結果を踏まえてから本業務を始動させることで合意した。同調査のとりまとめに調査最終時点までかかったため、本業務は調査団案「Introduction Report」としてまとめた。 更に、製造業が厳しいビジネス環境に直面している状況下では、当面は現状のモニタリングと課題把握に留め、彼らのビジネスが軌道に乗った時点で規制を課すことを提言した。

本業務における EIPP の提言として、比較的規制が緩い環境でも FDI 誘致が促進されていない現状下で、更なるインセンティブの付加を考慮せず規制を強化することは、企業側にとって投資環境の悪化と捉えられかねない。そのため、何らかの規制を設定するのであれば、併せてインセンティブの付与も検討する必要があり、各種インセンティブに関連する機関とも協議・調整しながら、EIC が本枠組み設置にかかる検討・最終化を行うことが求められる。

更に、エチオピアの省庁再編に伴い、工業団地の開発・運営を担う IPDC が EIC 傘下から離脱し、新たに財務省下に設立された Public Enterprises Holding and Administration（PEHA）の傘下となった（図 2）。大きな変更点としては、前体制下では工業団地は外資誘致のツールとして位置づけられていたが、PEHA は債務削減を目的としているため、IPDC 或いは個別工業団地の売却を含めた民営化が責務となっている。民営化により、工業団地事業の目的が売却先の企業収益となるため、規制業務のあり方が大きく異なる。ただし、2022 年 5 月時点では、民営化に対する規制・条件は定まっていない。従って、規制業務の責任機関が不明確な状況となっている



出典：EIPP チーム

図 2：省庁再編に伴う EIC・IPDC の位置づけ

2.2.2 工業団地の輸出額（目標値／実績値）のギャップに関する分析と提案

コロナ禍による影響を受け、国内にある国営・民間の工業団地に係る輸出額は、政府が設定した政策目標を下回っていた。このような状況下で、輸出額の目標値と実績値にギャップが生じている原因の特定と、入居企業が抱える問題の対応策に関する提言について、上記工業団地規制枠組みと同様、2020 年 8 月のオンライン会議で EIC から要請があった。他方、この問題はコロナ禍以前から認識されていたため、その前後で課題を分析し、それぞれに対する提言を取りまとめた。

具体的な実施作業として、まず入居企業向けの質問票をドラフトし、EIC 関係者のコメントを踏まえ最終化した。2020 年 12 月から 2021 年 3 月まで、ボレレミ、ハワサ、コンボルチャ、アダマ、ジョージ・シュー、ディレダワ、イースタン、フアジャンの 8 つの工業団地で入居企業に対する聞き取り調査を実施し、計 53 社から回答・協力を得た。聞き取り調査の結果を取りまとめた時点で、EIC 副長官（工業団地担当）に説明し、JICA（本部・エチオピア事務所）や政策対話チームに対しても情報共有を行った。

なお、本調査で特定された、FDI 製造業が直面している主要課題への対応方針を報告書に取りまとめた（別添資料 2-15 参照）。その多くは EIC の権限だけで改善できるものでないことも明らかとなった。これらは国の産業政策にも関わるため、EIC のみならず政策決定レベルでの議論・見直しが必要と考える。

上記聞き取り結果について説明を行った際、EIC から付加価値率（Value-added rate）に関する追加要請が出された。この背景には、エチオピア国立銀行が、FDI 製造業に対して付加価値率 30%以上の規制をかける旨言及したことに起因した依頼だった。コロナ禍による行動制限もあったことから、ボレレミ工業団地に限定し 2022 年 1 月から 3 月にかけて入居企業に対し聞き取りを実施した。ただ、付加価値率を算出するには、各企業の財務諸表に準じた具体的な支出入額の確認が必要であり、同資料の提示が義務化されていない状況下では各企業から協力を得るのは難しいのが実情である。実際、アプローチした 8 社のうち、2 社から協力を得て算出したが、具体的な財務関連の数字については情報を得ることができなかったことから、数字の正当性まで言及することは困難であった。更に、上記 2 社の製造取引形態は、原材料費が支出に含まれない「製品加工賃見積もりの縫製業（CMT：Cut, Make and Trim）」であることから、付加価値率が 90%台に達しており、これも付加価値率を適用することの妥当性を担保するものではなかった。上記から、付加価値率は輸出ギャップを分析するための指標には適さないというのが EIPP の見解である。

これら調査結果および提言については、EIC からのコメントを得て最終化し、2022 年 4 月 EIC に以下報告書を提出した（別添資料 2-14 参照）。

1.業務の名称	Export Gap Analysis
2.対象 C/P 機関	EIC
3.活動期間	2020 年 9 月 2022 年 5 月
4.活動目的	エチオピア政府は工業団地を FDI の受け皿とし、その他の優遇措置も加え、製造業を誘致した。しかし、当初計画していた輸出額を大きく下回る状況が続き、コロナ禍でその実態調査を実施し、同国に対する課題解決に向けた提言を合わせて調査結果としてまとめた。
5.調査・提言内容	▪ エチオピアにおける工業団地からの輸出状況 ▪ ボレレミ工業団地の輸出状況と課題

	▪ ハワサ工業団地の輸出状況と課題 ▪ その他工業団地の輸出状況と課題 ▪ 工業団地の横断的な課題 ▪ 課題改善のためのアプローチ案 ▪ 提言： *工業団地の運営改善、労働者の待遇とイメージ改善、材料の輸入代替、過剰な工業団地開発の抑制、企業に対する誘致先選定権限の付与*
6.成果品	報告書
7.活動状況	特になし
8.特記事項	特になし

2.3 ボレレミ工業団地における One Stop Service（OSS）の運営支援

第 2 フェーズの開始当初、EIPP は BLIP の運営管理状況、特に入居企業へのサービス提供状況について、同工業団地に常駐する IPDC マネージャーに確認した。その結果、BLIP は入居企業が抱える問題を迅速に対応するべく各機関担当者と緊密に連携しているが、報告・指示系統や連絡手段が体系的ではなく個人ベースでのやり取りに留まっていることが判明した。

2020 年 6 月に OSS の実施状況を再度確認したが、BLIP II では開発の進捗に鑑み本格稼働には時間がかかることが予想された。これらの結果を踏まえ、「Report On Fact-Finding Survey on OSS Service Providers at BLIP」を作成し、2022 年 1 月、EIC に提出した（別添資料 2-15 参照）。

1.業務の名称	Current Status Evaluation of One-Stop Shop Service at Bole Lemi Industrial Park
2.対象 C/P 機関	JICA-EIPP and EIC
3.活動期間	2021 年 11 月から 2022 年 1 月まで
4.活動目的	第 1 フェーズの支援も含め、ボレレミ工業団地における One Stop Service（OSS）の現状確認および評価を実施した。
5.調査・提言内容	▪ ボレレミ工業団地における OSS サービス実施状況 ▪ 管理棟設計と BLIP II マスタープランの実施に関する事業評価
6.成果品	調査・評価レポート
7.活動状況	特になし
8.特記事項	特になし

2.4 プログレスレポート、ファイナルレポートの作成・提出

プログレスレポートを作成し、JICA の確認を得た上で、2020 年 1 月、IPDC に提出した。これについては、2020 年 3 月に IPDC に対し第 1 回 JCC を実施する予定であったが、コロナの感染拡大を受け、同月 3 月に日本人団員が急遽帰国することになったため、JCC 開催は無期限延期となった。

上記プログレスレポートの提出から 1 年後の 2021 年 1 月に、その間の活動実績を追記した形で、プログレスレポート（改訂版）を作成し、JICA の確認を得た上で、IPDC および、この間支援業務を再開した EIC に提出した。

C/P への最後の報告書として、2022 年 4 月にファイナルレポートを作成し、JICA の確認を得た後最終化した（別添資料 2-16）。C/P の提出先については、2021 年 1 月以降、対 IPDC 支援が中断されたことから、本報告書は EIC に対してのみ提出された。

2.5 JCC の実施（2022 年 5 月）

本プロジェクト終了直前の 2022 年 5 月 18 日に、JCC を実施した（プレゼンテーション資料は別添資料 2-17 参照）。出席した EIC 副長官（工業団地担当）のコメント要旨は、以下のとおり（議事録は別添資料 1-4 を参照）。

【第 2 フェーズについて】

- EIPP による支援に感謝する。特に第 2 フェーズでは、自分が管轄する工業団地部署職員が、EIPP の日本人専門家とはオンラインで、ナショナルスタッフとは対面で緊密に連携を図り、かつフォローアップを行ってきた。
- 輸出ギャップ（目標値／実績値）及び工業団地規制枠組みで特定された課題と、それへの対応策に関する EIPP の提言は有益であった。
- 工業団地の規制監督機関である EIC としては、入居企業へのフォローアップを行いつつ、規制業務を進めていく。

【JICA による対 EIC 支援ニーズについて】

- 今後も JICA 支援・連携を希望する。主な支援ニーズは以下の通り。
- 投資促進：多くの国でコロナ禍に伴う渡航制限が解除されている中、EIC は 2022-23 年度目標として積極的な外国投資誘致を掲げており [1]、この分野での JICA 支援・連携を期待する。
- 能力強化： EIC 職員への能力強化が必要であり、この分野における JICA 支援を期待する。
- EIC のデジタル化：現状は紙ベースでありデータが散在している状況であるため、全ての投資関連情報をデジタル化・一元化する必要がある。

[1] JCC 後に表敬訪問した別の EIC 副長官（投資促進担当）の発言では、2023 年度（9 月まで）に 60 米億ドルの誘致目標が課されているとのことである。

3. プロジェクト実施上の課題

本プロジェクトの実施に際しては、次のような背景のもと以下課題が挙げられる。

3.1 EIC 向け業務実施上の課題

1. EIC の本邦支援スキームに対する受け入れ体制

   業務量に対する職員数が圧倒的に少なく、かつ頻繁に担当職員が変更されることから、打合せ時間の確保や調査成果に対するコメントなどの対応が非常に困難な状況にある。そのため、C/P 職員のキャパシティ・ビルディングを含めた技術支援を受け入れられる状況にない。

   更に、執務室に関しても事務所スペースが限定されていることから、EIPP は C/P の建物外に事務所を借りて作業を行っている。そのため、C/P の隙間時間の確保や直前のスケジュール確認に困難を極めた。

2. EIC の業務取組み姿勢

   EICの最重要責務として「FDIの誘致」があげられる。そのため、本プロジェクト開始当初の第 1 フェーズでは、投資環境整備（営業資料やニュースレター作成、エチオピアでの事業・起業立ち上げに係る手続きの提示や必要提出書類様式へのアクセス簡素化など）およびプロモーション活動（セミナー開催、本邦企業との直接面談など）の支援を実施してきた。

   コロナ禍で支援を再開した際には、第 1 フェーズの支援とは異なり、輸出ギャップ調査や既存の製造業への規制枠組みに関する支援が要請された。前者については、EICを含めた今後のエチオピア政府としての「FDIの誘致」対策を検討するために必要な事項となるが、後者の規制枠組みに関しては、定期的なモニタリングへの対応も含めて、企業にとっては負担・締め付けとなることが懸念される。EIC の責務は FDI 誘致に向けた投資環境整備と、誘致した FDI の規制であるが、コロナ禍や国内治安情勢の悪化、更には AGOA からの排除など、FDI 誘致に必ずしも最善の環境とは言えない状況下では、まず FDI 誘致に向けた取り組みに注力し、一定の誘致が実現しある程度の操業期間を経た時点で、具体的な規制の取り組みを検討・実施することが重要と思料する。

3. EIC の組織としての権限の限界

   本プロジェクトが支援してきた中で、EICが自らの責務を遂行するのに、EIC単独では対応し得ない事項が多くみられた。例えば、FDI の誘致促進において交渉材料として使われる優遇措置については、多くの国では、特に大企業や戦略的な企業に対して個別の交渉を行うケースが一般的だが、EIC は優遇措置を決められる立場にないため、事業進出を検討している企業と面談しても既存の優遇措置を伝えるメッセンジャーでしかならない。そのため、関心のある企業を誘致できる好機にもかかわらず、誘致に関する実質的な「交渉」を行うことができない状況にある。また、OSS の実施においても税関、銀行、各種インフラ事業者などとの連携が必要となるが、関係機関に対して OSS への参画を指示できる立場にないなど、彼らが与えられた役割と得ている権限とのギャップがある。

   上記 2.5 でも記載の通り、2022 年 5 月の JCC で EIC 副長官から具体的な企業誘致支援が求められ、更に、他の EIC 副長官からも、2023 エチオピア会計年度中（9

月まで）に 60 億ドルの誘致目標が課せられていることから、具体的な投資案件を用いた支援が日本を含めた他ドナーにも求められている。このことから、EIC としても、優遇措置など誘致に関する具体的な交渉を通して、エチオピア政府関連機関との調整を図っていくことが実質的と考えているものと思料する。

4. コロナ禍における遠隔業務

長く続いた日本人専門家の渡航制限により、EIC 関係者への協議調整に時間を要する場面が多く発生した。輸出ギャップ分析、工業団地の規制枠組み、いずれも共通して、業務進捗の報告や提言を含む報告書の内容確認・コメント取り付けを行う度に時間を要し、度重なる作業計画の見直しを強いられた。打合せに関しても度々延期されるなど、EIC 担当職員が多忙を極めていることも本業務の効率を引き下げている要因となっている

また、2021 年 8 月に EIC から追加の支援要請がなされたことから、EIPP 内で検討した回答案を 9 月 11 日に JICA に提出し、同月 22 日に本部・事務所関係者と協議した。その結果を EIC に説明しようとオンライン会議を設定したが、EIC 側の都合による直前の日程変更や国内治安情勢の悪化による JICA 関係者の国外退避もあり、調整に時間を要した。最終的に 11 月 9 日に会議が実現し、EIC 副長官（工業団地担当）などに説明することができた（議事録については別添資料 1-5 参照；同回答案は同月の活動報告書に添付して提出済み）。

3.2 IPDC 向け業務実施上の課題

1. IPDC 新社長就任後の支援要請方針の変更

第 2 フェーズ開始初期は、EIPP の業務は対 IPDC 支援に集中していたが、2020 年 7 月に IPDC 新社長が就任されたことにより支援の要請方針が見直された、8 月 11 日に IPDC、JICA および EIPP 間でオンライン会議を行い、EIPP が引き続き IPDC 支援を行っていくことで合意した。その上で、IPDC より、まず EIPP が支援可能な分野を提示してほしいという要請があったことから、支援可能分野をリストにして IPDC に提出した。

しかしその後、IPDC 新社長の方針転換により、技術支援ではなく、IPDC 直営の現地要員派遣支援に移行された。新社長就任後間もなく、IPDC 事業の方向性を検討する目的で業務移行チームが結成され、そのチームに EIPP の現地傭人を出向させるよう要請があった。JICA の技術支援スキーム上、人的資源支援を行う他の開発パートナーとは異なり、C/P に対する成果品の品質管理は EIPP の責任の下で行ってきた。その観点から、EIPP の現地傭人を IPDC に出向させることは担当業務、責任範囲、品質管理の実施が困難であり、その点を IPDC 側にも説明した（議事録については別添資料 1-6 参照）。その後、2021 年 1 月 26 日に IPDC から JICA に対し、協力案件を解消する旨通達があった。その結果、EIPP は IPDC 内のオフィスを退去し、新たにプロジェクトオフィスを設置して引き続き業務を行った。

2. EIPP 支援に対する IPDC 内の意見の相違

公社である IPDC は、工業団地開発・運営事業を持続するために、収益性の追求が求められており、工業団地開発に費やした莫大な投資（ローン）を回収しなければならない。コロナ禍で入居製造業の運営が問題に直面した状況下で、特に入居率の高いボレレミ工業団地の国内企業に対する現状調査と、IPDC が取り得る企業支援方針の検討業務が、IPDC 支援の撤収後に副社長より要請され対応した。現

場レベルでは、EIPP が IPDC の課題を事前に提示し、そのための解決策を提案してきたことが評価され、将来的に EIPP による支援を受けたい意向はあるものの、新社長の方針により、表立った対応が困難な状況にある。

3.3 新型コロナウイルスの世界的感染拡大によるプロジェクト実施への影響と課題

2020 年初頭に発生した新型コロナウイルスの世界的感染拡大を受け、同年 3 月、JICA は事業関係者による渡航見合わせを発表した。これ以降、現地傭人と連絡を取りつつ遠隔にて業務を行ってきた。コロナ禍で全体の活動計画にも影響を与える可能性があったことから、状況を注視し問題などが発生した場合は JICA や C/P と協議しながら柔軟に対応することが求められた。また別の課題として、遠隔事業における各関係者とのコミュニケーションがあった。MS-Teams や zoom などのオンライン会議ツールやメール、Skype、Telegram などを活用しコミュニケーションの促進を図っているものの、特に微細かつ技術的な事項などについての議論は、対面ほど容易ではなかった。これについては、現場で C/P と調整・フォローアップを行う現地傭人の役割が極めて重要であった。2021 年 1 月に渡航制限は解除されたものの、3.4 で後述する通り、国内の治安情勢悪化に伴う渡航見合わせもあったことから、遠隔事業に関連した上記課題は引き続き存続した。

3.4 治安によるプロジェクト実施への影響と課題

上記 3.3 で述べた新型コロナウイルスの世界的感染拡大に加え、国内の治安情勢も日本人専門家の渡航計画に影響を与えた。総選挙実施に伴い 2021 年 5 月 5 日から 7 月 21 日まで、そしてティグライ州の治安悪化に端を発した国内全土の緊急事態宣言発令により、2021 年 11 月から 2022 年 2 月上旬までエチオピア渡航が見合わせとなった。JICA とエチオピア関係機関との間で締結された協議議事録（R/D）によれば、プロジェクトの活動は当初 2022 年 1 月までとされていた。しかし、2021 年 11 月 2 日に全ての JICA 関係者がエチオピアを退避した後、延長に関する EIC-JICA 間の協議設定は困難を極めた。この間、JICA 本部およびエチオピア事務所とのオンライン協議を行った結果、R/D が延長されず日本人専門家による渡航が実現しなかった場合も、遠隔にて進行中の活動を完了するため、本案件の履行期間が 2022 年 6 月まで延長された。なおその後、2022 年 2 月に JICA 事業関係者による渡航が再開され、翌 3 月中旬に R/D 延長に係るミニッツが締結されたことから、プロジェクト期間中の日本人専門家による渡航が可能となった。

4. 本業務を実施する上での工夫・教訓

4.1 新型コロナウイルスの世界的感染拡大および緊急事態宣言下における遠隔業務

エチオピア国内の新型コロナウイルス感染拡大、更にティグライ地域における治安情勢悪化による緊急事態宣言を受け、約2年2ヶ月の間、現地への渡航が出来ない状態が続いた。渡航再開の時期も想定できず、早い段階から遠隔業務を念頭に以下の対応を実施した：

1. 現地傭人によるC/P機関への対応
   - C/P機関とも良好な関係を構築している現地傭人をC/Pとの連絡窓口としてアサインすることで、遠隔業務下でも、C/Pおよび現地傭人とのコミュニケーションを円滑にすることを可能にした。
   - 第1フェーズから本プロジェクトに参加している現地傭人を引き続き雇用することで、業務内容も熟知し、かつC/Pとの関係も既に構築していることから、遠隔での現地調査を可能にした。
2. オンライン環境の整備による密な連絡と遠隔業務によるコミュニケーションロスの軽減
   - C/P事務所のインターネット通信環境が貧弱かつコロナ禍で事務所の「密」を緩和するため、シフトによる在宅勤務を推進した。また、必要台数のルーターを導入し、オンラインによる業務を可能とした。
   - コミュニケーションツールとして会議用（zoom、MS-Teams）と通話用（Skype、Telegram）の目的別で導入し、状況に合わせたコミュニケーションの促進とファイル共有による共同作業を可能とした。

なお、遠隔業務の実施に際し、日本とエチオピアの時差（6時間）は実質共同可能な時間は半日となることから必ずしもタイムリーでないこと、更に双方の説明が口頭によることで多くの時間を要することから、従来の現地作業と比較し、より多くの時間と労力が必要となった。

4.2 JICA事業関係者への関連情報共有および支援実施体制についての協議・調整

コロナ禍以前は、現場での状況確認やC/Pとの直接対話などを通じて彼らのニーズをくみ取り、それに対する支援内容や実施体制をJICAとの相談を踏まえて、柔軟な形で支援を実施してきた。しかし、コロナ禍での影響が刻々と変わる状況下で、かつ調査団が長期に渡り現場入りすることができなかったことから、現場の状況を判断するのに困難を極めた。それに対し、特にC/Pの現状およびニーズの先読みに必要となるエチオピアの世情、主に経済、工業・製造業、外国投資、政府動向に関して、現地傭人を通じた現地報道の取りまとめを行い、リアルタイムでの現場の状況把握に努めるとともに、JICA事業関係者にも週毎に共有した。また、状況の変化に応じた支援内容や実施体制の見直しが頻繁に発生したため、それらにタイムリーかつ柔軟に対応できるよう、JICA（本部／エチオピア事務所）への報告・相談を適宜行った。これら対応の見直しについては、以下、5回の変更契約に係る打合簿を交わし、JICAと合意の上で業務に当たった。

(1) 2020年3月31日付打合簿

- 2020年4～9月までの現地業務1.9MMを国内業務に振替え（経費変更なし）。

(2) 2020年8月11日付打合簿

- 上記 2020 年 4～9 月の現地業務から国内業務への振替について、業務効率性を補完するため、国内振替分 1.9MM の約 2 割に該当する 0.4MM を追加。
- 本案件の終了履行期限を、2021 年 6 月 30 日から 2022 年 3 月 31 日に延長。

(3) 2021年2月1日付打合簿

- IPDC より供与されていたオフィススペースの縮小に伴い、コロナ対策のためのオフィススペースを新たに確保。

(4) 2021年7月7日付打合簿

- 現地渡航の見直しに伴い、現地渡航 2 回を削減。
- 2021 年 7～8 月までの現地業務 0.8MM を国内業務に振替えるとともに、国内業務振替に伴う業務効率性の低下を補完するため、約 2 割に該当する 0.2MM を追加。

(5) 2021年10月29日付打合簿

- 2020年11月～2022年3月までの言質業務 2.0MM を国内業務に振替え

本プロジェクトは 2017 年から第 1 フェーズが開始されて以降、支援・業務内容に関しても 2019 年に見直され、その後も状況に合わせて打合簿・変更契約にて臨機応変に対応したものの、コロナ禍および国内外の紛争などによって海外投資や製造業が置かれる環境が大きく変動したことにより、本報告書時点では支援・業務内容自体が調整可能な状況ではなくなった。このような状況下で、調査団および JICA（本部・エチオピア事務所）双方が C/P との打合せ・協議時間を得ることができず、以降の支援の進め方に関しての打合せ・協議ができなかった。
上述 3.1 の「3. EIC の組織としての権限の限界」で述べた通り、EIC からの要望に即して、具体的な投資案件を用いた支援を日本が行った場合、誘致目標を課せられた EIC としても、協議・交渉のための時間を優先的に確保するものと思料する。

5. 結論および提言

5.1 エチオピアの工業化・産業振興に関わる課題

エチオピア国が抱える課題、主だったコロナ禍およびウクライナ・ロシア紛争による経済影響を以下に記す。

1. エチオピア国内の課題
   - 物流：内陸国であることによる時間・料金のデメリット、AGOA からの排除による対米貿易の大幅減
   - 外貨：保有規制
   - インフラ：脆弱な電力・水道・インターネット
2. コロナ禍による影響
   - 市場ニーズの変化：商業・大型消費から個人・小口消費への転換
   - 物流：ニーズ急増に対する担い手不足などによる輸送時間の増加および所要時間の不確実性
3. ウクライナ・ロシア紛争による影響
   - 原材料価格：天然ガス・燃料、レアメタル、小麦などの急騰

このような状況下で、物流が大きく影響する輸出志向型 FDI 製造業の誘致を重視したエチオピアの産業振興政策は、上記課題に対応しておらず、同国の工業化・産業振興に対して重い足枷となっている。

5.2 今後の支援のあり方

上記 3.1「3. EIC の組織としての権限の限界」でも記載の通り、2022 年 5 月の JCC で、EIC から具体的な企業誘致支援が求められた。一方、短・中期では本邦企業の誘致は望めないことから、特にエチオピアが直面している「外貨および物流課題」を念頭に、今後 JICA および日本政府が支援を行う場合の検討事項として、以下 3 点が挙げられる。

1. 現状、製造業は主に国外から原材料を調達することから、外貨保有は非常に重要な問題である。外貨規制が厳しい状況下では、内貨での調達を通じて、外貨支出の削減に寄与する「国内資源の活用」への積極的な対応が必要となる。
2. 現在のエチオピアの産業政策は輸出志向型であるため、特に内陸国であるエチオピアにとっては物流の問題が原材料調達と製品の輸出に大きく影響する。そのため、比較的物流の影響を受けにくい「地産地消」を、FDI を含めて推奨する必要がある。
3. FDI 誘致が困難な状況下では、産業・経済を持続させるためにも、国内外問わず「国内市場向けの産業育成」が急務となる。

上記および EIC が強く望まれている「具体的な FDI 誘致支援」を鑑み、現状 FDI にとってリスクが高い「直接投資（例：工場設営など）」だけではなく、以下の「フランチャイズ（例：現地企業への技術提供など）」が現実的だと思料する。

1. 地元企業に対する（本邦）製造機器導入のための融資支援ならびに同機材を活用したキャパシティ・ビルディング

- エチオピア側の課題：国内産業育成支援の枠組みと体制
- 日本側の課題：地元企業に対する日本政府による直接融資支援の可否、それに伴うキャパ・ビル（技プロ）の実施可否

2. 製造業のフランチャイズ契約
   - エチオピア側の課題：外貨規制緩和を含めた、非居住者企業に対するオフショア契約の可否
   - 日本側の課題：上記エチオピア側の課題解決に向けた必要関連政策および法案の整備支援の可否

上記 FDI による「技術提供」の実施に関しては、具体的に機器の販売・フランチャイズ事業参画を希望する（本邦）企業を特定し、官民連携で進めることで、事業の実現と持続性を可能とする。なお、（本邦）企業の特定に関しては、JETRO との連携（ビジネスマッチングなど）が必須である。

一方、2022 年 5 月の JCC でも EIC から支援要請を受けた、同機関の業務全体に関わるデジタル化については、「産業振興プロジェクト」と異なる目的であるため、本要請への対応については、別の枠組みでの検討が必要と思われる。

6. 別添資料

1. 議事録

- 1-1: Online meeting with IPDC (CEO, Special Advisor to CEO) and JICA (HQ/Ethiopia Office)
- 1-2: Online meeting with EIC (Deputy Commissioner, Principal Advisor of Commissioner, Chief of Staff) and JICA (HQ/Ethiopia Office)
- 1-3: Online meeting with EIC (Commissioner, Principal Advisor to Commissioner, Chief of Staff), JICA (HQ/Ethiopia Office) and Policy Dialogue Project
- 1-4: JCC meeting with EIC
- 1-5: Online meeting with EIC (Deputy Commissioner, Chief of Staff)
- 1-6: Online meeting with IPDC (Chief of Staff)

2. その他

- 2-1: Mixed Residential Area Design Guideline for Bole Lemi Smart Industrial City
- 2-2: Green-Smart Building
- 2-3: ICT Park Development Guideline
- 2-4: To Transfer E-waste Management Facility from CRTC to IPDC
- 2-5: The Role of the ICT Park in Digital Transformation Strategic Framework and Implementation Roadmap
- 2-6: Industrial Park Oriented Entertainment Center
- 2-7: “Welosefer” High-density Mixed-Use Building Project, A Technical Proposal
- 2-8: Center of Excellence for Eco Industrial Development
- 2-9: Road-Map to Set-up Center of Excellence
- 2-10: Local Companies: Challenges and Supporting Framework for The Industrial Parks
- 2-11: Preliminary Study on Suitable Site Identification for Logistics Parks
- 2-12: ICT Park Land and Property Valuation
- 2-13: Regulatory Framework for Industrial Parks
- 2-14: Report on Export Gap Analysis
- 2-15: Report on Fact-Finding Survey on OSS Service Providers at BLIP
- 2-16: Final Report
- 2-17: JCC Presentation Material

Meeting Information		
Subject	Discussion on the way forward of JICA support to IPDC	
Date and Time	11 August 2020 on 08:00 AM – 9:30 AM	
Venue	MS-Team on-line meeting	
Material	N/A	
Attendant	IPDC	Mr. Sandokan Debebe (CEO) Dr. Ewnetu Tamene (Special Advisor of the CEO of IPDC)
	JICA HQ	Mr. Toru Homma Mr. Kenji Ishizuka Ms. Rika Karikomi
	JICA-ET	Mr. Takeshi Matsuyama Mr. Hiroyuki Amaya
	EIPP - JICA Project Team	Mr. Teddy Masanori Ms. Kazuyo Kaneko Mr. Minoru Nagai Mr. Yutaka Taniguchi Ms. Tsion Lemawossen Ms. Bezawit Yohannes

Discussion points

1. Introduction between IPDC and JICA

- Mr. Sandokan made an opening remark and introducing IPDC participant, and thank the support that has been done for the past 3 years.
- Ms. Kaneko introduces from the JICA and EIPP side.
- Mr. Matsuyama apology for the delay start due to technical problem, and made an opening remark.

2. IPDC Requests

Mr. Sandokan and Dr. Ewnetu explained the supports that IPDC is looking for more practical support.

- JICA support needs to be one-step-ahead than current support: e.g. research study and developing documents.
- IPDC also needs support for the environmental management issues.
- On the community rehabilitation, IPDC needs a study on value-chain how to integrate the community to the IP's as a manpower, and share the experience of Japan or other developed countries.
- IPDC wants to see JICA's support at the corporate level. Since currently IPDC is suffering from COVID-19 and still has many problems in each park JICA's support is important.
- On the IP's investment promotion; to attract Japanese investors specifically on the IPs.
- On the ICT infrastructures for the office use.
- On the modernizing office setup and improving service and operation which is including making IPDC paperless corporation.

3. Discussion on the support of JICA to IPDC

- JICA's supports are multi-sectoral in Ethiopia like the agriculture sector, water, and

sanitation sector, and others.

- On the awareness creation for COVID-19, JICA supports to rural agricultural area by providing training.
- In the agriculture area, JICA is under discussion on nutrition projects to promote nutrition for the community resident through the agriculture extension office.
- IPDC prefers that support in response to COVID-19 should be apart from awareness creation.
- IPDC wants to change the JICA support approach, which is in both financial, technical, and supports in-kind way.
- IPDC has several environmentally-friendly IPs but they are still facing different problems in solid and liquid waste management system which needs technological, technical, and financial support.
- As per JICA's support scheme and modality, it is appreciated to change financial support requests in human capital or in-kind supports.
- There are several studies conducted by the EIPP team and at-least JICA requires to directly support the implementation of those 3 or 4 projects.
- JICA needs more information from IPDC on the area of its needs to decide which supports can be provided or not.
- From the IPDC side, Dr. Ewnetu will be the contact person from now on to JICA.
- IPDC will prepare the proposal which has the prior areas of support and will share with EIPP soon.

(End of Document)

Meeting Information		
Subject	Discussion on the possible technical support of JICA to EIC	
Date and Time	4 August, 2020 on 10:00 AM – 11:15 AM	
Venue	MS-Team virtual meeting	
Material	N/A	
Attendant	EIC	Mr. Daniel Teressa (D/Commissioner) Mr. Bruck Teshome (Principal Advisor of the Commissioner) Ms. Tsion Kifle (Chief of Staff to the Commissioner)
	JICA HQ	Mr. Katai Mr. Homma Mr. Ishizuka Ms. Karikomi Ms. Uehara
	JICA-ET	Mr. Matsuyama Mr. Amaya
	EIPP - JICA Project Team	Mr. Teddy Ms. Kaneko Mr. Taniguchi Ms. Tsion Lemawossen Ms. Bezawit Yohannes

Discussion points

1. Introduction between EIC and JICA

- Mr. Daniel made an opening remark and introducing EIC participant.
- Ms. Kazuyo Kaneko introduce from the JICA side.
- Mr. Bruck from EIC mentioned the EIPP project and the collaboration with EIC before COVID-19.

2. EIC Requests

- Mr. Daniel explained the supports that EIC is looking for;
  - On the regulation framework,
  - On the export gap in the Industrial Parks (IPs); since the country is not getting what it needs from the IPs export and need to made analysis on that, and
  - Investment promotion; to attract Japanese investors.

3. Discussion on the possible technical support of JICA to EIC

- EIC needs policy assessments on the export performance of the IP's for both public and private.
- Regarding the framework as regulating body EIC has mandate to regulate all the performances and tenants in the IPs.
- Regarding export, job creation and regulating all the performance of companies are under EIC and there is no any mandate issue this time between IPDC and EIC.
- EIC expects the number of IPs to grow double in the next year as more of the parks become operational and there will be more private IPs. So the commission as a regulator wants to increase its capacity in how to regulate the IPs.

- EIC needs JICA's support on the preparation of IP regulation framework, capacity building and creating experience sharing platforms.
- Regarding the export performance, EIC keen JICA's support in assessing and identifying challenges in IP export in order to increase the export amount from the parks. It will assist the companies to be able to export more and to ensure the country's economy.
- It is important to consider the impact of COVID-19 case in the economy and export performance of individual firms in the IPs.
- EIC Investment Promotion and Policy Research Division needs support to attract Japanese potential investments that have been in the pipeline, and also to integrate already active companies on the ground in automotive sector, garment and textile.
- In addition, EIC wants to continue engaging in the automotive sector and they welcome any policy dialogue tools.

(End of Document)

Minutes of Meeting		
Subject	Discussion on EIC×JICA (Policy Dialogue and EIPP)	
Date and Time	Wednesday, 11 November, 2020 at 11:00-12:00 (ET) / 17:00-18:00 (JP)	
Venue	MS-Team virtual meeting	
Material	N/A	
Attendant	EIC	Ms. Lelise Neme (Commissioner) Mr. Bruck Teshome (Principal Advisor to the Commissioner) Mr. Ewnetu Hailu (Chief of Staff to the Commissioner)
	Policy Dialogue Team	Prof. Kenichi Ohno Prof. Izumi Ohno Ms. Sayoko Uesu Ms. Mieko Iizuka
	JICA HQ	Mr. Keiji Katai Mr. Kenji Ishizuka Mr. Toru Homma Ms. Rika Karikomi Ms. Misako Uehara
	JICA-ET	Mr. Takeshi Matsuyama Mr. Hiroyuki Amaya
	EIPP Team	Mr. Teddy Masanori Ms. Kazuyo Kaneko Mr. Yutaka Taniguchi Ms. Tsion Lemawossen Ms. Bezawit Yohannes

Discussion points

Policy Dialogue team

- The policy dialogue team is in the middle of preparing FDI policy report and would like to review Ethiopia's FDI policy and performance. So, the teams need EIC's comments, information and data.
- First draft of the report is ready and the team plans to finalize it next year.
- This research with PSI was reported to PDC (Planning and Development Commission) and the Commissioner is willing to create a platform to disseminate the research and would like to have EIC's involvement.
- On the issue of automobile assembly, if it is policy matter the policy dialogue team will handle it, and EIPP team can take care of the issues on attraction to industrial parks.
- The policy dialogue team has been working on the possibility of inviting Japanese automobile assembler. The main challenges of Japanese automobile assemblers on investment in Ethiopia are foreign exchange, current small demand, and the fact that incentive structure is not quite right.
- In fact, the government is now in good direction in terms of tax incentives and used car restriction.

- The policy dialogue team, Japanese embassy, JICA and JETRO are not only interested to work in automobile sector but also garment, food processing, flower, mechanical industries, heavy industries and telecom sector.
- Japan also wants to contribute to the concrete issues and targets of 10-year plan specially the manufacturing production area, and would like to interact with the microeconomic team at Prime Minister's office.

EIC

- Regarding policy dialogue, FDI research is very crucial and timely.
- Regarding the question raised about the current FDI environment, the time is not ideal for FDI flow. Situations related to the pandemic affects negatively of the ones in the IPs. Generally speaking, FDI flow will not be robust, particularly for light manufacturing sector.
- The construction sector relatively attracts more investment.
- For telecom, liberalization and privatization would happen within this financial year and expect to optimize FDI flow in this sector.
- Asking for the response of JICA to the support requests from EIC.

JICA

- JICA is willing to work with EIC on the received requests of regulatory work, export gap analysis, and most of works requested by EIC.

(End of Document)

Ethiopian Investment Promotion Project
Joint Coordination Committee
May 2022

Minutes of Meeting		
Subject	Joint Coordinating Committee (JCC) meeting	
Date and Time	Wednesday, 18 May 2022, 9:00 -10:00	
Venue	EIC meeting room and MS-Teams	
Material	PPT	
Attendees	EIC	Mr. Daniel Teressa, D/Commisioner (IP Devision) Mr. Mebrahtom Gebreyesus, Chief of Staff Mr. Dejene Kuru, Chief of Staff
	JICA Ethiopia	Dr. Katsuki Morihara, Chief Representative Ms. Megumi Hirose, Senior Representative (via MS-Teams) Ms. Mai Toguchi, Representative Ms. Sakiko Kurosaka, Project Formulation Advisor Mr. Gebeyehu Tuji, Programme Officer
	JICA HQ (via MS-Teams)	Mr. Keiji Ishigame, Director, Private Sector Development Group Mr. Naoto Mukai, Private Sector Development Group Ms. Rika Karikomi, Private Sector Development Group Mr. Toru Homma, Senior Advisor (Private Sector Development: Investment, Trade & Industry)
	Policy Dialogue Team (via MS-Teams)	Prof. Kenichi Ohno Prof. Izumi Ohno Ms. Sayoko Uesu Ms. Mieko Iizuka Ms. Yumi Iwata
	Export Promotion Team (via MS-Teams)	Mr. Noriyuki Nagai
	EIPP team	Mr. Teddy Masanori, Project Team Leader Ms. Kazuyo Kaneko, Sub-Team Leader Mr. Nagai Minoru, International team Ms. Tsion Lemawossen, National Staff Mr. Abiye Girma, National Staff

Discussion Points

1. Opening Remarks by Mr. Daniel Teressa, Deputy Commissioner (IP Division), EIC

2. Presentation made by Mr. Teddy Masanori, EIPP Project Leader, on the project activities between October 2019 and May 2022

3. Comments, Questions and Answers

[Mr. Daniel Teressa, EIC Deputy Commissioner]

- EIC appreciates efforts made by the JICA-EIPP team and collaboration on the tasks that have been conducted during the Phase 2 of the project.
- Presentation on the assessment of Export Gap Analysis was very informative. And EIC, specially the IP Division team was closely working and following up with the Japanese technical team virtually and also with the national team in person.
- Both IP Regulatory Framework and Export Gap Analysis clearly indicate gaps and challenges with essential recommendations to address the problems.
- EIC is interested to work on the regulatory works with close follow-up of enterprises and industrial parks, since the Commission is in charge of regulatory activities to achieve the government's expectation to attract Foreign Direct Investment (FDI).

[Mr. Mebrehatom Gebreyesus, Chief of Staff, EIC]

- EIC appreciates engagements and supports given by JICA-EIPP on IP Regulatory Framework and Export Gap Analysis.
- In both documents, EIPP clearly stated the way forwards, particularly on what is expected from EIC, IPDC and other stakeholders to solve the problems that were identified by the study.
- As a development partner, I wonder if there are any specific other tasks to engage with EIC. Several months before, for example, EIC forwarded to EIPP a ToR regarding areas of collaboration and support needed with some detail activities. I would like to know if there is any chance to get support on these issues, and as JICA what EIC can expect for further collaborations.
- EIC is also looking for support on investment promotion as well as other activities.

[Mr. Teddy Masanori]

- Last August EIPP received a list of task requests from EIC, especially on the digitalization within EIC. However, EIPP team is more specialized in industrialization, and for this reason the EIPP team could not give directly answers to EIC.
- In addition to the fact that the remaining period of EIPP project is limited, the areas of requested tasks are different from the EIPP's specialization.
- Investment promotion is very crucial now especially for Ethiopia. During the Phase 1, EIPP provided such kind of support to EIC, by taking Mr. Temesgen and the former Deputy Commissioner (Mr. Teka) to Japan for conducting seminars, etc. But this time because of COVID-19, it is still difficult to conduct a seminar and Japanese companies are also not very willing to travel for business opportunities.

[Mr. Daniel Teressa]

- As Mr. Mebrhatom mentioned, there are some areas of EIC's interest for collaboration. Since I joined EIC, I have been working with JICA-EIPP team on the two studies, but EIC has many gaps and challenges, and is expecting support from JICA.
- One of the areas EIC needs support is investment promotion. In most of the countries COVID-related restrictions have been lifted, and in 2022-2023 EIC is highly and aggressively looking for foreign direct investors. For this purpose, EIC expects support from and collaboration with JICA on investment promotion in general.
- I remember that EIC has submitted ToR sometime last year with areas of collaboration. Perhaps this time was very tough because of COVID-19, etc. Now we are aggressively engaged in investment promotion to attract foreign direct investors. There are some challenges like AGOA, but the government is committed to addressing these challenges. Yet it is not possible for the government to address such challenges alone, without Japan and other development partners. We have some partners working to address the gap but also need support from JICA.
- Second area EIC needs support is capacity building. I know JICA is good at capacity building, in fact my first travel to Japan was organized by JICA in 2014. JICA may

help EIC on capacity building as there is a gap in human resource development.

- Another area for support is data management and automation of EIC's works; it was also included in the ToR EIC submitted earlier. EIC has poor data management system; data system is scattered and paper-based, but all investment-related information should be digitalized and managed in proper manner.
- JICA-EIPP presented issues and challenges to be addressed during the studies, and recommended interventions are very important. But only the study is not enough to address such challenges to get what EIC needs. So JICA's support is highly needed.
- JICA may want to discuss internally and EIC is not looking for immediate responses to the above requested support areas, but hopefully we will discuss again after JICA comes back with responses. EIC's expectation for JICA is very high we are looking forward to work with JICA on these areas. We really appreciate support and collaboration with EIC. We have been discussing many things with JICA-EIPP team, so we hope collaboration and partnership with JICA will be strengthened by working the above areas.

[Mr. Teddy Masanori]

- We hope our country relationship with Ethiopia can be stronger, and EIPP thanks for support by EIC during the project period.
- EIPP's collaboration were more focused and based on study which is limited to the industrialization area.
- From the industrialization point of view, partnership between JICA-EIPP and IPDC was also very strong. It is not only for the study itself, but for example, on master plan in Bole Lemi, they started discussing with Addis Ababa city and agreed to develop the plan together as "Smart Industrial City". Also for ICT-Park, based on lease pricing proposed by JICA-EIPP, our national team members supported IPDC in explaining to the investors during the negotiation.
- EIPP understands that it is important to attract investors before industrialization, and it has to admit that this is limitation of EIPP's support.

[Dr. Katsuki Morihara, Chief Representative, JICA]

- Firstly, I would like to thank you all, particularly EIC, for taking time to participate this JCC meeting today.

- As explained by the Expert team, the Phase 2 of this project was nothing but the period of turbulence, so to speak, with many ups and downs experienced. As a result, the Japanese Expert team was able to conduct their activities on the ground with a quite limited period of time. Despite all the difficulties, however, so many activities were rigorously carried out during this period, and I would like to take this opportunity to thank EIC, IPDC and the Expert team for their commitments, efforts, patience and excellent work done.
- JICA traditionally embraces the concept of "self-help" and "ownership" of the counterpart of the country; these two philosophies are deeply rooted in Japan's own development experiences. We strongly believe that process of adaptation based on the strong country ownership is very important for any type of development in any country. In its cooperation program, JICA never takes the driver's seat, replaces or substitutes the counterpart's work, rather it supports efforts of the counterpart from behind the scene. For this reason, JICA does not usually provide pure financial support or labor force to our counterpart. And because of this, JICA was not able to responds to a request from IPDC, that is to provide manpower from JICA-EIPP to the Corporation.
- Another important feature of JICA's approach is the field-oriented approach; JICA values real actions and implementation on the ground, rather than just talking about policies or plans. JICA is always trying to bring about the real changes on the ground.
- Based on the above philosophies, JICA highly expects that EIC and IPDC digest and localize all the analysis and recommendations made during this project and put them into the real actions, with strong leadership.
- As the way forward, I feel very honored to know that EIC is strongly interested in working with JICA. It is difficult to provide immediate answer to EIC's requests, but I will take them as a homework and JICA will consider them internally.
- It should be noted that there is not much time left before the end of the project that is by the end of January 2023. We also have resource constraints for various reasons. It also needs to consider that external environment surrounding FDI has been drastically changing in the last couple of years. Given all these, we will consider

how JICA could respond to EIC's request.

- Lastly, I would like to thank EIC and IPDC for cooperation rendered to the implementation of this project in the last five years, and JICA is looking forward to continuing a dialogue on the way forward.

(End of Document)

On behalf of JICA:	On behalf of EIC:
Dr. Katsuki Morihara Chief Representative	Mr. Daniel Teressa Deputy Commissioner
	On behalf of EIPP: Mr. Teddy Masanori Team Leader

Minutes of Meeting		
Subject	EIPP's support to EIC	
Date and Time	Tuesday, 9 November, 2021 at 11:00-11:30 AM	
Venue	Ms-Teams	
Attendees	EIC	Mr. Daniel Teressa, D/Commissioner Mr. Mebrahtom Gebreyesus, Chief of Staff
	EIPP	Mr. Teddy Masanori, Project Team Leader Ms. Kazuyo Kaneko Mr. Minoru Nagai Ms. Chiaki Shibayama Ms. Tsion Lemawossen

Discussion Points

- **Greetings and introduction is made by both Teddy Masanori (EIPP team leader) and Daniel Teressa (EIC, IP division D/ Commissioner).**
- **Presentation on the intervention and the collaboration areas made by Kazuyo Kaneko.**
  - Explains the specific supports to EIC by JICA as per EIPP project period.

Comments

- Mr. Daniel thanks EIPP team for the presentation and detail explanation on the intervention areas.
- EIC will expects more additional engagements and support areas from JICA with the EIPP project period renewal.
- EIC will support EIPP team to finalize the ongoing tasks as per the project period.
- EIC hopes to hear good news from JICA on the requested new tasks with contract renewal.

(End of Document)

Response by JICA to EIC's Requests for Support

September 2021, EIPP

During the tripartite consultation on the above-captioned matter, JICA HQ, Ethiopia Office and EIPP confirmed the common understanding regarding current conditions and points for considerations, as described 1. and 2. Below.

1. Current conditions

- Project duration: under current project scope, activities will need to be completed by end of February 2022.
- Impact of COVID-19: FDI in Ethiopia slows down, less our work efficiency.

2. Points of consideration in response to support needs from EIC

（1）Whether EIPP or other JICA projects support is essential for EIC.

（2）Whether the activity can be completed within the current project duration (until February 2022).

（3）Whether the activities supported by EIPP are sustained after the completion of the project.

Based on the above, below is response by JICA, as indicated in 3. below.

3. Proposed response to EIC's request for EIPP support

Request from EIC	Response by JICA
1. Conducting Public and private IPs specific research area	
a. Study on the areas of multi-factor productivity in IPs	Another JICA project on policy dialogue has produced the document "Ethiopia Productivity Report", which can be shared with EIC. On this issue, the Policy Dialogue team is in the best position to address the needs of EIC.
b. Study on the role of IPs in import substitution	This item is already being addressed within the IP Regulatory Framework.
2. Delivering IT/ICT specific supports to EIC by JICA	
a. Developing skill and knowledge transfer monitoring system for IPs and IP enterprises	Please refer to responses to 2b) and 2c) below.
b. Automation of service of delivery system for IP enterprises	One possible area is to digitalize the questionnaires to be used as monitoring tool under the IP regulatory framework. However, this is not enough by itself since the ultimate goal would for EIC to monitor periodically through the digitalized system (e.g.

	guiding IP companies in entering data, extracting and analysing data, etc.). Since digitalized system is not established in EIC and its human resource is limited, it requires long-term support beyond EIPP's project period, to make such activities a routine operation.
c. Performance tracking system of IP enterprises	Although it is possible to analyze the trends over the years, it will take more than 2 years to collect necessary data, beyond EIPP's current project period.
3. Developing industrial parks regulation framework	This activity is currently implemented.
4. Capacity building tasks	
a. Delivering soft skill and/or hard skill training for IP experts and OSS experts	This area already covered by IPDC through Industrial Project Service (IPS), where EIPP also made a partial support on the building/training venue design.
b. Delivering soft skill/hard skill training for IP enterprise local staffs [especially the middle and/or top management levels]	Ethiopian Kaizen Institute (EKI) has also been providing local companies with Kaizen training programmes under other JICA project, including the courses for top/middle management level.
4. Employing embedded expert for whom tasks can be assigned by EIC. Detail follow up and work assignment is to be handled by EIC while remuneration and related aspects are to be handled by JICA.	Since technical assistance is JICA's mandate, it is regret that financial support to staff is out of JICA's scope.
5. IP Investment Promotion event : Hosting four annual [once in quarter] investment promotion events.	Implementing events four times per year seems too often considering the lengthy preparation. Under COVID-19, webinar would be more appropriate instead of gatherings, on which UNIDO is supporting EIC.

(End of Document)

Meeting Information		
Subject	Scope of support to IPDC	
Date and Time	Tuesday, 20 October 2020 at 12:00-12:30 (ET) / 18:00-18:30 (JP)	
Venue	MS-Team on-line meeting	
Material	N/A	
Attendant	IPDC	Mr. Addisu (Chief of staff)
	JICA HQ	Mr. Katai Kenji Mr. Kenji Ishizuka Mr. Uehara Misako Ms. Rika Karikomi
	JICA-ET	Mr. Takeshi Matsuyama Mr. Hiroyuki Amaya Mr. Masaki Wakai
	EIPP- JICA Project Team	Mr. Teddy Masanori Ms. Kazuyo Kaneko Mr. Yutaka Taniguchi Ms. Tsion Lemawossen Ms. Bezawit Yohannes
	EIPP-JICA National Team	Mr. Biruk Tilahun Mr. Getahun Habtamu

Discussion points

Introduction

- Mr. Teddy made the Introduction from the JICA side with Mr. Addisu.
- Mr. Katai explained about the received support request proposal from IPDC and reminded that JICA have sent a letter for the response.
- Mr. Katai clarified JICA's position that it can only provide support activities related to technical assistance, and the team would like to get a consensus with IPDC.

Mr. Addisu

- Mr. Addisu acknowledged JICA's support for IPDC in capacity building for the past years.
- The support from JICA has been technical so far and IPDC requested JICA to upgrade technical matter to in kind matter, but it is well understood that JICA could not provide such support.
- Since there are many other issues to cooperate, like the technical issues, IPDC will expect a proposal from the team on business development section and other possible support that can fulfill the gap in the cooperation.
- Once the proposal is received, IPDC will review, give a feedback and set directions on the way forward.

(End of Document)

Mixed Residential Area Design Guideline

For Bole Lemi Smart industrial city

EIPP-JICA

March, 2021

Acknowledgment

This The mixed Residential Design Guideline was prepared by an Ethiopian Industrial Parks Promotion/EIPP/, Japan International Cooperation Agency /JICA/ team, which composed of Ethiopian and Japanese Nationals. The EIPP-JICA team gratefully acknowledge IPDC various departments for their thorough comments. During the preparation of this Guideline, companies working in Bole Lemi-I were very helpful in providing relevant data. Thus, the EIPP-JICA team would like to express its gratefulness to all managers and workers of Bole Lemi Industrial Park-I for their support.

The following list shows participants of the EIPP-JICA team:

	EIPP Japanese Core Team	
1	Teddy Massanori	Leader / Investment Promotion / Business Environment Improvement 1
2	Akifumi Watanabe	Financial and Economic Analysis
3	Yutaka Taniguchi	Industrial Park Planning & Infrastructure development
4.	Kazuyo Kaneko	Sub-Leader / Investment Promotion / Business Environment Improvement 2
	EIPP Ethiopian Core Team	
1.	Biruk Tilahun	Urban Planner/ National Team Manager
2.	Abiye Girma	IT/ ICT/ DX Expert
3.	Amanuel Atlabachew	Urban/ Environmental Planner
4.	Daniel Tesfaw	Geographer/ Urban Developer and Manager
5.	Getahun Habtamu	Water Engineer/ Infrastructure Engineer
6.	Kinfe Abzo	Architect/ Urban Designer
7.	Tsion Lemawossen	Industrial Parks Promotion Master Planner/ Chief Engineer
	EIPP Supporting Staff	
1	Bezawit Yohannes	Industrial Park Promotion
2	Habtamu Dereje	Industrial Park Promotion
3	Zobra Ahmed	Industrial Park Promotion

Summary

Ethiopia is witnessing a phenomenal transformation in attracting industrial growth in light manufacturing sectors such as garment and apparel. Over the past decades Ethiopia's GDP rate has averaged an impressive 9.2 %[1], one of the highest in Africa. Despite recent political challenges in the country, industrial growth looks set to continue to strengthen, with the government planning to work on industrialization in the coming years.

The industrial park wave has the potential to create hundreds of thousands of jobs. Enticing workers to urban centers brings with it a complex set of issues like the availability of decent accommodation, infrastructure, safety and security. Inflationary urban living costs coupled with limited housing and poor infrastructure, have compounded the hardships of day-to-day life of workers in industrial parks.

The majority of workers in the already functioning parks are young rural inhabitants and particularly young women between the ages of 18 and 30. Housing for these workers who often move from rural areas to cities to is a critical issue; if not thought through properly, it has the potential to disrupt the government's industrialization strategy.

Already operational, Bole Lemi is Ethiopia's first industrial park developed by IPDC. It has an area of 275ha (Phase I, 99ha and Phase II,176 ha)[2]. When they become fully operational Bole Lemi Industrial Parks (I & II) will accommodate more than 87,000 workers, out of which close to 60% are in dire demand for accommodation. Housing for these workers will have to be provided at an affordable cost. Considering this and to alleviate the pressure on the workers and the local community, IPDC allocated **35.67** ha of land for residential area development.

To create a dynamic residential area which provide opportunity for all, there is a need to produce housing options that enable more people to feel welcome, secure, healthy, and happy. Mixed-residential developments, by accommodating low-income and high-income groups with commercial developments can help IPDC tackle the affordability predicament.

This document attempted to suggest a design guide that will inspire, encourage and support the creation of a sustainable and vibrant Mixed residential area. The guide sets out expectations for all involved in the process of planning, developing and monitoring the residential area. It also provides clear guidance and will be used to assess development applications.

[1](PDC, EFDR,2021)

[2] (IPDC, 2019)

The guideline strived to comply with all applicable legal ILO's requirements and Addis Abeba City guidelines and standards. The guideline will be used by developers, consultants, designers, contractors and the community. The Design Guideline will provide requirements and advices, for the common design issues that IPDC's planning department will face during pre-application, application and implementation discussions. The guideline will address the development at all scales, from the site level to individual building scale.

Contents

Acronyms

BLIP	Bole Lemi Industrial Park
BLSIC	Bole Lemi Smart Industrial City, which comprises Bole Lemi industrial Park I & II and the ICT park
EIPP	Ethiopian Industrial Parks Promotion
ICT	Information communication technology
ILO	International Labour Organization
IPDC	Industrial parks Development Corporation
JICA	Japan International Cooperation Agency
ROW	Right of Way

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Almost everyone reasonably familiar with housing issues agrees on the most pressing problem facing the industry today insofar as housing the poor: the shortfall in supply to demand, in both first and third world countries, is getting worse, not better (it has never been good), despite all the innovations and investment so far.

(HAMDI, 1995)

Section I: Introduction

1. Background

Cities are often characterized by concentrations of inequality, uncertainty, and exploitation. Cities have also long represented promises of opportunity and liberation. In cities around the world, people are feeling the strain in getting affordable houses. Rapid urbanization is instigating a serious housing shortage and escalating prices, largely because urban areas have not built enough in recent decades to keep up with the growing demand. As most other developing countries, Ethiopia is facing rapid urbanization in cities, especially in cities like Addis Ababa, this has given rise to the complicated problem of housing and infrastructure provision.

Over the last two decades, there was a development of low-income housing to abet the rapidly rising housing demand. This is aimed to address housing needs of the low-income groups by constructing low-cost condominium housing. The size of the houses varies between 30 m^2,55 m^2,75 m^2 and 100 m^2. The weary construction of low-income condominium housing projects did not guarantee the living conditions of low-income group. However, this low-cost housing projects, are not affordable for very low-income groups.

There is a dire housing shortage for existing urban population, in Ethiopia, let alone hundred thousand jobs that the IPDC is aiming to create through industrial parks in the next decade. Unless properly managed, the longing for industrialization will intensify the existing housing shortage.

The provision of affordable worker housing in close proximity to the parks, will help in minimizing workers attrition rate and productivity. The provision of a greater range of housing options aimed at a various income and family size is the only way to ensure that the industrial parks live up to its full potential. By incorporating both market-rate, below market-rate housing units IPDC could tackle the affordability crisis without isolating those of lesser means.

The magnitude of the need for social services and infrastructure (such as housing) depends, among others, on the size of the population and its growth in a certain area. As per EIPP's projection the working population in Bole Lemi will reach at least 87,000 at the its final development period (IPDC, 2019). Accordingly, one of the immediate challenges is "how to provide affordable and adequate housing for workers within a convenient environment".

The quality of the built environment has also an important influence on community cohesion and safety, health, and prosperity. The residential area design guideline envisions to help in creating a cheerful

environment If properly followed the design guideline can chart an overall roadmap for the other industrial parks in Ethiopia.

2. The Purpose of the Design Guideline

The purpose of these design guideline is to assist IPDC in achieving its vision of creating a "livable working environment" by developing mixed residential area. These guidelines outline the minimum levels of facility and specific requirements to incorporate in the design and construction of the residential area. The guideline complies with all all-applicable Addis Ababa City Structure Plan guidelines and standards This document is expected to complement BLSIC master plan document, which expresses IPDC's vision and goals related to the physical development of BLIP and ICT Park area. This Design Guide will help to achieve better physical design and planning for a Mixed-residential area. The design guide has been prepared by EIPP-JICA in collaboration with IPDC to help ensure standard quality mixed residential environment. In general, the guidelines:

I. Will define the requirements for the design of Mixed residential area
II. Are to be used by developers, consultants, designers and contractors
III. Will be used by IPDC in the assessment of development applications

However, the design guideline should not be as burdensome as to impact on the viability of the project or development. Whenever there is difference between developer and the planning department issues should be resolved in discussion. And the performance of the design guide should be monitored to establish whether it needs to be reviewed.

It is hoped that the guidelines will be extensively used as a reference to basic requirements for IPDC's workers housing. Unless specifically excluded herein design and construction methods, etc. shall conform to the relevant Addis Ababa city and ILOs (for workers Housing) Standards.

3. Scope of the Design Guideline

Industrialization entails efficiency, which is directly related to comfort of the environment. Well-rested workers will be more productive. The proposal provides guidelines that are specific to the residential mixed-use development[3].

[3] A mixed-use development is a single unified development that incorporates two or more different uses within walking distance of one another and may include a variety of housing types.

Issues addressed in the guideline include land use and building density, neighborhood framework design, site planning, streetscape and open space design, architecture, and the location and design of street furniture's.

I. These guidelines apply to all physical developments that will take place in the 'Mixed-residential area'.
II. The design guide tries to set the level of detail required to assist both developers and IPDC's planning/housing department.
III. The design guide provides requirements, practical advice and solutions, based on national and international standards.
IV. A full review of the document will take place within at least three years after its adoption. However, it may be reviewed earlier if there are changes to practices, which have a significant impact on the contents.

4. Development of the Guideline

This Guideline was developed through a collaborative process led by EIPP-JICA and IPDC. EIPP-JICA reviewed existing documents, reports, and studies, including the BLSIC Master Plan and Addis Ababa city Structure Plan, existing IPDC documents and other Design Guidelines.

Participation of existing workers was key to the development of the guidelines. A survey was conducted over a period of three weeks. The survey consisted of 14 questions (Appendix 1). Using random sampling method, a total of 374 workers completed the survey. The workers job position varies from industry workers who earn smallest wages to the managers. Distance from the park, Housing condition, means of transportation, cost of rent and demand for housing were themes that emerged. The survey results were used as an input for the development of the design and guideline.

Visual reconnaissance, Site analysis and context appraisal has been conducted. Although a visual survey of the topography, vegetation cover and movement analysis has been conducted a detail environmental and landscape appraisal should be conducted before implementing the preliminary design.

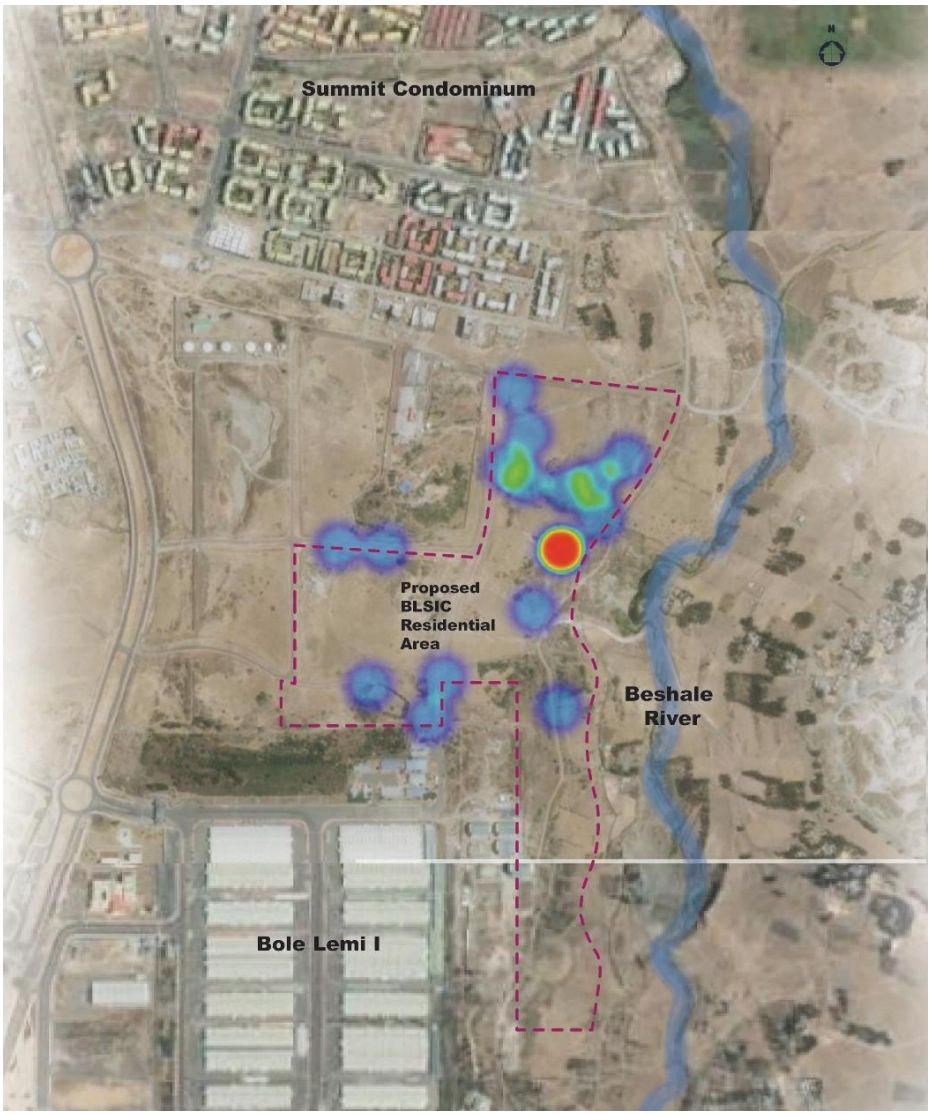


Figure 1. Physical Survey Area for Data Collected

Based on the results of the questioners, face to face interviews, input from the site survey and referred documents, EIPP-JICA developed an Initial Draft submitted it for comments.

The various offices of IPDC were contacted to provide comments on the guideline. Based on the inputs offered by the concerned departments and stakeholders, EIPP refined the preliminary design and guidelines.

5. Target of the Guideline

The Design Guide encourages consistent planning and design standards for mixed use residential area development. It has been prepared to:

- support in preparing a development application
- be a tool for developers, planners, urban designers, architects, landscape architects, builders and other professionals when designing the area
- assist planning professionals in IPDC in the assessment of development proposals.

The Guide will also help to inform IPDC on what is required to achieve good design and planning practice for mixed use residential area.

6. Structure of the Design Guideline

The Guide addresses the design of residential development at the site and individual building scale. It includes the following parts:

Section I - Introduction

This part introduces the background, purpose and scope of the guideline. It outlines the development of the guideline, how and who should use the guideline and the structure of the document.

Part II – Contextual Framework

This part introduces the importance of understanding the context, setting, local character, size and configuration of the development site. It is to be used primarily during the design stage of a development and during planning process when preparing controls.

Part III – The Primary Controls

This part explains the application of primary controls including building envelopes, building height, floor area ratio, building depth, setbacks and space between buildings. It provides tools in preparing planning controls.

Part IV – The Site Guidelines

This part provides guidance on the design and configuration of building development at a site scale. It outlines how to relate to the immediate context, consider the interface to neighbors and the public domain, achieve quality open spaces and maximize residential facility.

Part V - Architectural Guidelines

This part addresses the design of dormitory, apartment and commercial buildings in more detail. It focuses on layout, functionality, landscape design, environmental performance and residential amenity.

Section II: Contextual Framework

1. Introduction

Understanding the context[4] is the first step in any design endeavor. The contextual framework will assist a wide range of successive design decisions, including the layout, scale and massing of development. The character of the new development should be managed based on the understanding of the surrounding built and natural forms and the demand of the development.

At the core what makes dense urban environments authentic, desirable, and attractive is a network of forces that create unpredictability, serendipity, and diversity. This forces usually arise from the context. By studying the context and planning for local, integrated mixed-use areas, we can create potential for healthier, safer, and productive community.

2. An Overview of the Proposed Residential area [5]

2.1. The area and its surrounding

Bole Lemi Industrial Park is a part of the Bole Lemi Smart Industrial City (BLSIC) which located in the south eastern edge of Addis Ababa. The 'Mixed Residential Project' area is bordered in the north with "Summit" Condominium, in the northwest with BLSIC Core commercial Area, in the south with BLIP I and II shed areas and in the east, it is bordered with "Beshale" Rivers respectively. The area is bounded and traversed with BRT route and two sub arterial Streets. The area allocated for the 'Mixed Residential project' area covers around 35.67 Ha of land.

[4] Context is defined as the organized environments in which something occurs. It refers to the built and natural features, as well as social, economic and environmental factors that has an impact on an area.

[5] A detailed analysis on these issues (and so much more) should be conducted before any development in the area

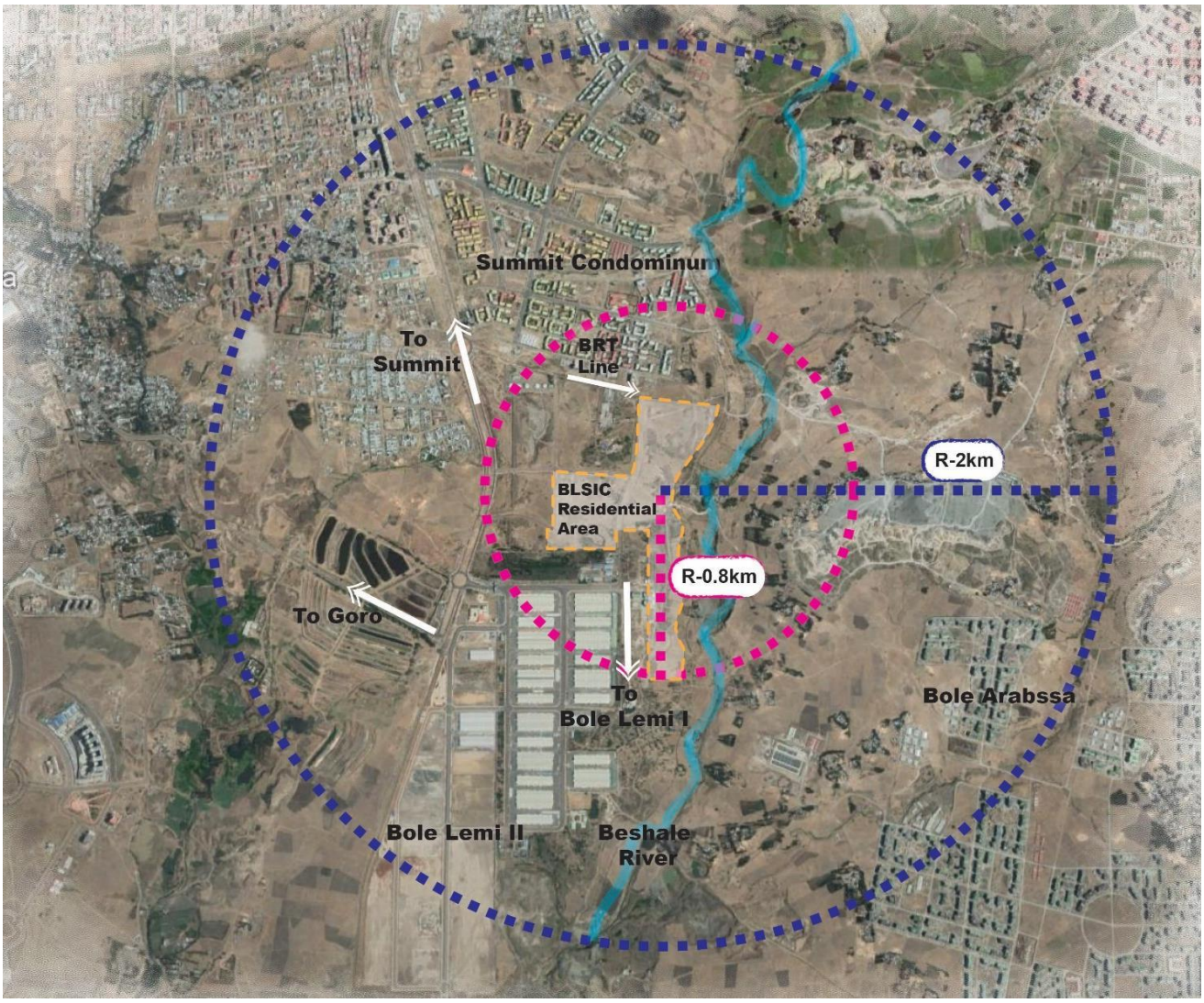


Figure 2. The Mixed Residential Area and Its Surrounding

2.2. Environment

Local climate highly affects any physical development. The Mixed Residential Project area in relation to the sun path and wind direction were assessed. The information is expected to be an input for the orientation and development of buildings, layout and arrangement of rooms and openings and landscape design. In the Project area the sun path and wind direction is considered due to its importance for the future development of buildings site and positioning of windows and other features for natural lights and energy related considerations.

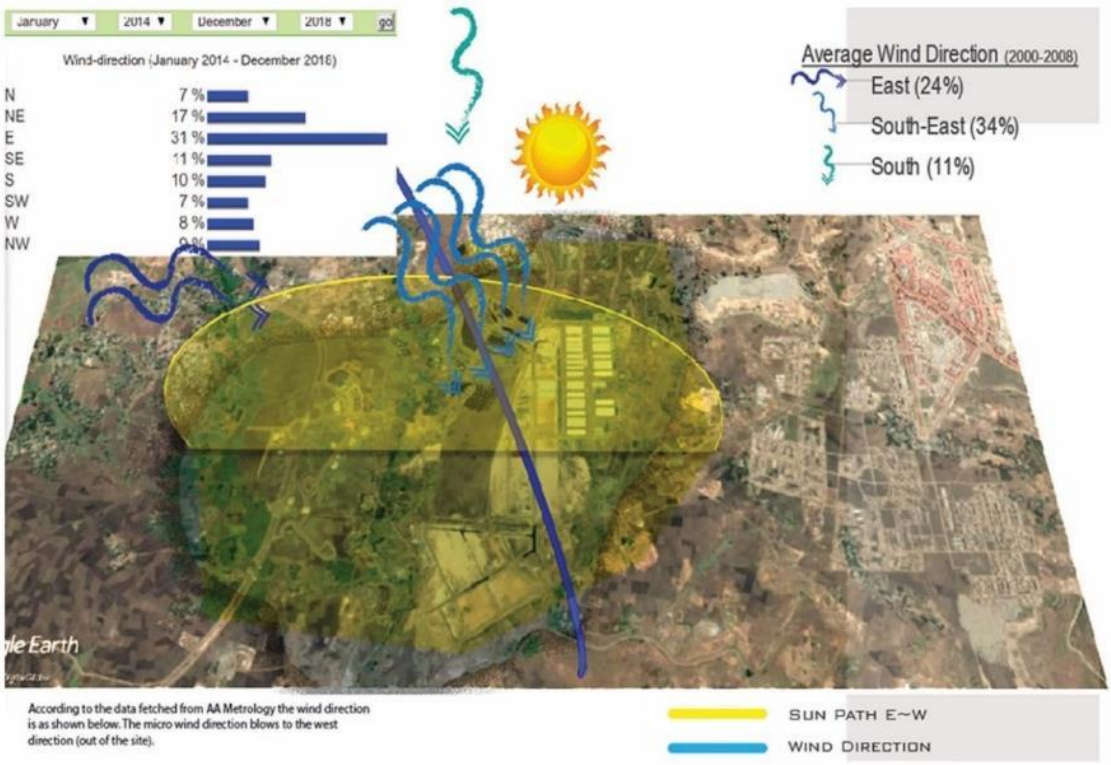


Figure 3. Wind Direction and Sun Orientation (source: Google Earth)

The data indicates that most of the time (34%), wind blows towards south east direction, followed by the east direction (24%) and south direction (11%). (IPDC, 2019)

2.3. Topography

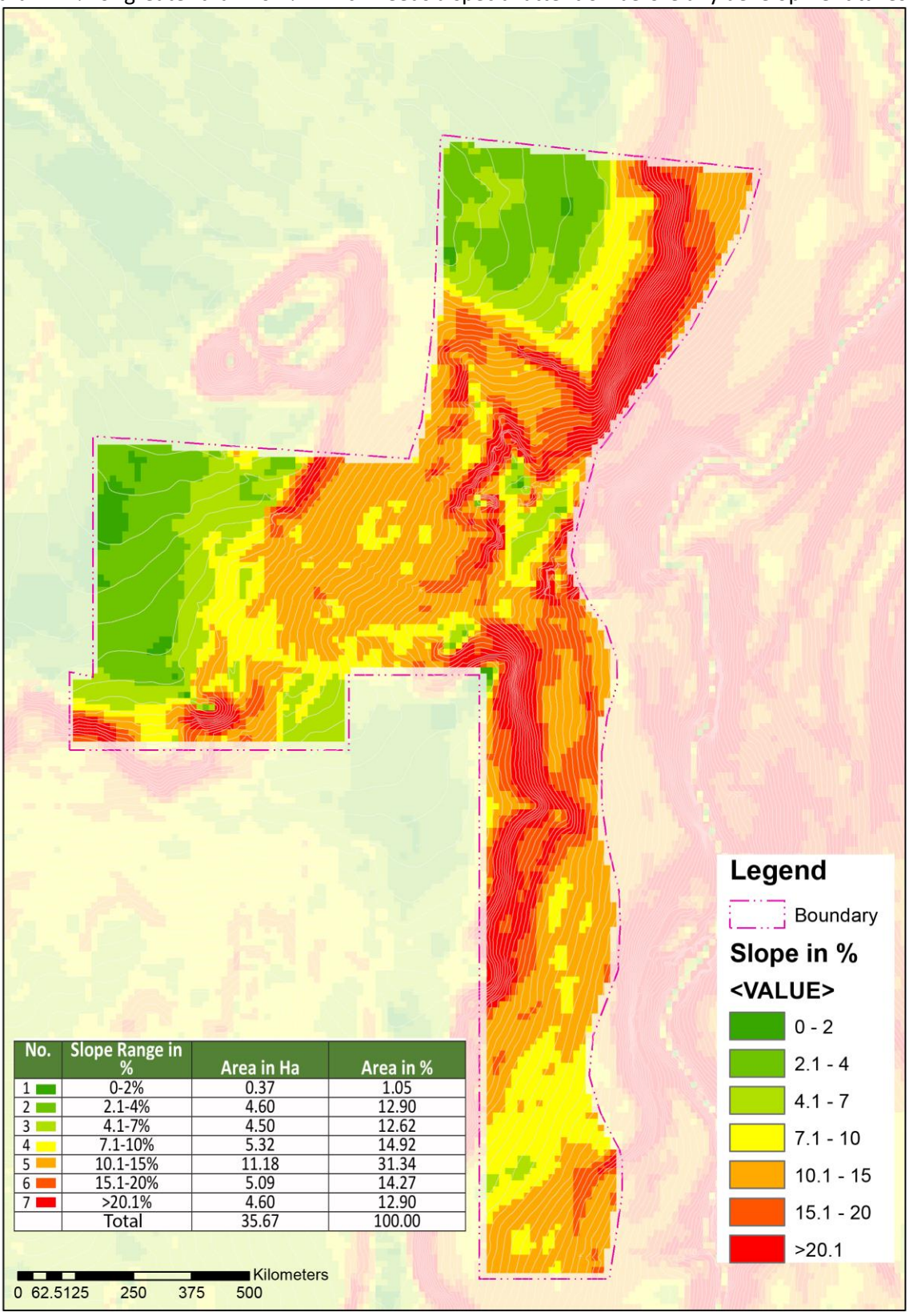
The elevation of 'Mixed-Residential Area' is between 2240 m and 2313 m above sea level. There is an overall height difference of 67m between the highest and the lowest point on the site. Generally, the site rolls down to 'Beshale River' at an average slope of 10%.

Figure 4 (right) and Table-1 (below) indicates that majority (around 40.44%) of the slope is suitable for housing development.

While the remaining area lies with less

Figure 4.Vegetation and Topographic on the Site

than 2.1% or greater than 10.1% which needs a special attention before any development takes place.



No.	Slope Range in %	Area in Ha	Area in %
1	0-2%	0.37	1.05
2	2.1-4%	4.60	12.90
3	4.1-7%	4.50	12.62
4	7.1-10%	5.32	14.92
5	10.1-15%	11.18	31.34
6	15.1-20%	5.09	14.27
7	>20.1%	4.60	12.90
	Total	35.67	100.00

Figure 5. Slope Analysis for the Mixed Residential Area

Table 1. Slope Classification for the Residential Area

Slope Range in %	Area in Ha	Area in %	Remark
0-2%	0.37	1.05	Prone to flooding and drainage problems in site development.
2.1-4%	4.60	12.90	For major roads and different kinds of large-scale development.
4.1-7%	4.50	12.62	Housing development, Intensive Small-Scale Industries
7.1-10%	5.32	14.92	Housing development
10.1-15%	11.18	31.34	Undulating to steep slope
15.1-20%	5.09	14.27	Steep slope
>20.1%	4.60	12.90	Prone to quick runoff.
Total	**35.67**	**100.00**	

2.4. Land Use

The site survey has indicated that there are different kinds of land uses surrounding in the Project area. In the most northern part of the site, within 400m to 800m, proximity there are residential developments and condominium houses.

Figure 6. Bole Arabsa Condominium as seen from the Site (top left)

Figure 7. A View to the River Boundary

While there are two religious places on the opposite ends of the site. The river and the industrial sheds also share boundaries with the site.

However, the predominant land use in the project area is an agricultural area and vacant lands. The site itself is free from any kinds of permanent structures.

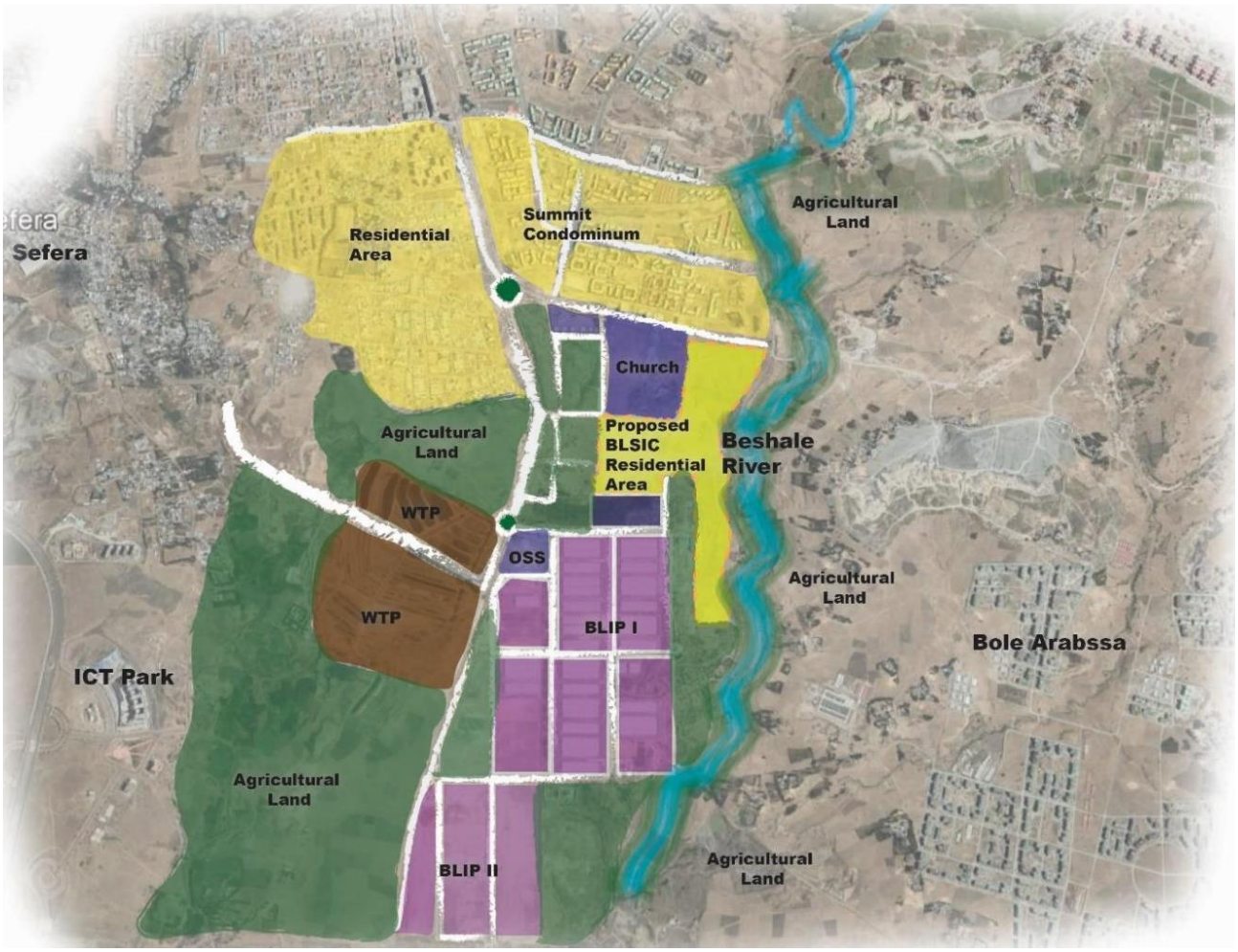


Figure 8. Existing Land Use

3. Proposed Development

In spite of the readiness of basic infrastructure in BLIP lack of 'low-cost' workers housing is straining the availability of a labor force. In addition to these, the area has limited commercial elements and residential buildings that have a higher financial return and could balance the subsidized rental sheds to achieve financial sustainability.

The proposed development needs to satisfy the needs of the workers for housing and IPDC's demand to satisfy investors as well as generate revenue. Hence the proposal envisions:

> To create high density mixed development that will result in a vibrant, health and safe neighborhood that will maximize workers availability and generate additional revenue.

Accordingly, the first step was to assess the need for housing and the types of housing. As stated, earlier

EIPP-JICA conducted survey (face to face interview and questioners) that could help in extrapolating the demand.

3.1. Housing Demand

According to the projections made the total number of workers expected in BLSIC (BLIP I & II and ICT) will be approximately ±240,500. As per the survey, the eleven companies within the park (with 14, 951 employees) spends more than 75,640,266.17 ETB per year[6] for the transportation service for the workers (IPDC, 2019). When it became fully operational BLIP (I & II) will accommodate 87,400 workers out of which close to 60% of the workers who travel more than 3km the maximum distances will be in dire need for accommodations. Hence, the construction of workers dormitories and apartments is a must.

The figure below (Fig. 9) demonstrates that, very few (9.2 percent) workers reside within a working distance of 500m radius. Majority (61.6 percent) of the respondents are living greater than 3km commute distance. This indicates that majority of them needs residence within the vicinity of Project Area. (IPDC, 2019).

The Mixed residential uses will limit the much costly trips by bringing together working, living and recreational activities within a close proximity. The result of mixed developments is the creation of a vibrant environment. This mixed-use development is designed to attract people from the surrounding residential areas and catalyze investment in the industrial park-residential area.

[6] Adjusted for the current exchange market

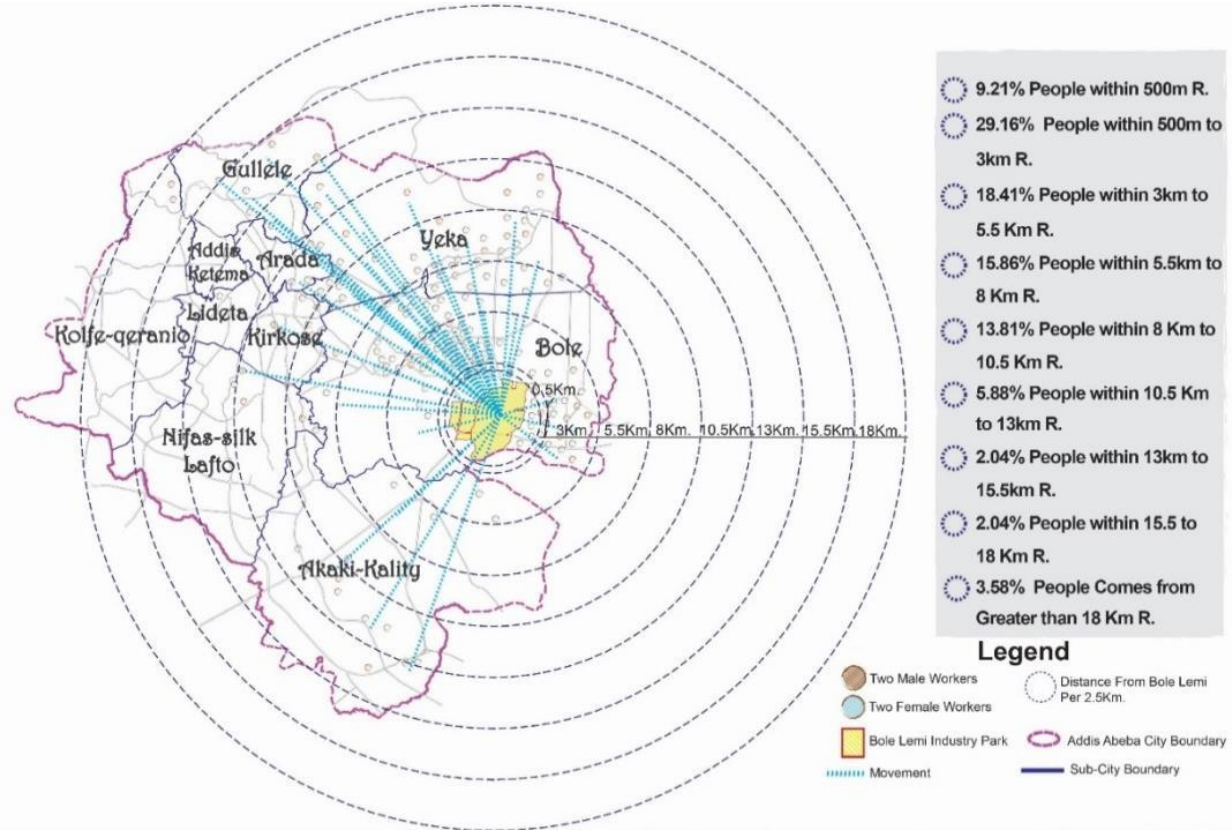


Figure 9. Workers Commuting Distance (IPDC, 2019)

3.2. Street Network

Streets are primary structuring elements of the development. The topography of the residential area highly affected the proposed street network. To encourage human interaction most of the newly proposed streets are designated for pedestrian domination.

Figure 10. Existing dry weather street/clearing

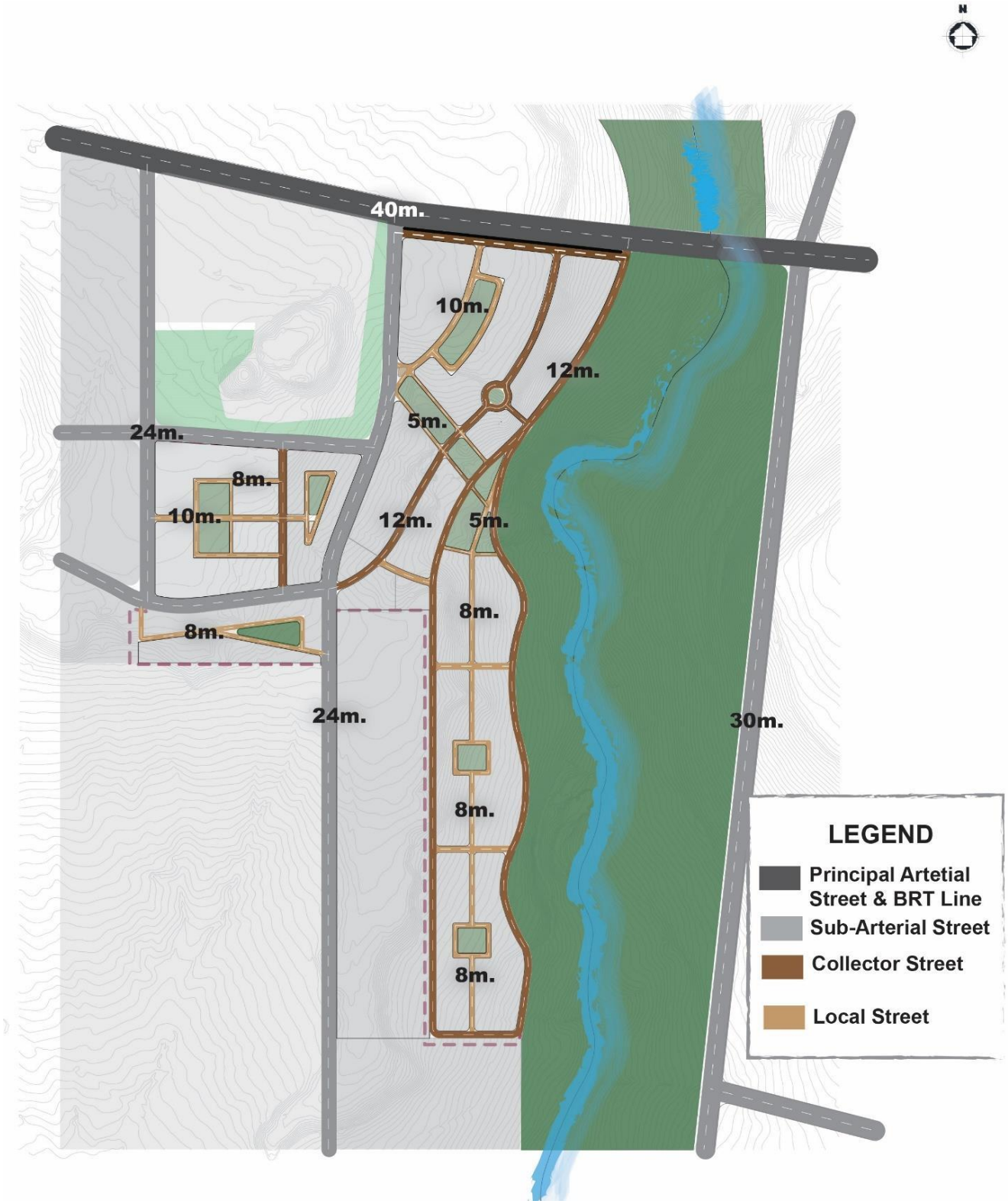


Figure 11. Proposed Street Network

As a general guide the Streets are planned to be developed for people and facilitate social and other activities. In proposing the street network due consideration is given to the topography. Existing trails were considered as a potential in implying the existing movement. This helped to avoid major challenging areas for the street design. Size of street and traffic are directly related, which means as street size increases the traffic volume it attracts also increase. In the mixed residential area, the main concern is to provide streets that are comfortable for pedestrians. Hence, the maximum proposed street size is limited to 12m (ROW) .

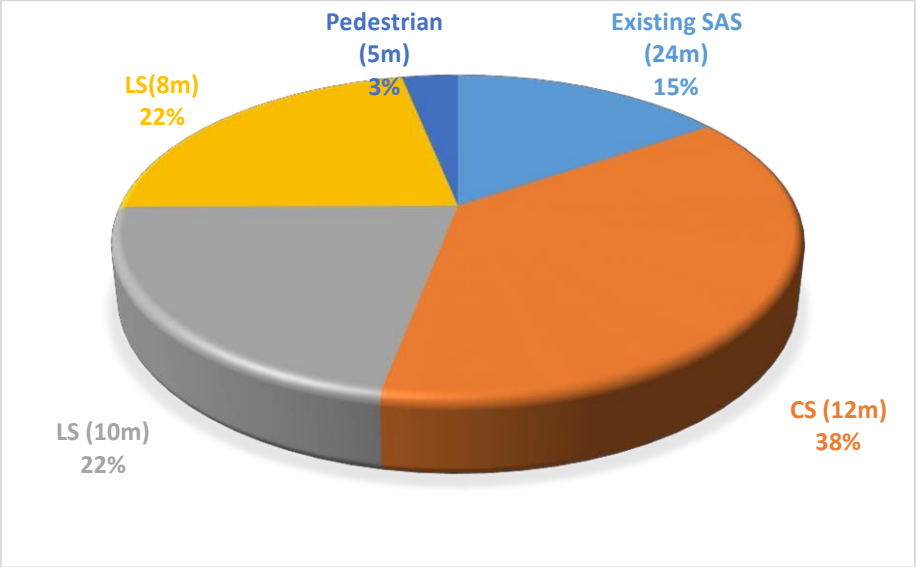


Figure 12. Proposed Street Network

3.3. Proposed Land Use Development

The gap created by sluggish development of affordable and subsidized housing, is and has created real strains on the low-income working group. The growing thirst for social equity and creation of safe vibrant communities entails the need to build more inclusive mixed residential areas. To increase opportunities, it is better that IPDC and developers look to devising diverse, affordable housing options. This option shall include;

- low-income workers housing,
- transitional middle-income housing (Midrise housing for middle managers and top managers), and
- high-rise apartments (for lease).

The Mixed-residential area land use has been proposed considering the development trend in the area. The proposed land use includes; residence, commerce, social services, streets, community open spaces and playgrounds and neighborhood parks.

Figure 13. Proposed Land Use.

Table 1. Summary of the Proposed Areas

S/N	Proposed Function	Phase	Area (m2)	Total Area	%
1	Dormitory	I	65,977.80	123,174.10	34.53
		II	57,196.30		
2	Midrise Apartment	I	8,312.70	18,344.00	5.14
		II	10,031.30		
3	Highrise Apartment	I	17,439.70	34,182.80	9.58
		II	16,743.10		
4	Commercial Area	I	16,307.40	26,197.80	7.34
		II	9,890.40		
5	Services	S-01	2,298.50	24,582.50	6.89
		S-02	15,245.60		
		S-03	4,780.00		
		S-04	2,258.40		
6	Public Space and Active Green	PG-01	2,333.60	18,789.22	5.27
		PG-02	2,333.60		
		PG-03	1,310.40		
		PG-04	4,671.30		
		PG-05	1,497.62		
		PG-06	3,214.90		
		PG-07	1,713.90		
		PG-08	1,713.90		
7	Public Plazas with Retail shops	PPL-01	2,218.93	3,304.70	0.93
		PPL-02	143.00		
		PPL-03	942.77		
8	Public Park	PP-01	9,307.50	16,224.10	4.55
		PP-02	3,730.30		
		PP-03	1,951.00		
		PP-04	1,235.30		
9	Street	24m	14,222.60	91,891.47	25.76
		12m	34,494.03		
		10m	20101.55		
		8m	20,156.54		
		5m	2,916.75		
	Total Area		**356,690.69**	**356,690.69**	**100.00**

Figure 14 shows that after excluding the already built arterials streets the majority of the area (41%) is allocated for workers dormitory and Midrise Apartment for middle and top managers. The commercial and mixed high-rise apartment has been allocated 18% of the area. Public spaces and parks will in combination have 11% of the area while 7% has been allocated for social services.

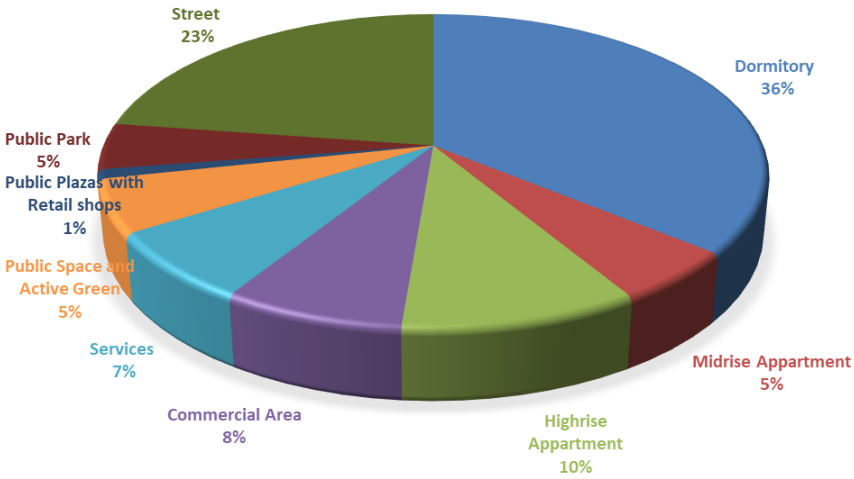


Figure 14. Share of the Proposed Residential Development

The allocation of the major share of the land for workers (41%) entails that the focus of the residential area is to create a comfortable working-living environment. However, the cost to deliver much needed housing is rising at unmanageable rates. To share the burden, the development of the workers dormitory should be done by each shed owner as per the demand and density specified. IPDC can use the rest of the land for the development of high-rise apartments and commercial business that could generate revenue, through rent and land lease. The high-rise apartments specially the ones closer to the highly active streets can use the first two floors for retail business to attract residents of various incomes.

Figure 15. Idea on Mixed apartment buildings (Picture adopted)

3.4. Building height, FAR, BAR and Density Analysis

Density is one of the factors that affect the quality and success of the residential development. The residential area needs to target the maximum density achievable. The factors that had a major influence on density includes: Building height, built up area ratio (BAR), Floor area ratio (FAR) and the architectural spatial standards to be achieved.

A thorough study of the factors for the residential area resulted with the following:

Table 2 . FAR, BAR and Building Height

Zone	FAR			Building Height		Built-Up Area	
	Street	Min	Max	Min	Max	Use	%
Zone 4 (Bole Lemi Area)	> CS	0.5	Free	-	35	Built Up	40%
	LS	0.5	3.5	-	35	Green, Open Space, Plaza etc.	30%
						Street Network	30%

Table 3. Accommodations, Livable Areas and Suggested Building Heights

Type of Building	Accommodations	Livable Area (in m^2)	Building Height (in m)
Dormitory	Bedroom facilities, sanitary facilities, canteen, laundry and communal spaces used for gathering, TV rooms etc.	$8m^2$/worker	17.5m (G+4)
Midrise Apartment	Living room, Bedroom, Kitchen and WC	$30m^2$ & $55m^2$ /dwelling unit	17.5m (G+4)
Highrise Apartment	Living room, Two Bedroom, Kitchen and WC	$100m^2$ & $125m^2$ /dwelling unit	35m (G+9)

Based on the assumptions set on Table 3 & 4 the number of workers that can be accommodated in the area is shown below:

Table 4. Projected Population

Type of Buildings	PHASE	Number of Plots	Total Plot Area	Number of People	Total number of people
Dormitory (Workers)	I	37	65.977.8	24,742	**46,190**
	II	34	57,196.3	21,449	
Midrise Apartment (Studio and one Bedroom)	I	6	8,312.70	831	**1,992**
	II	6	10,031.3	1,161	
Highrise Apartment	I	9	17,439.3	2,790	**5,121**
	II	8	16743.1	2,331	

For the Social services, G+1 is proposed for Kindergarten and G+2 is proposed for the other services such as Primary school, Administration, health center etc.

Table 5. Allocated Area for Social Services

Proposed Function	Type	Plot Area (m^2)	BAR	Building Area	Number of Floors	Total Floor Area	FAR
Services	Administration & Youth Center (S-01)	2,298.50	0.40	919.40	3	2,758.20	1.20
	Primary school (S-02)	15,245.60	0.40	6,098.24	3	18,294.72	1.20
	Health center & Police station (S-03)	4,780.00	0.40	1,912.00	3	5,736.00	1.20
	Kindergarten (S-04)	2,258.40	0.40	903.36	2	1,806.72	0.80
		24,582.50					

Section Ⅲ: The Primary controls

1. Introduction

The Primary development controls are the key design tools that will help to manage the scale of the development. It will help the development to relate to the context and desired future character of the area. The Primary development controls include: Envelopes, building height, Floor area ratio, Building depth, Space between buildings and Setbacks.

Primary controls should be developed taking into account daylight access, natural ventilation, orientation and privacy, public spaces and pollution. The controls must be carefully confirmed to ensure they are coordinated and that the desired built form is achievable.

Figure 16. Proposed development at the dormitory area

2. Building Envelopes

Building envelopes define 'the 'Container' within which a building is designed'. They are a useful to gain an understanding of the future form and scale of the area. Building envelopes, by defining the three-dimensional form of buildings, affect the surrounding open spaces and landscape areas.

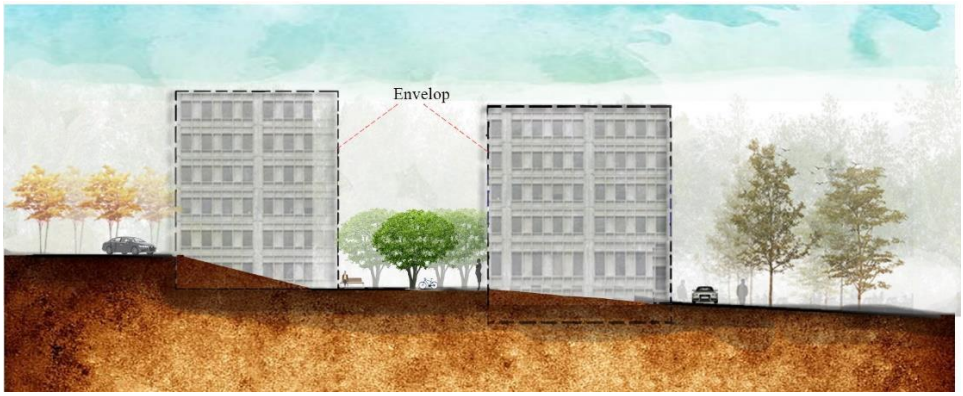


Figure 17. Building Envelope

Intention

- To ensure human scale development is attained

Guidelines

✓ To maximize density, keep the gross floor area of the building around 25% less than that of the envelope.

✓ Use the building envelope to test appropriate scale of future development in terms of height relative to the streetscape, public and private open spaces, and urban block.

3. Building Height

Building height helps shape the desired future character of a place relative to its setting and topography. It defines the proportion and scale of streets and public spaces and has a relationship to the physical and visual amenity of both the public and private realms. The height of a building is measured from ground floor finish level to the upper most rooftop of the building. Floor to floor heights vary depending on the use e.g., commercial spaces, are higher than the dormitory and apartments.

Building Height controls needs to consider daylight access, roof design and use, wind protection and respond to the landform.

Figure 18. Section through the mid-rise apartments

Intentions

- To ensure that adequate daylight and natural ventilation have been achieved
- To ensure harmonized skyline, memorable image and comfortable streetscape
- To Ensure that the development responds to the desired future scale and character of the street, public spaces and neighboring area

Guideline

- ✓ The residential area lays within Zone 3 and Zone 4. in both areas the maximum building height for the development area cannot exceed 35m.
- ✓ Consider the average maximum floor to floor height as 3.5m.
- ✓ Considering energy consumption and the creation of walk-up the maximum building height for the dormitories and Mid-rise mixed developments should not exceed 17.5m.
- ✓ The maximum building height for the commercial area and High-rise mixed developments should not exceed 35m.
- ✓ For social and community service the Maximum Building height should not exceed 10.5m.

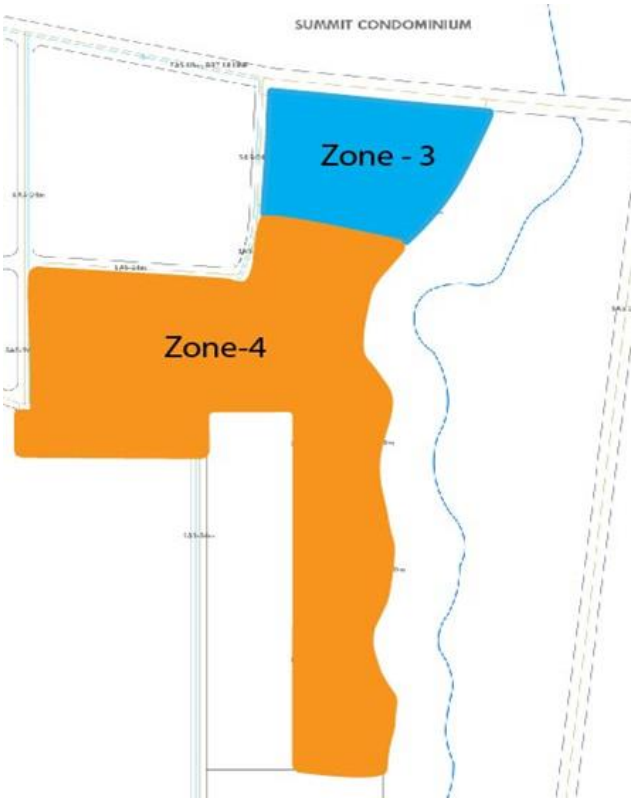


Figure 19. Position of the residential area within the city Building height Zone

- ✓ The maximum height for any temporary structures in designated open spaces is 6m.
- ✓ The suggested floor height could vary as different functions require different heights but ensure that the buildings have extravagant ground floor heights.

4. Floor Area Ratio (FAR)

Floor Area Ratio (FAR) is the ratio of the total floor area of a building relative to the total site area it is built on. It indicates the intended density. FAR is a widely used method for estimating the development potential of a site. FAR controls the hypothetical maximum capacity of the area. Since, FAR should be read in conjunction with other development controls it may not always be possible to reach the maximum allowable floor space.

Table 5. Summary of the Proposed Floor Areas

S/N	Proposed Function	Total Plot Area (m^2)	Proposed Floor Area
1	Dormitory	123,174.10	369,522.30
2	Midrise Apartment	18,344.00	56,860.50
3	Highrise Apartment	34,182.80	170,914.00
4	Commercial Area	26,197.80	183,384.60
5	Administration & Youth Center	2,298.50	2,758.20
6	Primary school	15,245.60	18,294.72
7	Health center & Police station	4,780.00	5,736.00
8	Kindergarten	2,258.40	1,806.72
		226,481.20	**809,277.04**

Intentions

- To ensure that the sustainable optimum carrying capacity of the site has been achieved.
- To provide opportunities for building articulation and creativity within a building envelope by carefully setting the maximum floor space.
- To ensure that the appropriate proportion of open and green spaces has been provided.

Guideline

Accordingly, to get the best out of the area the following ratios needs to be followed.

- ✓ For the commercial area: Maximum FAR is 7.
- ✓ For the High-Rise Apartment: Maximum FAR is 5.
- ✓ For the dormitory and Mid-Rise Mixed uses: Maximum FAR is 3.
- ✓ For any social services and schools: FAR is between 0.8 and 1.2.
- ✓ For open spaces, Parks and Plazas: the maximum FAR needs to be below 0.005.

5. Building Depth

Building depth is another important tool for determining the development capacity of a site. It is the overall cross section dimension of a building envelope. Building depth dimensions typically include projecting balconies, corridor access, overhangs, sun breakers and other architectural features. Usually, commercial uses have deeper floor plates as compared to the residential uses.

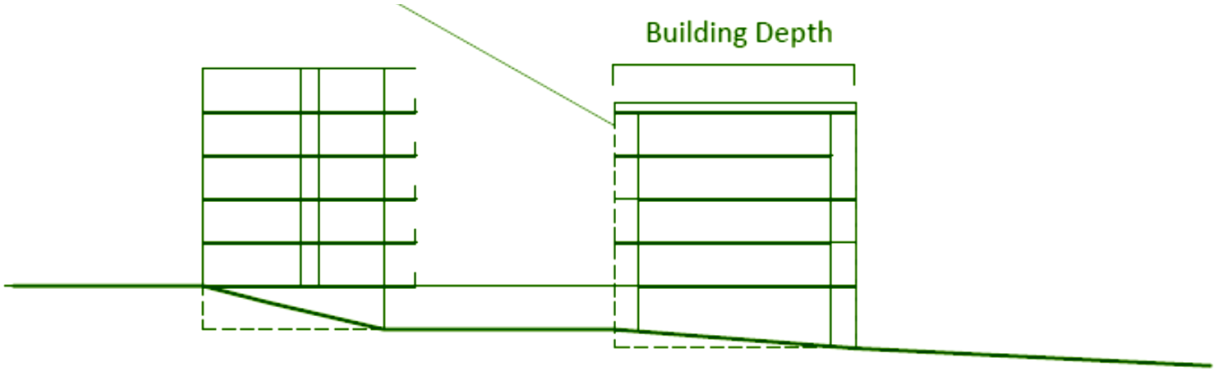


Figure 20. Building Depth

Intentions

- To Ensure better building circulation, configuration and efficient internal residential facility.
- To ensure better access to light and air.

Guideline

- ✓ Ensure building depths support passive energy usage
- ✓ Aim for narrower building depths to achieve optimal natural ventilation and daylight access.
- ✓ Use a range of preferred building depths of 12-18m from glass line to glass line.
- ✓ Whenever possible Consider varying building depth relative to orientation.
- ✓ Ensure building depths support the maximum leasable floor space for commercial area.

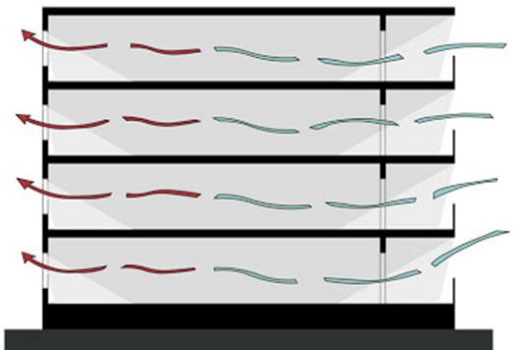


Figure 21. Schematics showing the relationship between Building depth and movement of air

6. Street Setbacks

Street setbacks establish the alignment of buildings along the street frontage, spatially defining the street. Combined with building height, street setbacks define the proportion and scale of the street and contribute to the character of the public realm.

Figure 22. Setbacks along the local street

In the Commercial area, the building line may be set at the property boundary defining the Collector street corridor with a continuous built edge. In the dormitories and apartments, the street setback may accommodate front gardens, contributing to the landscape setting of buildings and the street.

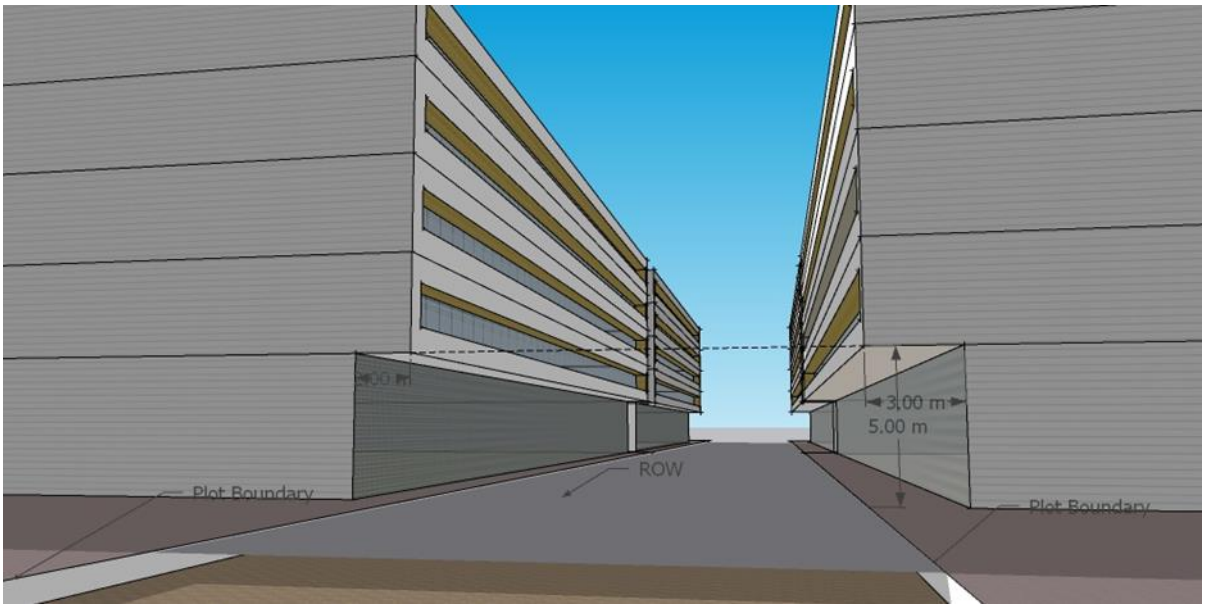


Figure 23. Street Setbacks

Intentions

- To establish the desired spatial proportions of the street and define the street edge.
- To provide space that can contribute to the landscape character of the street where desired.
- To create provide a clear transition between the public and private realms.
- To define the street edge and establish a spatial proportion.

Guideline

- ✓ For all developments in the residential area the front setbacks shall not be less than 2m for local and collector roads, and 3m for PAS and SAS
- ✓ For dormitories and apartments in the landscape and architectural design should ensure visual and aural privacy from the street.
- ✓ By cantilevering the first and above floors the plot owner can use above 5m air space.
- ✓ Promote passive surveillance through design by encouraging 'eyes on the street'.

7. Space Between Buildings

Space between buildings is the distance measured between building envelopes. Space between buildings contributes to the urban form of the area. Establishing minimum distances between buildings within the site, and between sites helps to provide public facility. Space between buildings assists with aesthetics, natural ventilation, daylight access and privacy. It can also assist in providing transition between different land uses.

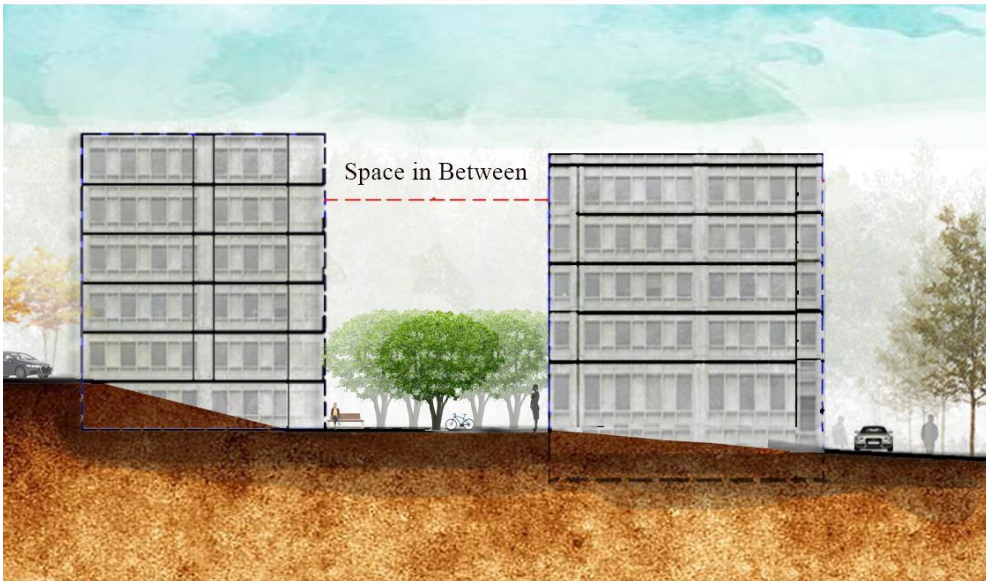


Figure 24. Space in between

Intentions

- To Provide access to sun light, natural ventilation and better view for neighboring properties and buildings.
- To Provide for adequate privacy between buildings.
- To achieve setbacks that maximize green spaces.

Guideline

- ✓ Minimum space between residential and commercial buildings is set to be 6m.
- ✓ When there is land use or height variation the space may increase to achieve adequate sun light and open space on the site.
- ✓ Retain visual connection or create a rhythm or pattern of spaces between buildings.
- ✓ Provide suitable areas for communal open spaces and landscaping.

Section Ⅳ: Site Guidelines

1. Introduction

Site planning and development has various phases. Site planning involves choices about where to or not to build. To protect and restores natural resources site planning must be informed by a thorough understanding of the site's character and context. Site guidelines implement the essential mixed residential area design framework. It is to be used during the design process and in the preparation and assessment of development applications.

2. Site Analysis

Site analysis is an important part of the design process and should be undertaken at the beginning of a project to inform the design principles. Development proposals need to illustrate that design decisions are based on careful analysis of the site conditions and relationship to the surrounding context.

By describing the physical elements of the area and the conditions impacting on the site, opportunities and constraints for development can be identified and addressed in the design. It is beneficial to undertake a site analysis in collaboration with professionals.

Intentions

- To illustrates that design decisions have been based on opportunities and constraints of the site conditions and their relationship to the surrounding context.
- Development proposals need to illustrate that design decisions are based on careful analysis of the site conditions and relationship to the surrounding context.

Guideline

- ✓ Ensure that the key elements: Location map, Site base map, Site context and survey plan, streetscape elevations and sections and analysis are included.
- ✓ Ensure the availability of a written statement explaining how the design of the proposed development has responded to the site analysis.
- ✓ Ensure technical advice from Surveyors, landscape architects, environmental experts, geotechnical engineers and botanists are included in the analysis.

3. General Planting

A variety of plants can be grown in the area. Selected plants should be given on the public and private spaces that are not considered as built spaces. These public and private spaces are mainly classified as streets, pedestrian walkways, plazas, open spaces and Parks. (See Appendix III. Plant Index)

Figure 25. Proposed Plantation Map

Intentions

- To reduce glare produced from buildings and impervious surfaces.
- To minimize runoff through the selection of plants appropriates to the area and its function.

Guideline

- Protect existing important plants in the area.
- Primary considerations should be healthy plant growth and ease of maintenance.
- Use and reinforce Indigenous trees and shrubs to be planted on streets (pedestrian walkways, medians and street corridors).
- It is advisable that all plantings need low water consumption.
- Promote water conservation by using an automated irrigation system as well as efficient underground drip irrigation systems.
- Locate trees to maximize exposure to winter sun and provide summer shade.
- Consider edibility, fragrance, sound, color and texture in planting design.

4. Streetscape Plantings

Plantings on streetscape can provide shade and create aesthetically pleasing environment. Well thought plantings can also minimize the heat island effect and create and encourage pedestrian movement. (See Appendix III. Plant Index)

Intentions

- To encourage aesthetically pleasing and functionally efficient street trees and median plantings.

Guideline

- ✓ Depending on species, Street trees should be adequately spaced, to provide shade and cooling for pedestrians.
- ✓ Street trees should shade 60-65% of a typical sidewalk's length.
- ✓ Select trees which have low maintenance requirements and stand the effects of nearby traffic.
- ✓ Whenever there is a need for trees in sidewalk and hard surfaces, provide a minimum $4m^2$ of pervious area and soil.
- ✓ For large trees, in sidewalk and planting strip areas minimize soil compaction to encourage healthy growth.
- ✓ Ensure to have more shades on South-facing streets and walkways.
- ✓ Groupings of trees should be located to allow clear visibility for safety and security.

5. Opens Spaces and Parks

Buildings should be sited and designed to enhance and activate outdoor space. Public open spaces, courtyards and parks at the residential area provide special places for both community interaction and privacy.

Figure 27. Public space and building interaction (figure adopted)

In the context of mixed-use environments, public spaces have always been central to the creation of memorable spaces. They form the beating heart of communities, defined by edges rich in retail, art, workplace, and entertainment.

The size, location and design of parks and open space vary depending on the site context and the scale of development. However, the proposal provides two parks of size 1.1ha and 0.6ha and other small activity centers in the development area.

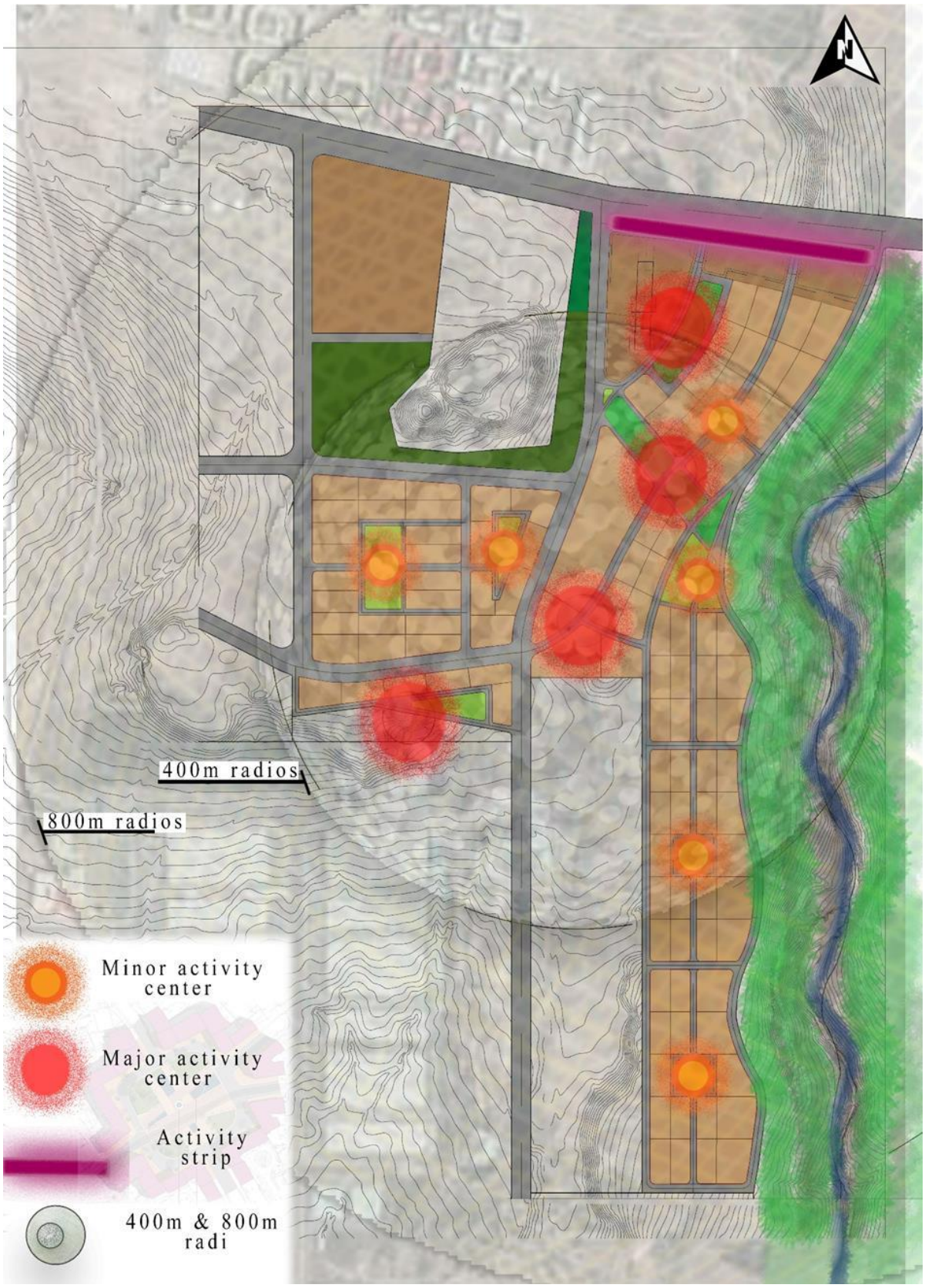


Figure 28.Proposed Minor and Major activity Centers

Intentions

- To improve the visual and functional quality of the environment.
- To provide opportunities for group and individual recreation, activities and social interaction.
- To provide opportunities to modify microclimate.

Guideline

- ✓ Ensure that the parks, plazas and courtyards have a sense of enclosure, and provide a variety of seating opportunities.
- ✓ Select plants for their color, texture, aroma, seasonal change and their ability in creating shade.
- ✓ Whenever appropriate use evergreen and flowering plants and trees to create focal areas.
- ✓ Provide root barriers for courtyard trees and trees adjacent to hardscape to minimize pavement damage.
- ✓ Ensure that at least 80% of the green space is covered with soft landscape.
- ✓ Ensure the size of the spaces can provides outdoor recreation opportunities for residents.
- ✓ Enhance the accessibility and quality of the open space with careful selection of materials and plants.
- ✓ The area reserved for a structure for recreation should not be more than 1.5 % from allocated area of the park.

6. Walkways

A well-designed hierarchy of open spaces, plazas and walkways enriches the residential area environment and identity. However, Circulation routes should be planned bearing in mind, that physically impaired people could use them.

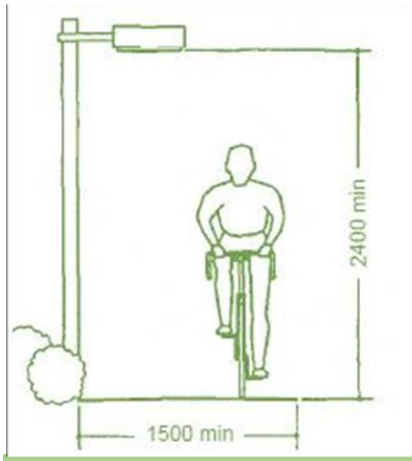
Intentions

- To improve the visual quality and reinforces the dominance of the pedestrian.

Guideline

- ✓ Slope of pavements and the materials used needs to consider disabled people, and should not exceed 2%.
- ✓ Paving materials, width and finishes needs to be up to standard and should avoid slippery surfaces.
- ✓ The Color of pavements affects the degree to which heat and light are absorbed or reflected; hence a thorough consideration should be taken.
- ✓ Tactile warning strips should be used to give advance notice to visually impaired people of abrupt grade changes, vehicular areas, water fountains etc.
- ✓ Use permeable paving materials that allow rainwater infiltration.
- ✓ Encourage the use of Paving materials with recycled content.
- ✓ Paved hardscape areas should facilitate regular maintenance and cleaning.
- ✓ Select paving for durability to withstand wear and minimize maintenance.
- ✓ For larger areas pavement materials should interlock to facilitate long-term stability.
- ✓ Walkways should incorporate places to stop and rest coordinated with lighting and signage.

7. Site Lighting



Outdoor lighting is important to ensure public safety and increase the night-time activity in the residential area. Residential area lighting should be well-organized in simple patterns which reinforce the open space, courtyards, plazas and circulation.

Intentions

- To ensure an even, consistent coverage, of light on the residential area that could improve night time visibility.

Guideline

- ✓ Provide sufficient lighting to establish safe conditions for access and circulation.
- ✓ Consider lighting to enhance the aesthetic qualities of the residential area.
- ✓ Avoid fixtures that are not easy for maintenance and are susceptible for destruction.
- ✓ Coordinate lighting locations and pole heights with tree locations and constructed elements.
- ✓ Keep the minimum height of streetlights along pedestrian and cycle paths around 2.4m.
- ✓ Ensure the light from the fixture are projected on the ground rather than creating glare.
- ✓ Select fixtures for maximum durability and energy-efficiency.

8. Site Furniture

Site furnishings are important elements of an exterior public realm. They help define the character of the place. They also improve the livability and comfort of outdoor spaces by providing places to gather, meditate and socialize, thus improving community communication and interaction.

The furniture's included here are signage, seating benches, tables and chairs, dust bins, trash and recycling containers, bicycle racks, bollards, fountains, sculpture and kiosks.

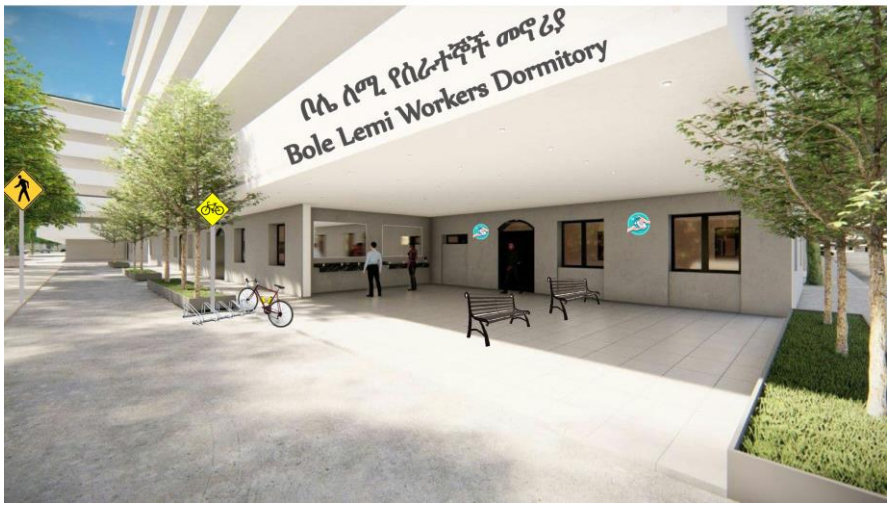


Figure 29.Street furniture's around the dormitory

Intentions

- To improve the livability and comfort of outdoor spaces.
- To enhance and provide places for meditating or socializing.

Guideline

- ✓ Furnishings should be selected and located to maintain the cleanliness and order of the residential area.
- ✓ Street furniture should be carefully organized for safety and easier intercession for those with visual impairments.
- ✓ A textured surface can be used to separate furniture from clear walking space.
- ✓ Furniture's should be durable and comply with local environment.
- ✓ Avoid using imported furnishing materials whenever possible.
- ✓ Furnishings should be easy to repair and maintain.
- ✓ Material and color selection should be coordinated with the lighting, signage and buildings.
- ✓ As much as possible the furnishing should be shaded during harsh sun.

9. Water Management

Water management considers integrated management of water in the project area. It includes rainwater, wastewater, storm water and groundwater. The management starts from the initial site planning considerations to maximize green areas for water infiltration to storm water and wastewater recycling. The Mixed-residential area is located on western- hill of 'Beshale River'. The natural drainage scores part of the topography, forming a gully, which drain east ward into the river.

Intentions

- To use topographic changes in an elegant and appropriate manner and encourage infiltration of site drainage where practical.

Guideline

- ✓ Onsite conservation of rainwater, and landscaping that minimizes water consumption is encouraged.
- ✓ Slopes should be designed to facilitate surface drainage, limit soil erosion, and avoid slides and instability.
- ✓ To improve residential area sustainability by preserving trees, shrubs and natural open space, minimizing erosion and protecting water quality.
- ✓ Slopes of plazas and other open space hardscape should be an average of 2%.
- ✓ As much as possible the design should maintain and enhance natural drainage patterns.
- ✓ Design for natural infiltration and evaporation where possible to reduce water run-off.
- ✓ Promote the filtering of run-off from roofs and paving via green or eco-roofs, bio- ponds, filter strips, storm water planters and other water-quality enhancing techniques.
- ✓ The minimum drainage slope of streets should be 2.5%.

10. Waste Management

Waste management is pertinent at all stages of the project development. The life cycle and efficiency of buildings is highly affected by poor waste management. Waste management includes safe and convenient collection and storage of waste and recycling.

Intentions

- To minimize and effectively manage domestic waste.
- To limit the potential harmful impacts of waste on the environment.

Guideline

- ✓ Provide facilities for onsite Separation of waste into Organic Wastes, Hazardous Wastes and Recyclable Wastes.
- ✓ Garbage bins shall be positioned in the mixed residential areas with the minimum access road of 8m width.
- ✓ Avoid locating garbage bins near playgrounds or green areas.
- ✓ Space for garbage facilities can be provided away from the main entrance.

11. Circulation Systems

The circulation system is important for the proper functioning of the residential area. The Principal Arterial Streets that bound the site in the north and eastern direction are the main connection points to the adjacent neighborhood. In addition, two Sub arterial streets cross the residential area.

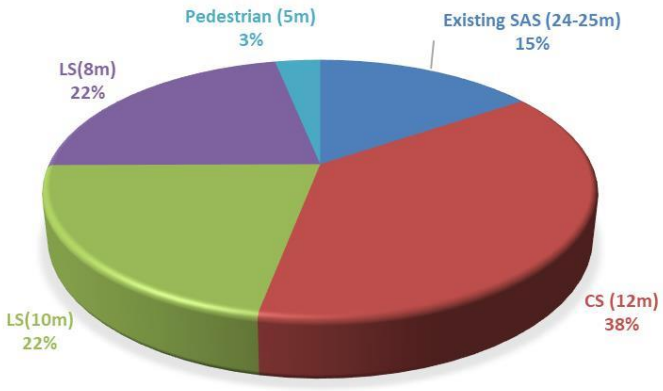


Figure 30.Percentage Share of the streets

The rest of the circulation system is designed so that pedestrians could have priority in the residential blocks, and public spaces. Good pedestrian access delivers high quality, equitable, safe and pleasant walking environments along the street, into the dormitories and mixed-use buildings.

Figure 31.Pedestrian and cyclist's street

Intentions

- To ensure that Streets are used as public space where a various activity simultaneously take place.
- To provide direct, safe and appropriate pedestrian circulation to all areas of the development whenever possible.

Guideline

- ✓ Use the narrowest cross-section feasible for vehicular traffic to reduce impervious surface.
- ✓ Within street rights-of-way, walkways should be of sufficient width to create a pedestrian-friendly atmosphere.
- ✓ Crosswalks should be enhanced with special paving material to emphasize priority of the pedestrian.
- ✓ Traffic-calming measures such as speed breakers should be introduced wherever feasible.
- ✓ Ensure that People be able to move around, stroll and window shop at ease, along shaded and well-surfaced walkways.
- ✓ Ensure that seats, benches and water fountains are provided.
- ✓ Walkways should be barrier-free.
- ✓ Promote a walkable pedestrian friendly and attractive streetscape.
- ✓ Furnish streets with tree linings complete with all public amenities and quality landscaping.
- ✓ Address parking provision within the plots and as underground parking in the commercial and mixed-use buildings.

Section Ⅴ: Architectural guidelines

1. Introduction

The way places and buildings are planned and designed matters in many ways. The guidelines address the strategies for the design of buildings to complement and enhance the overall visual effect of the residential area. When a building is proposed, the contextual assessment, Site Guidelines and all of the Architectural Guidelines should be considered. If well designed and guided for better livability the built environment can be a source of joy. Livable spaces also influence health safety, community cohesion and prosperity.

2. Functional Layout (for Dormitories)

Functional dormitory and apartments layouts which meet the needs of residents with room sizes and configurations are appropriate for their intended use. The long-term needs of the community require a range of housing types, so people of different income group, backgrounds and needs are provided for. Workers' dormitory and the apartments should meet certain minimum standards and specifications in respect of the nature and standard of the accommodation and facilities to be made available.

Intentions

- To fashion comfortable living space which fulfills basic requirements.

Guideline

- The dormitory building shall be 5 floors without elevator.
- Minimum floor size per person shall be 3.6m^2; and the total share of space for one person should be within 7m^2 to 8m^2 (*).
- The number of workers sharing the same room should ranges from 6 to 8 (*).
- Minimum floor to ceiling height should be 3.2m (*).
- The ratio of window area coverage to wall has to be 0.4-0.5.
- Balconies can be incorporated as an additional living space and for multipurpose usage.
- The dormitory blocks must have an emergency evacuation assembly area.
- The building should have enough emergency exit as per the requirement of Ethiopian building regulation.

- Fire safety measures shall be taken; safety exits must be maintained and marked.
- Whenever possible the ground floor can incorporate shops and other services.
- Rooms for disabled persons should be provided on the ground floor & should have a ramp access.
- Room names, spaces for disabled people & permitted number of occupants must be indicated on the design.
- Separate accommodation of the sexes and a separate bed for each worker is mandatory.
- In order to ensure ease in construction, faster time and ease in quality check, design is expected to have modular designs.
- Beds should not be arranged in tiers of more than two; there must be enough clear space between the lower and upper bunk of the bed. From 0.7 to 1.10m and minimum space between beds must be 1m.
- Rooms should have Adequate natural light during the daytime; and adequate ventilation to ensure sufficient movement of air in all conditions of weather and climate.
- A ventilated clothes locker which can be locked by the occupant to ensure privacy should be provided.
- Common dining rooms and canteens that fulfills COVID 19 protocols should be located within the building away from the sleeping areas and should have reasonable space.
- Recreation rooms and health facilities, shall be provided.
- As a safety measure one Isolation room per floor should be provided (*).
- Toilet, Shower/bathroom facilities shall be provided to workers. 1 unit shall serve from 6 to 8 persons and should be maneuvered mechanically (*).
- Toilet facilities shall be conveniently located and easily accessible. The maximum distance can range from 18 to 24m from rooms.
- All the water supply system shall have water saving mechanism.
- Enough water storage should be provided whenever necessary.
- Using alternative on-site sources of water (e.g., rainwater, storm water, and gray water) for toilet and urinal flushing should be considered.
- Adequate drainage shall be provided.
- Garbage facilities should be provided away from the main entrance.
- There shall be adequate laundry facilities which are appropriately situated.

** Consideration on COVID19*

3. Outdoor Circulation

One of the defining characteristics of the residential area is the integration of buildings with outdoor spaces. The careful siting of buildings helps give definition to open spaces, creating interesting experiences across the development area.

Intentions

- To engage residents with the outdoor space.
- To define the outdoor spaces and create a sense of place.

Guideline

- Buildings should be located and designed to support, enhance and activate common outdoor space.
- Whenever possible utilize covered but not enclosed exterior circulation.
- Incorporate exterior circulation elements and gathering spaces
- Within a plot create Exterior connections between buildings to encourage cohesion.

Figure 32.Buildings and outdoor activity (Figure Adopted)

4. Building Orientation

Orientation is the position of a building and its internal spaces in relation to its site, the street, the open spaces and neighboring buildings. The careful siting and orientation of buildings helps define the character of the development. Building orientation directly affects facilities including daylight access and privacy to both the development and neighboring sites.

Intentions

- To coordinate the building to the street, open spaces and neighboring buildings.

Guideline

- Orientation should consider solar angles and wind direction.
- Consider the main entrances and pedestrian circulation around the building.
- Buildings should help frame significant view and respond to the topography and other constraints.
- Building orientation should consider future development on or adjacent to the site.

5. Public– Private Interface

Buildings should not simply define or enclose an open space but should also actively engage them. It is at the ground floor where people interact most directly with a building, so the scale should be more in harmony with human dimensions and perception. Ground floor space offers the potential for private open spaces and direct access from the street. They also provide opportunities for the building and its landscape to respond to the human scale of the streetscape.

Figure 33. Hand washing area in the ground floor

Intentions

- To maintain human scale and encourage activity in and around the buildings.

Guideline

- Coordinate the design of the ground floors of buildings with the design of the adjacent open spaces.
- Provide transparent and open ground floors surge the interaction between inside and outside.
- In the mixed and commercial areas facades at the ground floor should be open to view from adjacent spaces.
- Avoid blank walls at the ground floors.
- Permeable ground floor areas such as open connections to internal courtyards should be incorporated.

6. Building Materials

The selection of building materials should be sensitive to the overall development as well as the immediate surroundings of the building. Buildings, materials and colors should be harmonious with the surrounding to achieve an overall sense of unity. The selection of building materials should establish a sense of permanence and quality.

Intentions

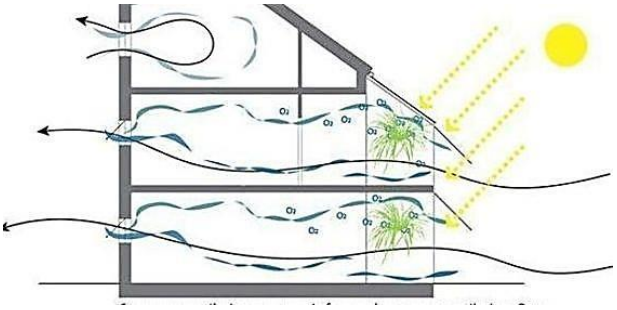
- To create a harmonious built environment.

Guideline

- Select materials produced as close to Addis Ababa as much as possible.
- Consider materials produced with minimal impacts to the environment.
- Reflective glass should not be permitted at any part of the development.
- Select materials which ensure durability and ease of maintenance.

7. Sustainable Building Design

An appropriate response to climate is essential to a building's success. The siting and layout of a building Should consider the climatic factors such as solar gain and natural ventilation. The buildings response to the sun and wind is a major factor in the functionality of the building.



Intentions

- To provide the ability for building occupants to control their indoor environments through natural means.

Guideline

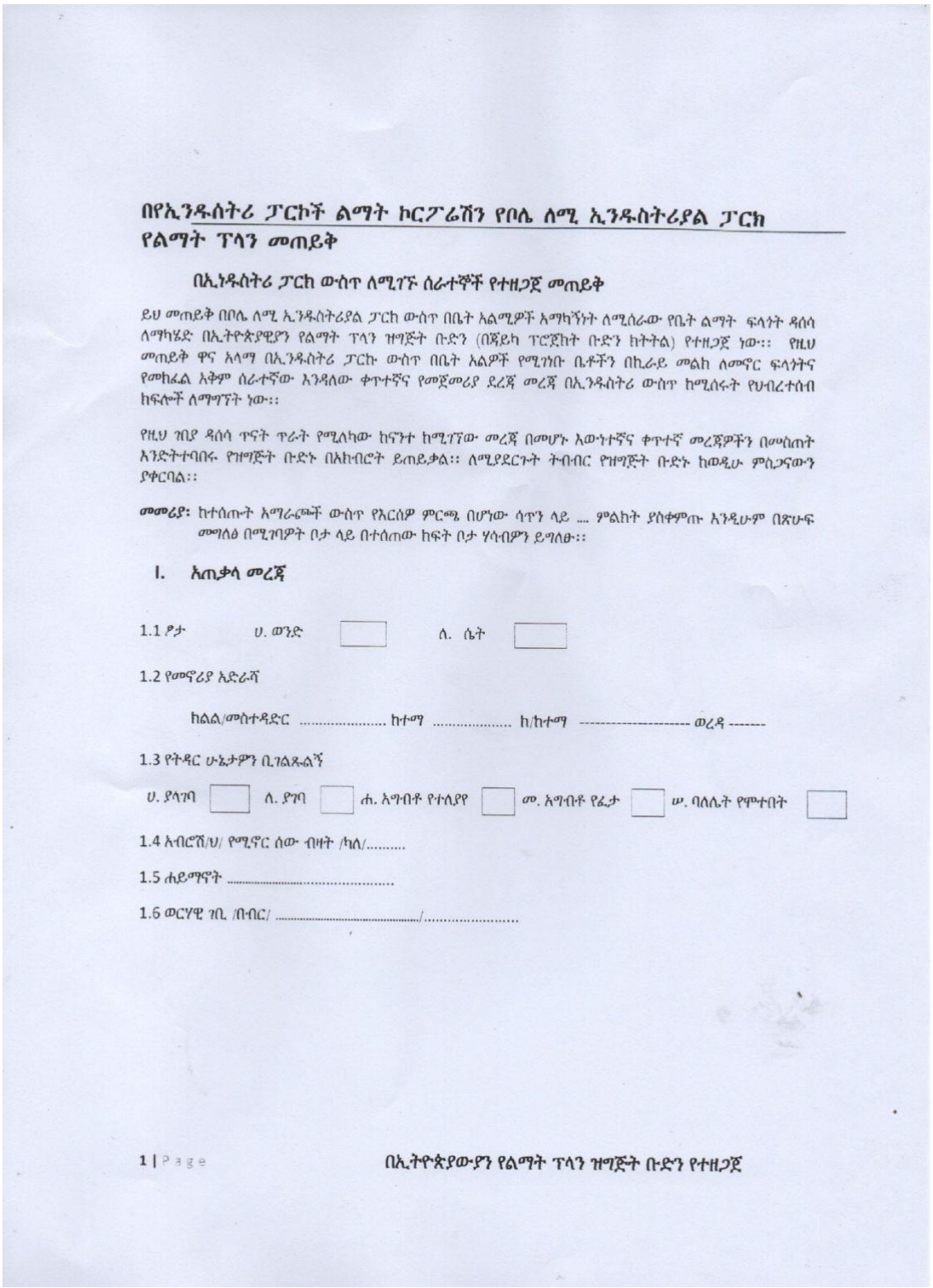
- ✓ Integrate building and landscape design.
- ✓ If possible incorporate green roofs and photovoltaic systems in building facades or rooftops.
- ✓ Maximize daylighting opportunities.
- ✓ Use energy efficient appliances.
- ✓ Provide charging stations for electric powered scooters, cycles and cars.
- ✓ Make sure that each building has a LED screen on the ground floor that display energy and water consumption of the building.
- ✓ Ensure the availability of indoor and outdoor camera and security system.
- ✓ Placement and orientation of openings should take advantage of solar orientation and natural breezes.
- ✓ Use of building elements for protection from sun, wind and rain should be encouraged.
- ✓ Employ building envelope, layout and building depth which enhance natural ventilation.

References

1. Adler, David (Ed.). (1999). Metric Handbook Planning and Design Data. Oxford: Architectural Press.
2. AACPPO. (2016). Addis Ababa City Structure Plan (2017-2027, Final Draft). Addis Ababa.
3. IPDC. (2019). Bole Lemi Smart Industrial City Master Plan (Final Report). Addis Ababa.
4. Neufert, Ernest and Peter. (). Architect's Data. Oxford: Blackwell Science.
5. City of London Industrial Parks. (). Architectural Control guidelines. Ontario: Canada.
6. AASOID and EiABC. (2015). Addis Ababa's Main City Center Urban Design Guideline. Ethiopia.
7. International Worker Housing Standards, A comparison of ILO and IFC standards. (2017)
8. Hamdi, Nabeel. (1995). Housing without Houses. Warwickshire. Practical action Publishing Ltd
9. PDC, EFDR. (2021). Ten Years development Plan,2021-2030.Addis Ababa.

Appendix

I. Housing Demand questioners



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በኢነዱስትሪ ፓርክ ውስጥ ለሚገኙ ሰራተኞች የተዘጋጀ መጠይቅ

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I. አጠቃላ መረጃ

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1.3 የትዳር ሁኔታዎን ቢገልጹልኝ

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1.4 አብሮሽ/ህ/ የሚኖር ሰው ብዛት /ካለ/.....

1.5 ሐይማኖት .....

1.6 ወርሃዊ ገቢ /በብር/ ...../.....

II. በኢንዱስትሪ ፓርክ የሚሰሩ ሰራተኞች የስራ ቦታ ተደራሽነት

2.1 የትኞቹን የመጓጓዣ/የትራንስፖርት አይነትዎች ከመኖሪያ ቤትዎ ስራ ቦታ ደርሶ ለመመለስ ይጠቀማሉ?

ተ.ቁ.	የመጓጓዣ/የትራንስፖርት አይነትዎች	ከመኖሪያ ቤት - ስራ ቦታ	ከስራ ቦታ - መኖሪያ ቤት	አስተያየት
1	ታክሲ/ሚኒባስ			
2	ሐይገር/ሎንቾን			
3	አንበሳ ባስ			
4	ባጃጅ			
5	ሞተር ሳይክል			
6	ቢሽክሊሊት/ሳይክል			
7	ጋሪ			
8	የእግር ጉዞ			
9	ሌላ (እባክዎ ይግለጹ)			

2.2 ከመኖሪያ ቤትዎ ስራ ቦታ ሲመላለሱ በአማካይ የሚወስድበዎት ሰዓት ቢገልጹልኝ?

ተ.ቁ.	የመጓጓዣ/የትራንስፖርት አይነትዎች	ከመኖሪያ ቤት - ስራ ቦታ	ከስራ ቦታ - መኖሪያ ቤት	አስተያየት
1	ታክሲ/ሚኒባስ			
2	ሐይገር/ሎንቾን			
3	አንበሳ ባስ			
4	ባጃጅ			
5	ሞተር ሳይክል			
6	ቢሽክሊሊት/ሳይክል			
7	ጋሪ			
8	የእግር ጉዞ			
9	ሌላ (እባክዎ ይግለጹ)			

2.3 ከመኖሪያ ቤትዎ ስራ ቦታዎ በሚመላለሲባቸው ጊዜያት የሚያጋጥምዎትን ነገሮች ቢነገሩን? .....

III. በኢንዱስትሪ ፓርክ የሚሰሩ ሰራተኞች የመኖሪያ ቤት ፍላጎት

3.1 አሁን የሚኖሩበት የቤት ሰሪት አይነት የትኛው ነው?

ተ.ቁ.	የቤት ሰሪት አይነት	ይዞታ	ኪራይ	ጥሻ	ሌላ (እባክዎ ይግለጹ)
1	የግል				
2	የማህበር				
3	ኮንዶሚኒየም				
4	የመንግስት				
5	ሀገሀጥ/የጨረቃ				
6	ሌላ (እባክዎ ይግለጹ)				

3.2 አሁን የሚኖሩት በኪራይ ቤት ውስጥ ከሆነ በወር ምን ያህል ብር ይከፍላሉ?

...../.....

3.3 አሁን በሚሰሩበት አካባቢ ቤት አልሚ ባለሃብት የመኖሪያ ቤት ቢያቀርብለዎት ለመከራየት ፍላጎት አለዎት?

A. አዎ ☐ B. አልፈልግም ☐

3.4. በተራ ቁጥር 3.3 ለተጠየቀው ጥያቄ መልስዎ አዎ ከሆነ ምን አይነት ቤት ለመከራየት ይፈልጋሉ?

ተ.ቁ.	የቤቱ አይነት	የእርሰዎ ምርጫ	ለምርጫዎ ደረጃ ይስጡት
	የመኖሪያ ቤት ለከፍተኛ እና መካከለኛ ደረጃ አመራረ		
1.1	ቪላ		
1.2	መደዴ ቤት		
	ኢፓርትመንት ቤት ለቡድን መሪዎች/ሱፐርቫይዘሮች		
2.1	ስቱዲዮ		
2.4	ባለ አንድ መኝታ		
2.5	ባለ ሁለት መኝታ		
2.6	ባለ ሦስት መኝታ		
	ዶርሚቶሪ ለሰራተኞች		
3.1	አንድ ክፍል ለአንድ ሰው		
3.2	አንድ ክፍል ለሁለት (2) ሰው		
3.3	አንድ ክፍል ለአራት (4) ሰው		
3.4	አንድ ክፍል ለስድስት (6) ሰው		
3.5	አንድ ክፍል ለስምንት (8) ሰው		

3.4 አሁን በሚሰሩበት የኢንዱስትሪ ፓርኩ ውስጥ የቤት አልሚ ባለሃብት የመኖሪያ ቤት ቢያቀርብለዎት በምን ያክል ለመከራየት ይችላሉ?.....

አመሰግናለሁ!

Figure 33. Housing Demand Survey Questions

II. Contextual assessments considerations for developers

Developers will need to determine which of the major features of the area are positive and will strengthen the character of the area. Some of the major features that might be included;

1. the existing landform,
2. views into and out of the site, and
3. Routes to and from destinations.

Developers are expected to conduct contextual assessment at three levels, the site, its immediate neighboring area and the wider local area.

1. At the Site Level

   Identify the key allowable and existing features, including its landform, open spaces, streets and land uses.

2. Relation with the Immediate Neighboring

   Analyze, important views into and out of the site, existing streets, and the character of neighboring development.

3. Wider Local Area

   The positive features of the surrounding local area.

The assessment should be used to help determine the character of the new development. The major issues to be adhered to are factors such as;

- ✓ sustainability,
- ✓ achieving the density, and
- ✓ providing appropriate open space.

III. Proposed maximum Parcels for the development

IV. Sample street sections

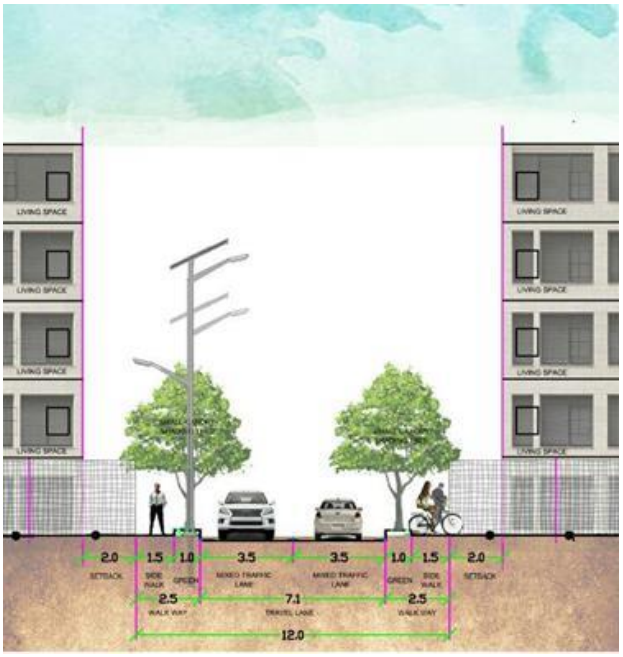


Figure 34. Local Street

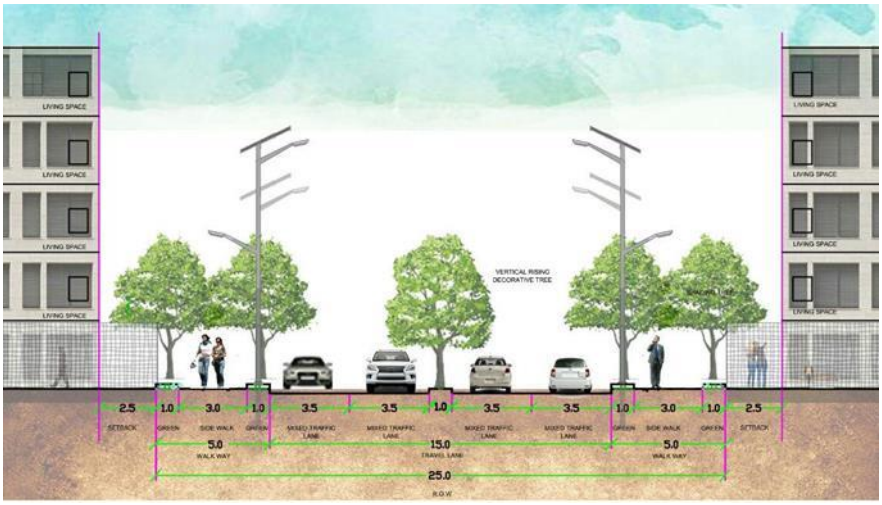


Figure 35.Sub Arterial Street

V. Proposed Plants Index

Table 8. Suggested Plants Index

No.	Figure	Plant Name (Local)	Scientific Name	Min Spacing Between seedlings	Maximum Growth in Height	Type of Plant	Purpose	Appropriate location to Plant
1		Weira	Olea Europaea Var. Africana	10 to 12m	10-15m	Ornamental tree Plant	Good for soil conservation, Medicinal Value and can Be used as toothbrushes (twigs)	Near the river side area and steep slope areas.
2		Bazra girar	Acacia Abyssinica	10 to 12m	Up to 20m	Ornamental tree plant	Good for soil conservation and, Nitrogen fixation	Near the river side area and steep slope areas.
3		African tulip tree	Spathodea campanulata	8 to 10m	10-15m	Ornamental Tree Plant	Can Be used as a shade and Wind breaker	Near the Dormitory housing area and open spaces.
4		Grevillea	Grevillea Robusta	8 to 10m	Up to 20m	Ornamental Tree Plant	Good for soil conservation, ornamental, shade, windbreak Easy To grow in few years.	On the Street side and open spaces
5		Neem	Azadirachta Indica	10 to 12m	Up to 20m	Ornamental Tree Plant	Good for soil conservation, ornamental, shade, windbreak,	Near Open Spaces, Solid Waste collection or

							insecticide and Fast Growing.	temporal dumping sites.
6		Yetebmenja zaf	Jacaranda mimosifolia	10 to 12m		Flowering Ornamental Tree	Ornamental, windbreak, shade	Near the Dormitory housing area, open spaces and Street sides
7		Girangire	Sesbania Sesban	5 to 8m	Up to 8m	Shrub or Tree	Can be mulch, soil improvement, soil conservation, nitrogen fixation, shade	Near the river side area, open spaces and steep slope areas.
8		Duranta	Duranta erecta	0.50 to 1 m	Up to 6m	Shrub, ornamental	For fencing purpose of Gardens, open spaces, beautification of gardens and separating spaces	On the Open space edges, dormitory Edges, Street Median and other public spaces
9		Cigar Plant	Cuphea	0.50 to 1 m	Up to 8m	Shrub, ornamental	Beautification of gardens and can attract different butterflies due to its nectar.	On the Open space gardens, dormitory Edges, Street Median and other public spaces
10		Kega	Rosa abyssinica	1 to 2m	Up to 7m	Indigenous Rose Shrub, ornamental	Food (fruit), Beautification of gardens and can attract different	On the Open space gardens and dormitory Edges.

							butterflies due to its nectar	
11		Mango	Mangifera indica	8 to 10m	Up to 15m	Food Plant/ tree	Firewood, fodder (leaves), food (fruit), bee forage, ornamental, Shade, windbreak, soil conservation, gum.	On the Open spaces and Near the Dormitory Areas.
12		Kazmir Fruit	Casimiroa edulis	8 to 10m	5 to 16m	Food Plant/ tree	Food (fruit), Shade, windbreak, soil conservation, gum.	On the Open spaces and Near the Dormitory Areas.
13		Avocado	Persea americana	8 to 10m	Up to 10m	Food Plant/ tree	Food (fruit), shade, cosmetics, oil (fruit).	On the Open spaces and Near the Dormitory Areas.

Green-Smart Building

A report: the suggested interventions on the

“Administration Building “

Prepared by EIPP

Table of Contents

List of Figures

1. Introduction

Green buildings are buildings designed and constructed in accordance with environmental friendly principles. Green buildings strive to minimize the number of resources consumed in the building construction, operation and demolition. Nowadays with climate change green buildings are becoming a typical phenomenon in the world. Green-Smart buildings are the answer in creation of healthier and more resource efficient environment.

2. General description

The new administration building /“One stop service building”/ in Bole Lemi industrial park is a building which will accommodate variety of service providers such as Customs, Textile Industry Development Institute, Leather Development Institute, Immigration Office, Banks etc. The building lies on a 2.6Ha of land of which the foot-print of the building takes 15% and, 47.6% is dedicated as a green space.

Figure 1.Site Layout

The basic function of the building is as an office building and the total floor area is around 11,523m^2. Expected Number of Workers will be around 576. As it could be seen from the site plan the main entrance of the building is on the northern part while it has a service entrance at the southern and western parts.

Picture 1 Space allocated as Green-Recreational Area

The building is well designed with two internal green courtyards (27.3m^2 & 125.6m^2 respectively) and a flat roof with an area of 1463.5$m^{2.}$. Although the solid-void ratio of the envelop are proportional , in parts of the building there is shortage of natural light within the building, this is due to the depth of the building.

Picture 2. View of the Entrance area

3. Importance of the intervention

The importance of retrofitting the "One stop" building "Green-smart" has at least three advantages

a. It will improve employee's satisfaction by creating comfort within and around the building.
b. It will Create attractive and informative environment for visitors &
c. In a longer period it will minimize the environmental cost of the building

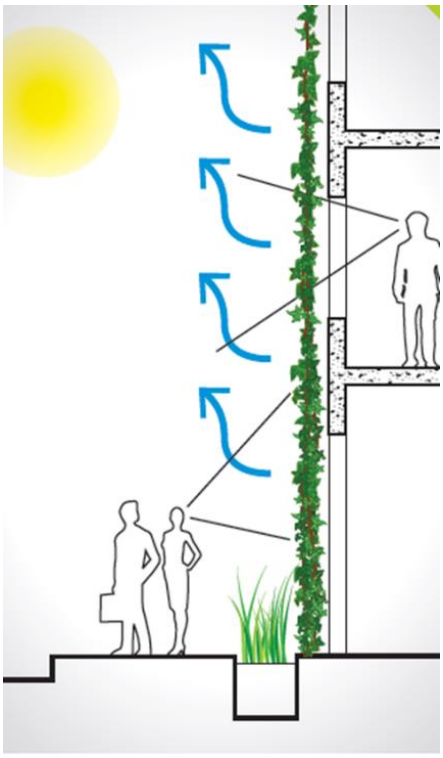
4. Scope of intervention

BLSIC is a smart city and smart cities are expected to have smart buildings, in this specific case smart - green buildings. To be used as a showcase of smartness it is proposed to amend the existing Administration building into green-smart building.

- **The vision is to retrofit a selected buildings and make it seamlessly fulfill its mission while becoming a showcase for sustainability as well as Smartness in BL-SIC."**

In discussing about retrofitting buildings the most important factor to consider is the depth of intervention. In this specific case, the construction works of the "one stop "building is on the final stage hence our intervention is supposed to take into consideration this "hard" fact. The team has been studying possible scenarios that could be implemented. Accordingly, considering the existing condition, it was proposed that the retrofitting should focus:

- On creating Green walls and roofs
- On improving information system through Construction of display walls



5. Proposed intervention

Creating green wall and roof is the most effective approach of concise and rapid way to improve the images of the industrial park. In general Green will provide multiple benefits which include:

- reduction of thermal loading and heat island effect
- air purification and noise reduction
- enriching effect on those who see it
- deliver useful building services that make occupants more productive

I. <u>Green wall and Roof</u>

The team proposed to construct a wire mesh of the size 1.0m x 18.2m every 1.0m distance on the façade of the building except the entrances. This "Green Facade" will help the growth of various types of climber plants at a distance of 30cm from the main wall. Vertically it will be attached with the main wall with hooks at every 120cm.

Figure 2. The green wall

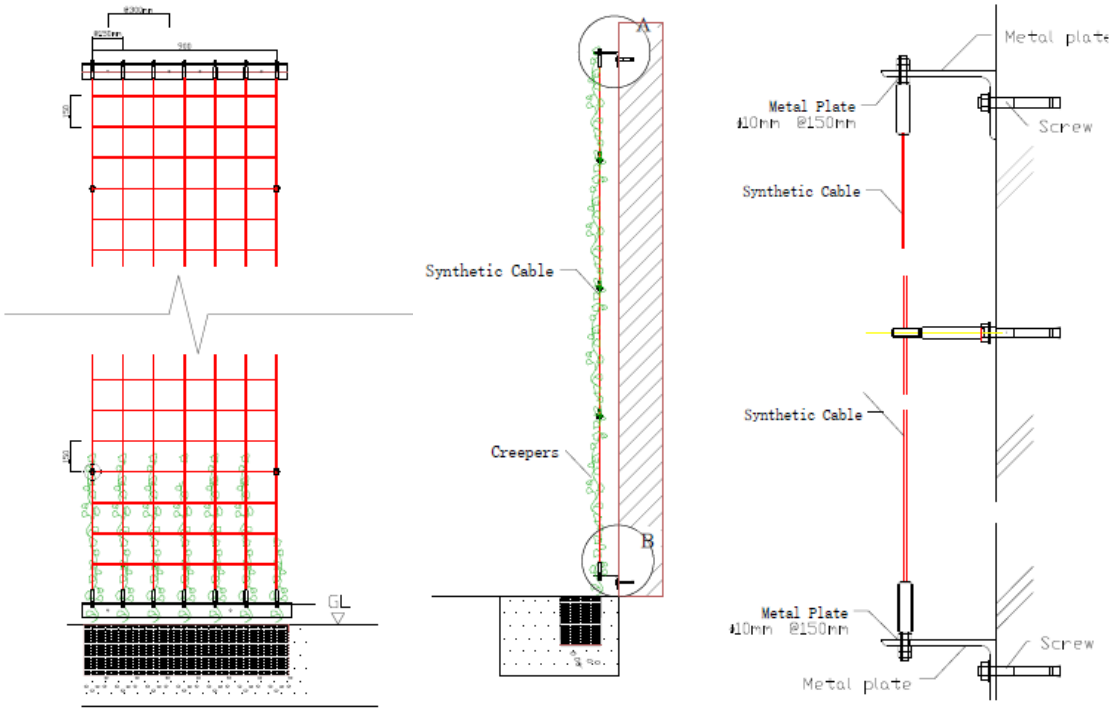


Figure 3. Proposed details of the green wall

On the flat roof the team suggested constructing “flower pots-roof garden” throughout the perimeter and on selected places. This will minimize the weight on the building while providing a garden on the top of the building.

Figure 4.The Roof garden and the green wall

A portion of the roof (1463.5m^2*0.70=1.024.45 $m^{2)}$ is suggested to be used as workers “cafeteria” in addition to the one on the ground floor. This might generate additional income.

Figure 5. Sitting areas on the roof

A common consideration in green roofs and facades is the irrigation system and the growing media. In order to determine the water consumption by the green wall and roof garden the one stop building, FAO guideline for crop water requirement is considered. Accordingly standard crop water requirement, application depth and water application interval is obtained .Based on the crop water requirement and area of the garden the volume of water is calculated considering two months of rainy season. Hence for drip irrigation two 10,000lt water tankers are proposed to be used.

Figure 6. Plumbing system for drip Irrigation

II. Display Screen

Smartness is directly related with information and every smart building needs to be informative. Hence the team suggested to construct a “display screen wall” with the size 120cm X 1200cm at the first floor visible from the lobby. This “display wall” will help to inform visitors and employees on the activities of IPDC and the different Industrial Parks within the country. The things to be displayed and the activities within the building has to be monitored by using an up-to-date information technology system. Hence the team proposed for the purchase and installment of modern it system in the security center

Figure 7. Display Wall

6. Cost of intervention

It is an obvious fact that to go “smarter and greener “leads to an increased overall cost of construction. However, in the long run it costs much lesser to operate a green building in contrast to a conservative building. There are various interventions that could be done to make a building “smarter and greener “. Considering the construction status of the building the team thought of sticking to the minimum intervention in terms of its physical effect on the building and general cost. Accordingly the major cost of intervention is as stated below:

a. General cost of the green wall:*580,560.00 ETB*
b. General cost of the green roof:*2,341,600.00ETB*
c. General cost of the Equipment for information system:*249,000.00ETB*
d. General cost of the Equipment for information system:*356,445.00ETB*

Cost of Retrofitting the Administration Building (One stop Building)

No.	Item	Unit	Unit Cost/M2 (ETB)/Rate	Total quantity	Total Cost in ETB	Total Cost in USD
1	Roof Greenery	m2	1,600.00	1463.5	2,341,600.00	82,742.05
2	Wall Greenery Mesh system: green wall with gabion mesh lined with steel pipe including workmanship including wire system with hooks, detail can be modified according to site condition.	m2	800.00	725.7	580,560.00	20,514.49
3	Construction of Display wall	m	13,350.00	26.7	356,445.00	12,595.23
4	Equipment for information center	LS	249,000.00	1	249,000.00	8,798.59
5	Miscellaneous Works	LS	705,000.00	1	705,000.00	24,911.66
	Total				**4,232,605.00**	**124,650.35**

N.B

LS= Lump sum

m-Linear Meter

m2-Meter Square

7. A way forward

Green building are profitable for all stake holders, the owner, occupants, the environment and society as a whole. There are at least five criterion to be considered for green certification (LEED). These are: Sustainable site planning, Water efficiency, Energy efficiency, Materials and resources conservation and Indoor environmental quality.

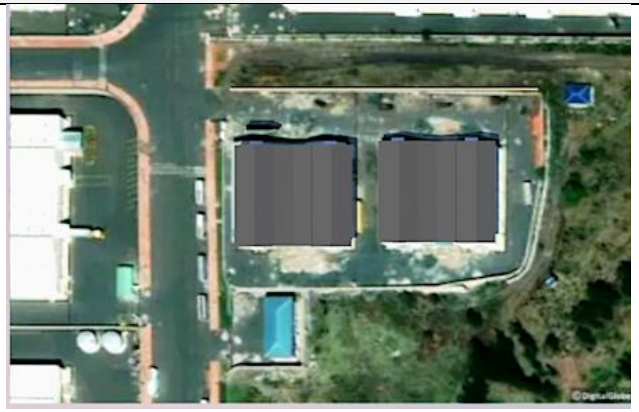
Since the construction process of the “One Stop” building is at the final stage, the proposed interventions focused on two of the criterion, which are sustainable site planning and indoor environmental quality. This has been proposed to be achieved through minimum interventions on the building envelop, roof top and on the information system. It should be stressed that if properly implemented this “minor” interventions will make the “One stop “building to be attractive and the focus of attention within the Bole lemi Industrial city.

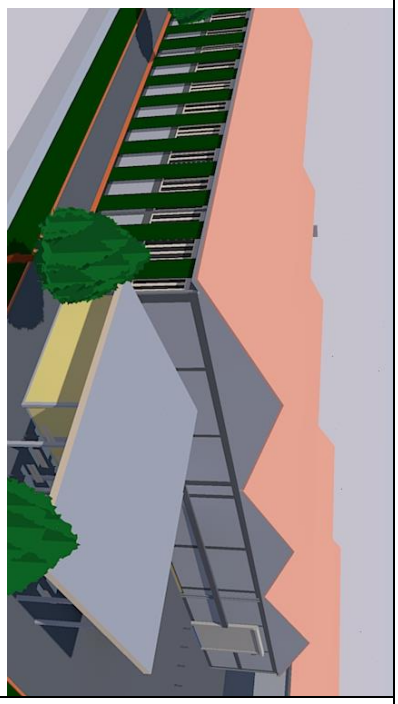
In addition to these interventions, the team also suggests that development of other Green buildings within the park should be considered in the future (see the proposed retrofitted green shed attached). Although there are substantial costs in the beginning of the projects through time the returns in terms of energy conservation and indoor environmental quality, compensates the cost incurred at the beginning.

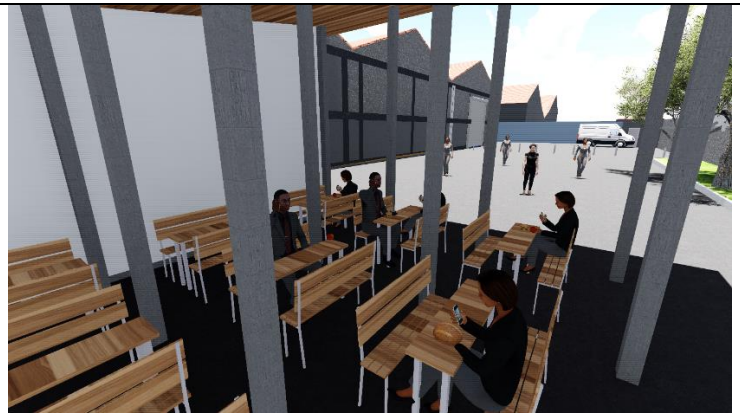
8. Annexes

I. Renovation of Bole Lemi Warehouse into Small shed

The team has been working on possibilities of renovating an existing warehouse in Bole Lemi industrial Park into green shed .The following pages show pictorial description and cost based on the analysis conducted from the study.

Description	Picture	Picture
Site layout of the existing Ware House		

Changing Room and Green wall	Staff Lounge and the green wall
	
	

Staff Lounge		

Renovation and Maintenance cost of Bole Lemi Ware house

No.	Item	Unit	Unit Cost/M2 (ETB)/Rate	Total qty	Total Cost in ETB	Total Cost in USD
1	External Wall painting	m^2	40.00	600	24,000.00	851.37
2	Landscape Gardening	m^2	600.00	294	176,400.00	6257.54
3	Mass Concrete Pavement thickness of 15 cm by 1m width around the ware house	m	500.00	26.7	13350.00	473.57
4	Four sliding Doors	No	94300.00	4	377200.00	13380.63
5	Repairing of surface drainage grits	LS	60000.00	1	60000.00	2128.41
6	Construction of workers lounge	No	11500.00	140	1,610,000.00	57112.45
7	Construction of Solid waste Storage and sorting	No	8000.00	30	240,000.00	8513.66
8	Green Wall with Wire Mesh	m	1500.00	100	150,000.00	5321.04
9	Electric lighting of the compound	No	43,855.50	16	701,688.00	23,389.60
10	Fence and common gate	LS	621,540.00	1	621,540.00	20,718.00
11	Roof and Truss Work	m^2	4,515.00	800	3,612,000.00	20,400.00
12	Down pipe and Gutter	m	1900.00	288	547,200.00	18,240.00
13	Asphalt Pavement	m^3	3100.00	822.9	2,550,990.00	85,033.00
14	Automatic Door for the lobby	No	91,600.00	1	91,600.00	3,053.33
15	Infrastructure	LS	664,569.00	1	664,569.00	22,152.30
16	Interior floor renovation	m^2	700.00	1800	1,260,000.00	42,000.00
17	Construction of Toilet and Shower	No	800,000.00	1	800,000.00	26,666.67
19	Miscellaneous works	LS	675,026.85	1	675,026.85	22,500.90
	Total				**14,175,563.85**	**478,192.46**

* **Not Including interior renovation cost**

IPDC
Industrial Parks Development Corporation
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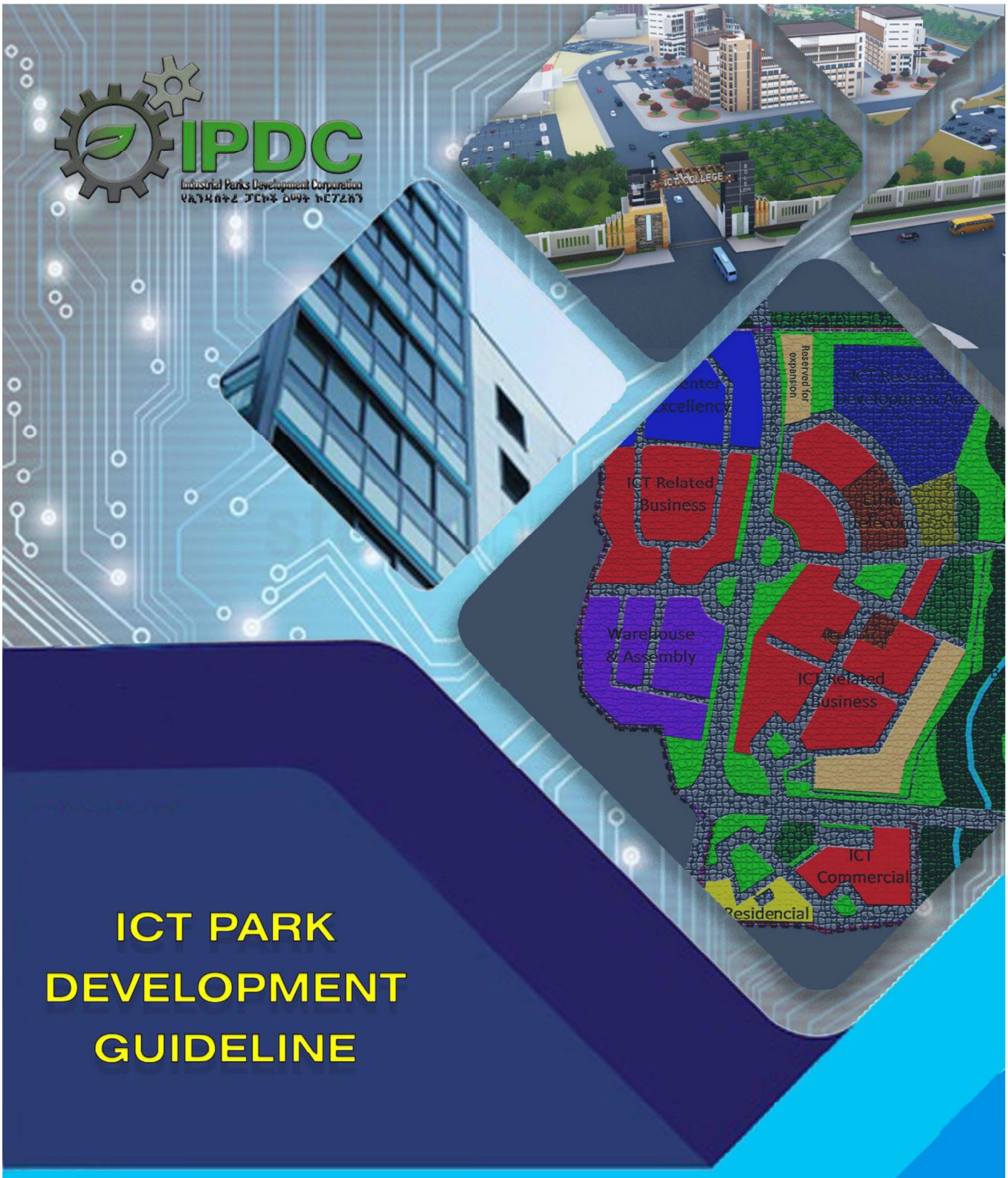

ICT PARK DEVELOPMENT GUIDELINE

JICA

EIPP

SECTION - I

ROAD MAP FOR ICT PARK DEVELOPMENT

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Acronyms

AAWSA	Addis Ababa Water and Sewerage Authority
ADB	Africa Development Bank
BD	Board of Directors
BLIP	Bole Lemi Industrial Park
BLSIC	Bole Lemi Smart Industrial City
BOD	Biochemical Oxygen Demand
CBD	Central Business District
CEO	Chief Executive Officers
CMA	Cleansing Management Agency
CR	Cost Recovery
CRTC	Computer Refurbishment and Training Center
CSA	Central Statistics Agency
CSS	Compact Sub-Stations
EAMG	Environmental Assessment and Management Guideline
EBA	Ethiopian Broadcasting Authority
EC	European Commission
EEU	Ethiopian Electric Utility
EIA	Environment Impact Assessment
EICTDA	Ethiopian ICT Development Agency
EIPP	Ethiopian Industrial Parks Promotion
EmoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPRDF	Ethiopian People Revolutionary Front
ERA	Ethiopia Road Authority
ERCA	Ethiopian Revenue and Customs Authority
ESIA	Environmental and Social Impact Assessment
ETA	Ethiopian Telecommunication Agency

ETB	Ethiopian Birr
ETC	Ethiopian Telecommunication Corporation
FDRE	Federal Democratic Republic of Ethiopia
GCI	Global Competitiveness Index
GDP	Growth Domestic Product
GESCI	Global e-Schools and Communities Initiative
GTP	Growth and Transformation Plan
HF	High Frequency
HRM	Human Resource Management
HV	High Volt
ICT	Information Communication Technology
IDI	Intercultural Development Inventory
IGNIS	Income Generation and Climate Protection
IMF	International Monitoring Fund
IPDC	Industrial Parks Development Corporation
IT	Information Technology
ITPC	Information Technology Park Corporation
ITU	International Telecommunication Union
JICA	Japan International Cooperation Agency
KVA	Kilo Volt Ampere
LED	Light Emitting Diode
LMT	Land Mark Tower
LTE	Long-Term Evolution
LV	Low Volte
MCIT	Ministry of Communication Information Technology
MCIT	Ministry of Communication and Information Technology
METEC	Metals and Engineering Corporation
MIS	Management Information System
MoI	Ministry of Infrastructure
MoUDHC	Ministry of Urban Development and Housing Construction

MoWIE	Ministry of Water, Irrigation and Electricity
MSAG	Multi Service Access Gateway
MSE	Micro and Small-Scale Enterprises
MV	Medium Volte
MVA	Mega Volt Ampere
NESB	National Enterprise Service Bus
NOD	Nitrogen Oxygen Demand
NPC	National Planning Commission
PKI	Public Key Infrastructure
PP	Poly-Propylene
RMU	Ring Main Unit
STP	Sewer Treatment Plant
SWM	Solid Waste management
SWMP	Solid Waste Management Plan
SWRDPO	Solid Waste Recycling and Deposal Project Office
UHF	Ultra High Frequency
UN-HABITAT	United Nations Human Settlements Programme
UNIDO	United Nation Industrial Development Organization
UNISCO	United Nations Educational, Scientific and Cultural Organization
VHF	Very High Frequency
WB	World Bank
WBG	World Bank Group
WEF	World Economic Forum
WWTP	Waste Water Treatment Plant

Definition of Terms

Asset: means any movable or immovable or intangible properties relating to ICT Park owned by public, public -private or private entities

Attack: includes destruction of computer based critical infrastructures or disruption of their services or obliterating the confidentiality, integrity or availability of information or computer based psychological attack on citizens or digital identity theft perpetrated by different techniques;

Call Center Service: means information provisioning service which is useful for a customer or potential customer by the initiation of the person providing the information himself or through a request made by the customer or potential customer by a telephone call or using internet, regarding the business or service the person is providing, or the business or service of another person, or on other similar issue

Close-Circuit Television/CCTV/: a camera that linked to central control rooms and computer systems allow observers to watch and record the movements and locations of individuals or groups of people.

Computer Aided Manufacturing /CAM/ has transformed the production of consumer goods ranging from small items like watches, televisions, DVD players to large industrial vehicles.

Computer Based Critical Infrastructure: includes industrial control systems, information management systems and infrastructures, cyber and telecom infrastructures, electromagnetic systems, geospatial infrastructures, military command and control infrastructures and any other infrastructures or systems that analyze, disseminate, store and retrieve information;

Computer Data Security: means the protection of a computer data from deleting, changing, and accessing by unauthorized person, compromising its confidentiality or any other damage;

Computer Emergency Response Center: means a center which is responsible for detecting, analyzing, warning citizen, recommending measures to be taken, devising recovery mechanisms on the issue of information and computer based infrastructure threats and enabling national and international coordination on such issue;

Computer: means any software and microchips technology based data processing, data storage,

data analysis, data dissemination and data communication device or any device that is capable of performing logical, arithmetic or routing, functions;

Control: ICT can be used to control other ICT systems or external devices by using data from sensors or instructions or commands written by the user.

Critical Infrastructure: means an infrastructure that can have considerable damage on public safety and the national interest, if attacked;

Cryptography: means a science of coding data so that they cannot be read or altered by any person or any machine other than the intended recipient or a science of authentication and non-repudiation in the electronic transaction;

Data Processing Service: means the service of reception, storage, processing, emission, routing or transmission of data by means of computer system and includes networking services;

Digital: a signal that have discrete values such as on/off, 1 or 0. In-between values are not used.

Disaster Recovery: Companies and organizations have to ensure that in the event of a total computer failure or data loss, they can recover their systems as soon as possible and with as little loss of data as possible. Disaster recovery procedures will include all the documents, policies and instructions for recovering the software and data to put the system back as it was before the problem occurred.

Domain: is names given to the addresses of computers on a network or on the internet. All the addresses are numbers which are difficult to remember so they are given names to make it easier for humans to use.

E-Commerce: Business activities involving consumers, manufacturers, suppliers, services providers and intermediaries using computer networks such as the Internet to conducts business

E-government: refers to government organizations' use of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that can transform relations with citizens, businesses, and other arms of government.

Encryption: is scrambled d by software using a preset key so that anyone viewing the data cannot understand it

File Server: A computer on a network that holds software, files and data so that they can be accessed by network users.

Firewall: is a security measure used to control access to networks or computer systems. Firewalls can be hardware or software and check each access to the network or system to make sure that it is allowed, using rules set up by the owner.

Information and Communication Technology Park: means an area with distinct boundary designated by the appropriate organ to develop comprehensive, integrated, multiple or selected functions of ICT industries, based on a planned fulfillment of infrastructure and various services such as road, electric power, water, fiber optics cable, duct, base transition station, and have special incentive schemes, with a broad view to achieving planned and systematic, development of ICT industries, mitigation of impacts of pollution on environment and human being and development of smart urban centers.

Information and Communication Technology: The convergence of technologies and information services in telecommunications, information technology, and broadcasting telecommunications, information technology, and broadcasting

Information: means an asset generated from any raw data obtained in the form of audio, texts, visual, map or orchestrated in any form including codes and programs used to command and control machines

Knowledge Based Economy: A country or region where ICT is extensively used and the foundation of the economic development is the knowledge of society.

Network: means the interconnection of two or more computer systems by which data processing service can be provided or received;

Security Audit: includes conducting penetration testing to computer based critical infrastructures to identify vulnerability or assessing institutions' information security system pursuant to the national information policy and standard and ordering, if necessary, corrective measures to be taken;

Security Testing and Evaluation: means pre-development, pre-procurement or pre-deployment testing and evaluating information technology products, services, systems and process,

pursuant to national security standards and criteria;

Technology Information: Embraces the use of computers and office systems technologies for the collection, processing, storing, packaging and dissemination of information.

Telecom Equipment: means any apparatus used or intended to be used for telecom service, and includes its accessory and software

Telecommunication Service: means Public Switched Telecommunication Service; Cellular Mobile Service; Interned Service; Satellite Telephone Service; Data Communication Service; Tele-centers or Resale Service; Mobile or Fixed Private Radio Service; VSAT (Very Small Aperture Terminal) Service; Cable Installation and Maintenance Service; Telecommunication Switches Installation and Maintenance Service; the transmission or reception through the agency of electricity or electromagnetism of any sounds, signs, signals, writing, images or intelligence of any nature by wire, radio, optical fiber, or other electromagnetic system or any other service designated as Telecommunication Service by responsible organ of the government.

Virtual Internet Service (V-Internet)" means the provision of dial-up internet access service, web hosting service, e-mail and other similar services to customers

Woreda-Net: A three-tier architecture based government network for use at Federal, Regional, and Woreda levels to provide basic IP services (Web service, VOIP (voice over IP), Directory Service, Messaging and Video Conferencing.

PART I: GENERAL BACKGROUND

1.1 Introduction

The Information technology (IT) Industry is viewed as a fast-growing strategic sector with capabilities to transform a developing country into a modern global economy (Hanna, 1994). Many developing countries recognize the potential of IT industries in contributing to their national development and have therefore focused on promoting it. India is an example of how the IT sector has driven the economic development of the country.

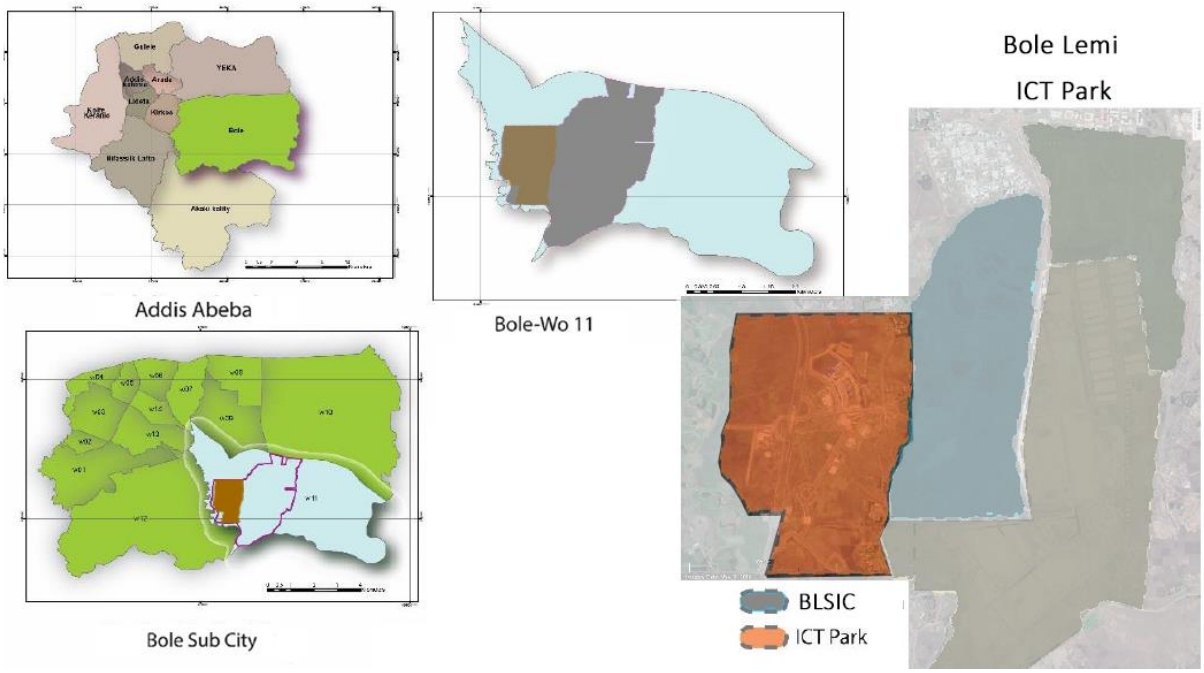
Globally, the IT industrial growth has been characterized by a conglomeration of heterogeneous mix of IT industries (e.g., computer hardware, Business Process Outsourcing and Software and IT services). At the national level, the Federal Democratic Republic of Ethiopia/FDRE/ has targeted Information Technology and Communications as one of its top five priorities for the development of the nation, which implies significant investments in ICT infrastructure. The Government has also realized the potential of IT Industries and has taken the initiative to establish an IT Park in the country.

The FDRE government recognizes information and communication technologies (ICTs), as the engines of growth and enablers of all other sectors. The government has adopted a series of policies and strategies including an ICT for Development (ICT4D) Action Plan, Rural Connectivity Program (RCP) and National e-Government Strategy that intend to accelerate the adoption of ICTs at household, individual, business and government levels.

In its effort to fast-track the local ICT sector development, the government has inaugurated an ICT Park project commonly known as 'Ethio ICT Village' in 2015. Since June 2018 the' Ethio ICT Village' has been operating under the umbrella of Industrial Parks Development Corporation /IPDC/ and its name is changed to ICT Park. The new ICT Park is intended to develop the local ICT sector, attract foreign investment, promote technology transfer and learning, create employment opportunities and spur participation of local companies in the global ICT Enabled Service (ITES) market.

1.2 Location

The ICT Park is located in south-eastern Addis Ababa at the Bole Lemi Industrial Zone. Taking this as economic of scale to robust the economic advantage of the industrial zone and for the realization of smart as well as eco-industrial city; the ICT Park was integrated with the Bole Lemi Industrial Park to form Bole Lemi Smart Industrial City.



Map 1. Location Map of The ICT Park

1.3 Vision

'To establish Ethiopia as the premier IT hub of Africa'

1.4 Mission

The mission of ICT Park is to:

- Provide impetus for the development of ICT sector in the country by offering a world class business environment along with a conducive policy and regulatory regime, state-of-the-art infrastructure and a value proposition geared towards positioning Ethiopia as the preferred IT hub of Africa.
- Create a destination for overseas investment and on-going generation of foreign earnings.
- Create employment and career opportunities for Ethiopian citizens.

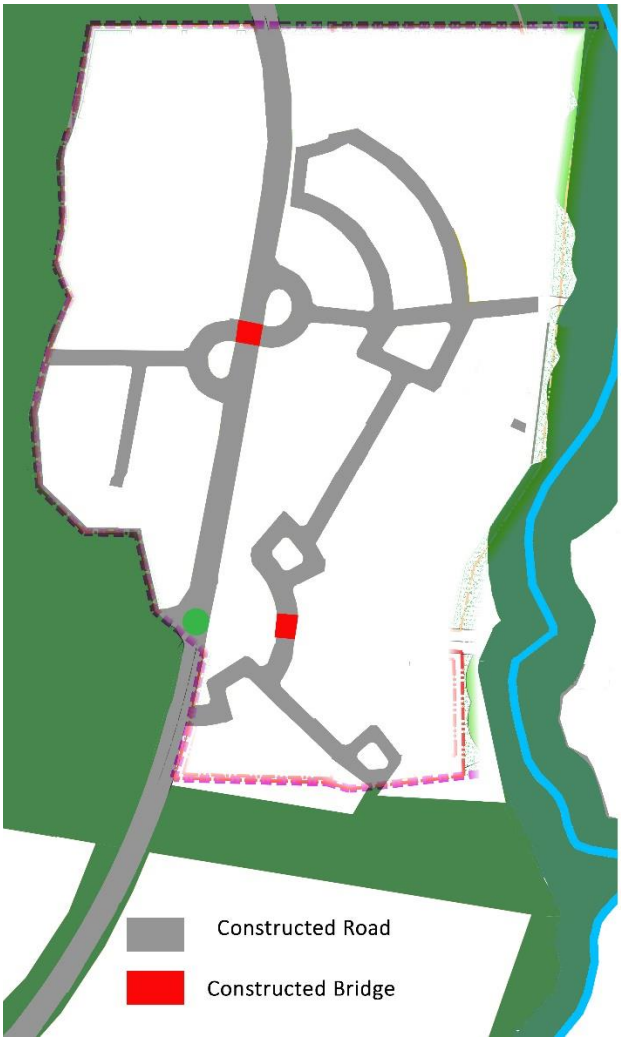
Part II: ANALYSIS OF THE EXISTING SITUATION

2.1 Physical Infrastructure Analysis

A. Street Network

The existing street network depicts that there is one major road that crosses the ICT Park from north to south. From this major road the eastern part has different roads that connect different functions such as: administration, incubation center and Ministry of Communication and Information Technology /MCIT/ buildings.

On the western part only two roads exist. The first makes connection of the eastern to western part of ICT Park, while the other road in the south eastern part of the park exists with the intention of dissecting 'fabricating area'. The existing road coverage of the ICT Park is about 5.5ha area coverage, which is 3.18% from the total area.



Map 2. Existing Street Network of the ICT Park

According to UN Habitat Global Urban Observatory estimation (UN Habitat, 2013)

Land allocated to streets should be labeled within the range of: Min 6% and Max 36%

$$\text{Land allotted to streets (LAS)} = \frac{100\ (\%\ \text{Land allotted to street-Min})}{\text{Max-Min}}$$

Decision:

100 if LAS ≥ 36

LAS if 6 < LAS

0 if LAS < 6

Accordingly, the existing land allocated to streets for the ICT Park is found to be -9.4. Therefore, land allotted to streets in the existing ICT Park is insignificant or zero.

B. Electric /Power

The ICT Park receives electric power from the Ethiopian Electric Utility (EEU). From the filed survey, the EIPP JICA team identified that, in the existing ICT Park jurisdiction there is unplanned electric power line with the capacity of 15 Kilo Volt/KV/ that passes through the park. In addition to this, the current electric power consumption of ICT Park is nearly 3 Mega Watt per Month.

In principle the line should pass underground using cable duck. However, the line passes above the ground. This is in total violation of Planning, safety, architectural and engineering standards.

Although, the ICT Park is an integral part of Bole Lemi Industrial Park, it does not get electric power from the Bole Lemi Industrial Park sub-station. Rather the ICT Park gets electric power from the line that passes in its jurisdiction form EEU. Up until now the park does not have any dedicated electric power input.

C. Water Supply

Currently, the ICT Park receives water from Addis Abeba Water and Sewerage Authority scheme system. When the ICT Park becomes fully operational, the demand for water will be very high. The average estimated average daily water demand for the park will be 5,156m3/day. Since the current source will not satisfy the estimated water demand, additional source has to be identified. The water source for the demand of the park will be from deep boreholes since there is no surface water source from the area.

D. Strom Water Drainage

Storm water drainage is part of the essential infrastructure of ICT Park. Commonly separate systems are provided for the collection and disposal of storm water and sewage. Due to high rate urbanization, climate change resulted I heavy rainfall life and property are often under threat of flooding. Based on the Ethiopian Metrology Agency climate data, the average rain fall of Addis Abeba is >1000 millimeters.

If we examine the ICT Park territorial trait the slope gradient is ranging from 2.1 to 7 percent.

The Park also engulfed with rivers. There are some drainage structures in the existing ICT Park in line with the road network. Considering the future development, the slope, ground water and the surrounding rivers; the ICT Park needs proper storm water drainage plan.

E. Sewerage System

The decomposition of the sewage ingredients in wastewater treatment plants commonly produces methane/CH4 (65 to 75%), carbon dioxide/CO2 (30%) and trace of other inert gases like Nitrogen/N2, hydrogen sulphide/H2S, etc. If no control is made on these gases, there will be a significant contribution to the climate change. As UNDP Human Development Report 2007/08 stressed, that climate change cannot be narrowly defined as 'just' an environmental issue. If the accumulating scientific and economic analysis proves correct, there is perhaps no comparable threat to the well-being of the next generation and beyond.

The commonly known five greenhouse gases or families of gases according to their importance (or magnitudes of impacts) are Sulfur hexafluoride, perfluorocarbons (HFCs), nitrous oxide, methane and carbon dioxide.

The existing buildings in the ICT park sewage system is directly connected to individual septic tanks.

F. Solid Waste

The BL ICT Park is under construction and IPDC is giving a title dead to additional interested companies. Almost all of the companies in the ICT Park including Ethio Telecom and Techno Mobile are either under construction or haven't yet start production. Due to this reason there is no proper waste management practice at the ICT Park. The wastes that are produced are organic or domestic wastes with null e-waste and hazardous waste character. Most of the waste generated on the ICT Park is dumped on open fields to be degraded. The responsibility of collection, storage, transportation, to informal dumping sites/ open spaces is done by janitors within the park.

Since the ICT Park deals mainly with electronic devices like computers, servers, switches, etc., its waste is limited to electronic waste mainly. The park will generate e-waster after some years of operation. E-waste is one of the most harmful by product of ICT industries. Incorrect disposal and dumping of old equipment such as computer parts and peripherals can be detrimental to the

environment and can cause serious health hazards. Dumping of electronic equipment can lead to the release of toxic substances like Lead (Pb), Cadmium (Cd) and Mercury (Hg) to the environment. These chemicals can contaminate soil and groundwater. It is therefore mandatory for the IT village to establish an e-waste management strategy.

G. Telecommunication Infrastructure

The park has fiber network installation within the administration Zone connecting all buildings within the park. The park uses this installation to provide internet services to tenants within the park. It has the capacity of handling up to 40Gbs network traffic. Each building has of 1GB per second on all edge node ports. Currently, the park leases internet service from Ethio telecom and sells it back to tenants without any profit. The Park can provide up to 40Mb per second for tenants.

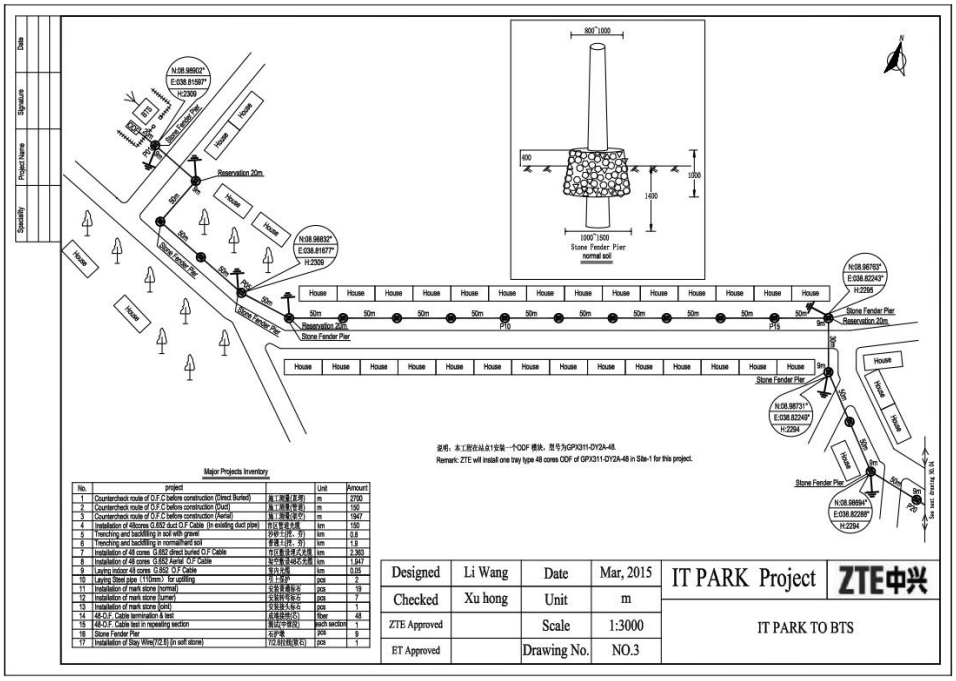


Figure 1 Fiber Optic Cable Installation within the Admin Zone

The park has outside connection with Ethio telecom with two main nodes. One comes from bole node and the other comes from Yeka node. However, part of the cables is laid on the surface exposed to different of damages and risk of being stolen. Damages and stealing of the cables have happened before, which caused internet black out within the park.

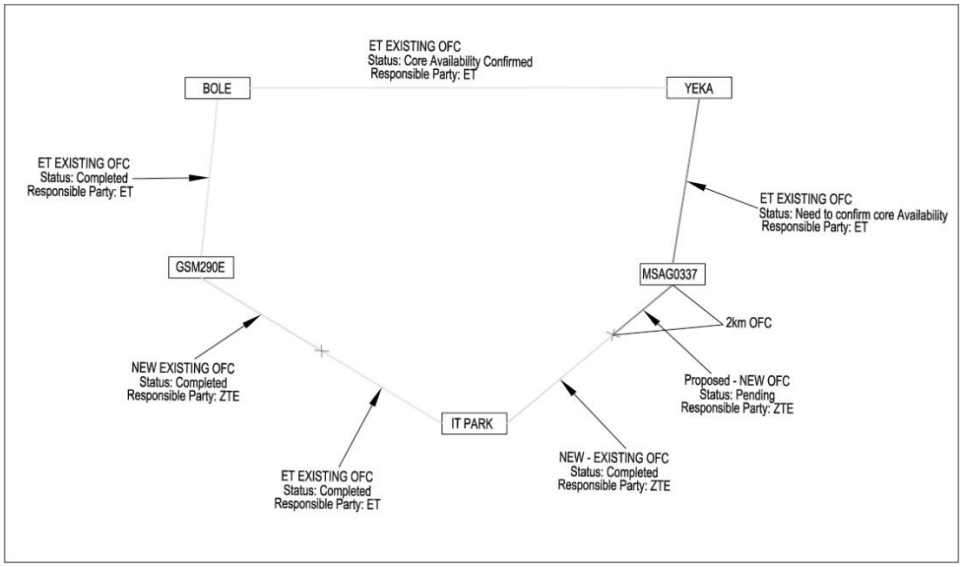


Figure 2. Optical Fiber Implémentation outside the Park

E. Data center

The ICT park data center can be classified as Tier-2 data center. Currently have storage capacity of 38.4 terra byte. Most of it is used for email, security service storages, ISP and storage services. The current Data center within the park doesn't have enough capacity to provide other type of services such as web hosting and other type of services.

Fig A. Backup Power Supply

Fig B. Power Managment System

Fig C. Control Room

Fig D. Data Center

- Existing storage capacity is 38.4 terra byte
- It is mostly used on email, security, ISP, storage services
- Not enough capacity to provide hosting and other storage services
- Capacity of internet traffic is 40 Gbps
- Currently providing internet at Ethio-telecom rate up to 40 Mbps
- Buildings connection capacity at 1 Gbps
- Currently tier-2 data center
- Plan to upgrade it to tier-4
- Plan to have their own gateway

Figure 3. Existing Data Center

2.2 PSTLE Analysis

The contemporary economy of nations has been transforming from manual based primary/agriculture/ and secondary/manufacturing industry/ economic activities to 'information and knowledge-based' economy. This transformation has been creating significant impact on social, economic, political and cultural development on the planet earth. The existing fact indicates that, for such kinds of holistic development and growth, the role of ICT is both a driver and an enabler towards establishing and developing the various sectors in an economy that contribute to stronger, more developed and richer societies. Thus, ICT is a broad notion, which can be described as an engine for growth and a tool for empowerment, which has profound implications for education, change and socio-economic development. UNISCO (2007) define ICT as:

> *Forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. This broad definition of ICT includes technologies such as radio, television, video, DVD, telephone (both fixed*

line and mobile phones), satellite systems, and computer and network hardware and software, as well as the equipment and services associated with these technologies, such as videoconferencing, e-mail and blogs.

This broadest definition follows inclusive approach to encompass all ICT related activities. Ethiopia is also used the broadest definition of ICT and it has been employing sector approach to addresses ICT.

The year 1996 was a watershed, for ICT sector in Ethiopia; because, a new law was promulgated to establish two separate entities, which have regulatory and commercial roles. The former one is mandated to the Ethiopian Telecommunication Agency /ETA/ while the latter was given to the Ethiopian Telecommunication Corporation /ETC/.

In 2003, the government established the Ethiopian ICT Development Agency (EICTDA) with a mandate to support information technology (IT) applications and capacity building within the government. (GESCI, 2017)

The other organization with an ICT regulatory mandate is the Ethiopian Broadcasting Authority (EBA). The EBA was set up in 1999 under the Ministry of Information, but later transferred to the Government's Communications Office. While the EBA was confined solely to the broadcasting sector, the ETA and EICTDA continued to share responsibilities across regulatory divides until the Federal Government decided to create a new Ministry of Communication and Information Technology (MCIT) that assumed all their functions. (GESCI, 2017)

Prior to the establishment of MCIT, an Information Technology Park Corporation/ITPC/ was established by virtue of Regulation No. 177/2010 with the purpose of: develop and operate information technology; and render service related to information Technology Park. ITPC was under the supervision of EICTDA. MTIC was formed in 2010 and leads the ICT development in Ethiopia and it consolidates three former agencies: the EICTDA, ETA and the communication department of the former Ministry of Transport and Communications. Since June 2018, ITPC becomes under IPDC. This part of the document explores the political, socio-economic, technological, environmental and legal factors that affects ICT sector in general and ICT Park development in particular.

2.2.1 POLITICAL ANALYSIS

The Ethiopian government has been designing pro-poor policies and implementing development plans. These policies, strategies and development plans considered ICT as enabling strategy for the realization of existing policies, strategies and plans. Apart from this the Government of Ethiopia prepared pleasant political environment to attract investors in the manufacturing and IT areas. The Ethiopian government acts has been manifested in: geo-political situation, normative and regulatory reforms.

The geo-political strategic location of Ethiopia, which connects the three continents: Europe, Asia and Africa, makes the country more preferable by investors. The country serves as seat of different International like Economic Commission for Africa/ECA/, Continental like African Union/AU/ and other diplomatic offices makes an economic of scale for investment. In addition the government political commitment for the value of peace and stability demonstrates in its acts of new political ideology of '*Medemer*' and strong diplomatic work with neighboring countries, which causes for prevailing peace and stability in the country as well as in the horn of Africa has spiel over effect on investment attraction to the affirmative.

Likewise the government of Ethiopia extending its political commitment to attract investors by promulgating legal documents and favorable institutional setups. The most known legal documents are the National ICT policy and strategy (2009), draft ICT policy (2016), the National Information Security Policy (2011), the Computer Crime Proclamation No.958/2016, the Registration of Vital Events and National Identity Card Proclamation No. 760/2012, the Telecom Fraud Proclamation No. 761/2012, Industrial Park Proclamation No. 886/2017, Industrial Park regulation No. 417/2017 etc. To regulate ICT different organs were established to mention the major ones: ETA, ETC, EICTDA, EBA, ITPC, MCIT. Currently Ministry of Innovation and Technology/MInT/ has mandated to regulate the ICT sector. Pertaining to ITPC currently known as ICT Park, initially it was supervised by EICTDA and MCIT; however, since June 2018 it is under IPDC.

2.2.2 SOCIO-ECONOMIC ANALYSIS

Ethiopia is land locked country located in the Horn of Africa, bordered with Sudan, South Sudan, Eritrea, Djibouti, Somalia and Kenya. The total land mass of Ethiopia is about 1,104,300 km^2.

According to World Population Review (2019) the total population of Ethiopia was estimated to be 110 million; this makes the country the second most papules state in Africa. Of the total population, 60% is under 25 years of age. The statistics shows that youth unemployment rate in Ethiopia from 2007 to 2017 was 7.43%.

From the total population 30% of them enrolled in formal education. The national education strategy followed 70:30 approaches to give more emphasis for science and technology graduate students from higher educations. Apart from this almost all universities provide ICT related courses. There are special departments designated for ICT engineering in: Addis Ababa, Ambo, Hawassa, Arbaminch, Adama Science and Technology, Haromaya, Jimma and Mekelle Universities. These universities enrolled nearly 10,000 undergraduate and post graduate students, which serves as producing skilled man power for ICT. (MoE, 2017/18); GESCI, 2017) In all higher institutions the medium of instruction is English language; this has an ample opportunity for ICT business in getting potential workforce.

Pertaining to the Ethiopian economy, the country has grown at a rate between 8% and 11% annually for over a decade, and it is one of the fastest growing non-oil economies in Africa. This growth has been driven by sustained progress in the agricultural and service sectors. Ethiopia's GDP in 2015 was US$61.54 billion representing a per capita GDP of just over US$1,628, and growth of 9.6%. (GESCI, 2017)

In 2015 inflation was 10.1% this will expected to show a slight growth to 11.1% in March 2019.

The Global Competitiveness Index (GCI, 2016-17) which assesses the ability of countries to provide high levels of prosperity to their citizens through measuring the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity ranks Ethiopia 109 out of 138 countries with a score of 3.8. The index points to corruption, access to financing and foreign currency regulations as primary limiting factors.

The World Bank's "Ease of doing business" index, a measure of the relative ease for starting and running a local business, for 2017 ranks Ethiopia as 159 out of 190. Getting credit and resolving insolvency are still constraints.

According to the International Telecommunication Union (ITU), Ethiopia's (IDI) score for 217 was 1.65, placing 170 out of 176; in 2016 was 1.42, placing it 171 out of 175 countries. This is

up from 172nd place and a score of 1.29 in 2015. According to the GTP II, Ethiopia is focused on sustaining the country's strong economic growth ensuring inclusive growth that will continuously reduce poverty, and supporting the country's goal to become a carbon-neutral middle-income country by 2025.

2.2.3 TECHNOLOGICAL ANALYSIS

In terms of ICT infrastructure, Ethio Telecom provides telecommunication services to Ethiopia. There is an open-wire, microwave radio relay, radio communication in the HF, VHF and UHF frequencies. There are two domestic satellites that provide the national trunk service. There is 12,000 km optic fiber cable infrastructure starting from central Ethiopia to all directions of the country and connected all cities with a capacity to transmit 40 Gbps along with the national backbone. (GESCI, 2017)

According ITU 2017 report, fixed telephone, mobile cellular, fixed broadband and active mobile broadband subscribers per 100 inhabitants were 1.1, 50.5, 0.6 and 5.3 respectively. This indicates that there is a huge demand in these areas.

MCIT has established 230 Community Information Centres and eleven community radio stations in remote areas of the country to provide information on new ICT technology transfer and implementations, healthcare, agricultural information and education issues. (GESCI, 2017)

Key indicators for Ethiopia (2016)		Africa	World
Fixed-telephone sub. per 100 inhab.	1.1	1.0	13.6
Mobile-cellular sub. per 100 inhab.	50.5	74.6	101.5
Fixed-broadband sub. per 100 inhab.	0.6	0.4	12.4
Active mobile-broadband sub. per 100 inhab.	5.3	22.9	52.2
3G coverage (% of population)	85.0	59.3	85.0
LTE/WiMAX coverage (% of population)	10.0	25.7	66.5
Mobile-cellular prices (% GNI pc)	6.5	14.2	5.2
Fixed-broadband prices (% GNI pc)	25.2	39.4	13.9
Mobile-broadband prices 500 MB (% GNI pc)	8.6	9.3	3.7
Mobile-broadband prices 1 GB (% GNI pc)	16.7	17.7	6.8
Percentage of households with computer	5.0	9.6	46.6
Percentage of households with Internet access	15.4	16.3	51.5
Percentage of individuals using the Internet	15.4	19.9	45.9
Int. Internet bandwidth per Internet user (kbit/s)	2.2	51.0	74.5

Note: Data in italics are ITU estimates. Source: ITU (as of June 2017).

Ethiopia is one of the last countries in Africa allowing its national telecommunications agency, Ethio Telecom, a monopoly on all telecom services including fixed, mobile, internet and data communications. A management contract with Orange Group was considered a first step towards privatization and the introduction of competition, and in 2013 the government rejected calls to privatize the incumbent and allow market competition. While some $3.1 billion has been invested in telecom infrastructure and service expansion projects over the last decade, the sector is heavily regulated and the government has complete control over networks, with virtually unlimited access to the call records of all phone users and to logs of internet traffic. ZTE and Huawei have provided most of the technologies used, and have often been favored for offering vendor financing.

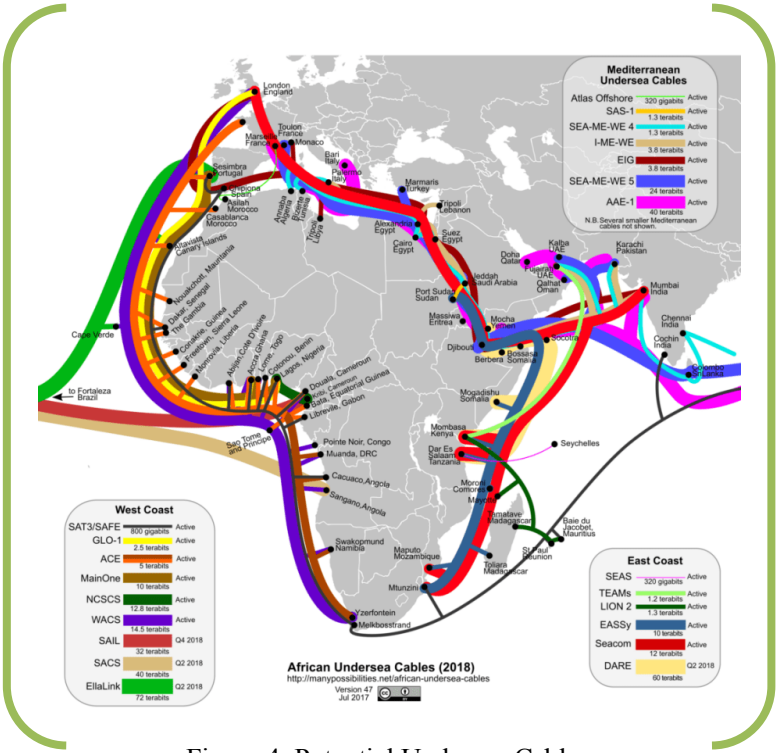


Figure 4. Potential Undersea Cables

Ethiopia's mobile penetration remains among the lowest in the world, at 48,3%, but growth is strong and considerable growth potential remains. Under the auspices of GTP II, the country could have some 103 million mobile subscribers by 2020, as well as 56 million internet subscribers.

Ethiopia has experienced massive increases in international bandwidth, improvements in national fiber backbone infrastructure and the growing availability of mobile broadband services via 3G and LTE networks, developing the broadband network. Prohibitive prices have meant that uptake of broadband services was low, but recently retail prices have been comparable to other more developed markets in the region. (GESCI, 2017)

The telecom network and service expansion activities are a major component of the second Growth and Transformation Plan (GTP II). According to the plan, by 2020, mobile service

subscription will reach 103.7 million, and that of internet and fixed line will be 56 million, and 10 million, respectively.

The mobile and internet penetration will be 100% and 54%. Out of the 56 million internet subscribers, 39 million will be broadband internet subscribers. The international internet gateway capacity will also increase, reaching 1,485 Gbps. (GESCI, 2017)

ICT4D (2006 to 2010), was the only national policy regarding ICT4D in Ethiopia. The policy promotes the need for the development of ICT infrastructure to ensure access to knowledge and information by all citizens. The policy is mainly aimed at development, deployment and the exploitation of ICTs to facilitate the growth of all key sectors of the economy. The policy also focuses on the use of ICTs for promoting democratic values, good governance, transparency and accountability.

ICT initiatives in Ethiopia are primarily focused on e-Government and Public Key Infrastructure (PKI), e-Infrastructure, entrepreneurship and e-Education. National initiatives focused on stimulating the use of ICT include the National Data Set, National Enterprise Service Bus (NESB), Public Key Infrastructure (PKI), Ethio ICT Village, WoredaNet, and Integrated Financial Management Information System.

2.2.4 LEGAL ANALYSIS

For the effective utilization of ICT sector for development sound legal and regulatory framework is mandatory. So far the Ethiopian government promulgates different legislations to regulate the ICT sector. To mention some: The Growth and Transformation Plan – II; ICT4D; National Information Technology Policy and Strategy (2009); Draft National Information and Technology Policy and Strategy (2016); the National Information Security Policy (2011); National Payment System Proclamation No.718/2011; the Registration of Vital Events and National Identity Card Proclamation No. 760/2012; the Telecom Fraud Proclamation No. 761/2012; Cybercrime Crime Proclamation No.958/2016; Telecom Fraud Offence Proclamation No. 761/2012; Telecommunications (Amendment) Proclamation No. 281/2002; License Directive For The Installation and Maintenance Of Cable, Wireless Local Loop, Exchange And Maintenance of Terminal Equipment In Telecommunication Service (November 2002); License Directive for

Resale and Tele-center in Telecommunication Services (November 2002); Telecommunication License Fee Directive No.1/2004; Value Added Services Directive (August 2005);

To protect consumer there is consumer protection law proclamation no. , copyright and patent laws like Copyright and Neighboring Rights Protection Proclamation No. 872/2014, Inventions, Minor Inventions and Industrial Designs Council of Ministers Regulations No. 12/1997, Transfer of technology council of Ministers Regulation No. 121/1993, Trade Mark Registration and Protection Proclamation No. 501/2006,

To regulate employer employees' conducts in the industrial parks: Industrial Parks Proclamation No. 886/2017 and Industrial parks Regulation No. 417/2017 introduced tripartite arrangement to prevent labour related disputes and if disputes arises to resolve amicably without disregarding the different binding laws such as: labour proclamation No. 377/2003; and Civil Code of Ethiopia 1960.

The government of Ethiopian promulgates a number of legislations to regulate investment activities in industrial parks such as: Investment Proclamation No. 769/2012, Investment (Amended) Proclamation No. 849/2014, Investment Incentives and Investment Areas Reserved for Domestic Investors Regulation No. 312/2014, Commercial registration and Licensing Proclamation No. 980/2016 and Commercial Code of Ethiopia 1960. There are also other regulations, which designed to encourage investors how are interested to engaged in the ICT sector like customs free imported goods for ICT developments ruling issued by Ethiopian Investment Bord 2001 E.C.

The existing normative frameworks indicate that almost all of them are obsolete; they need amendment or repeal to meet the dynamic ICT environment.

Pertaining to the institutional arrangement for ICT development, the government of Ethiopia established MTIC in 2010. In the same year Information Technology Park was established by virtue of Proc. No. 177/2010. Currently Ministry of Innovation and Technology/MInT/ has mandated to regulate the ICT sector. Pertaining to ITPC currently known as ICT park is incorporated under IPDC since June 2018.

2.2.5 ENVIRONMENTAL ANALYSIS

Ethiopia is experiencing climate change and its impacts on the environment and natural resources. The continued climate change is expected to bring greater variability, and extreme weather events which will degrade the country's ecosystems. The impact of climate change in Ethiopia is already apparent in the increasing temperature and declining rainfall, particularly in the north. Ethiopia is an agrarian state. A decrease in seasonal rainfall has devastating implications on agricultural production leading to food insecurity, malnutrition and famine. The frequency and intensity of drought is likely to increase over the coming decades, which will present a serious threat to biodiversity, ecosystems, water, agricultural and human health.

In order to protect the country from climate change, the Ethiopian government drafted the Climate Resilient Green Economy (CRGE) strategy in 2011. Four initiatives were selected to be prioritized: the fast-tracked initiatives are developing the vast hydropower potential, large-scale promotion of advanced rural cooking technologies, improving efficiency in the livestock value chain, and reducing emissions from deforestation and forest degradation. These initiatives were selected as they have the best chances of promoting immediate growth, securing large abatement potentials, and attracting finance for their execution.

In 2013, Ethiopia's CO2 emissions stood at 0.112 metric tons per capita, up from 0.069 metric tons per capita a decade earlier, with total greenhouse emissions in 2012 at 185,292. However, according to the GTP II, Ethiopia is focused on sustaining the country's strong economic growth ensuring inclusive growth that will continuously reduce poverty, and supporting the country's goal to become a carbon-neutral middle-income country by 2025. In 2012, Ethiopia got 88% of its electricity from hydroelectric plants, and a further 3.6% from other renewable sources. Currently, Ethiopia exports power to Kenya, Sudan and Djibouti, yet has contracted with Tanzania, Rwanda, South Sudan and Yemen to provide power, specifically from hydropower. Ethiopia is to begin exporting renewable energy to neighboring countries by 2018 as part of a cross-border endeavor to meet regional energy demand and limit increases in climate-changing emissions.

The introduction of ICT development demands new strategy to address e-waste disposal treatment. The absence of existing legal framework will severely affects the ecosystem in general and the ICT park in particular.

Part III: ICT Part Infrastructure Development Plan

3.1 Development Framework

This section of the report provides an overview of the ICT Park development plan and its various components. The Development Plan layout is shown at Map 2. The Development Plan provides a framework for future development of the park and shows an indicative lot layout, external and internal street network, landscape buffers, and land use allocation along with their percentages, integrated smart transportation system with parking and public gathering spaces.

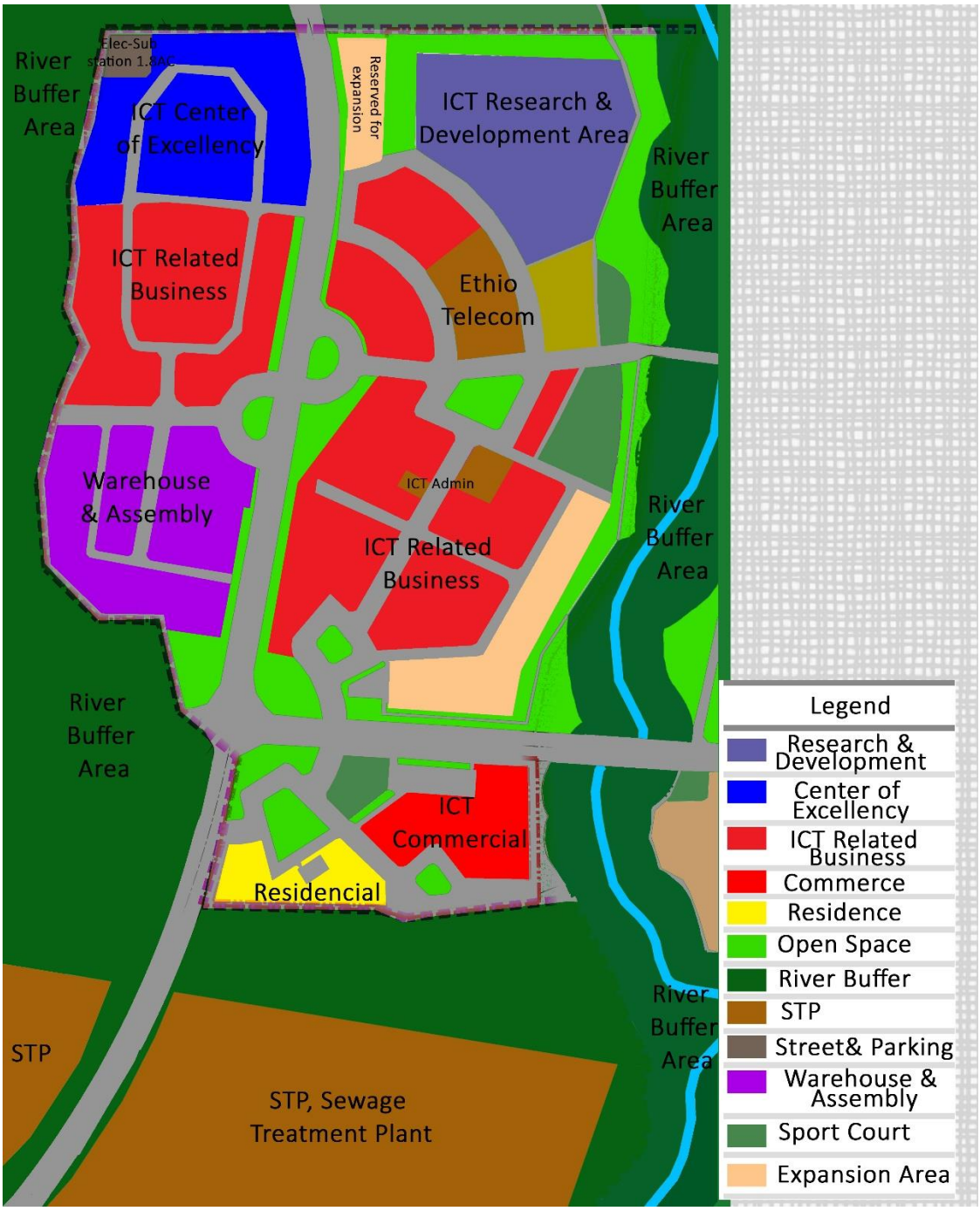
Map 3. Overall Development Plan

3.2 ICT Park Spatial Developmental Plan

3.2.1 LAND USE

The ICT Park land use has been categorized into six major land uses: ICT Related Business, Warehouse and Assembly, Research and Development, Administration Area, Center of Excellency, Residential and Commercial Area and other (Power Sub-Station, open space and future expansion Area).

ICT Park has a total area of 172.7 hectare of which ICT Center of Excellence 16.2ha, Warehouse and assembly 17.7ha, Research and Development 18.3ha, ICT Related Business 54.9ha, Administration Area 4.8ha, Commercial and Residential area 10.5ha, and other 49.6 ha.



Map 4. Proposed Land Use Share

3.2.2 POPULATION PROJECTION OF ICT PARK

Based on the existing plan and architectural standards the number of workers within the development period has been projected. And the projected number has been displayed in the following table. According to the projection Park is expected to accommodate a total population

of 137,386. Of this 109,694 and 22,105 are workers and visitors respectively.

Table 1. Expected Population, Number of Workers, etc. of ICT Park

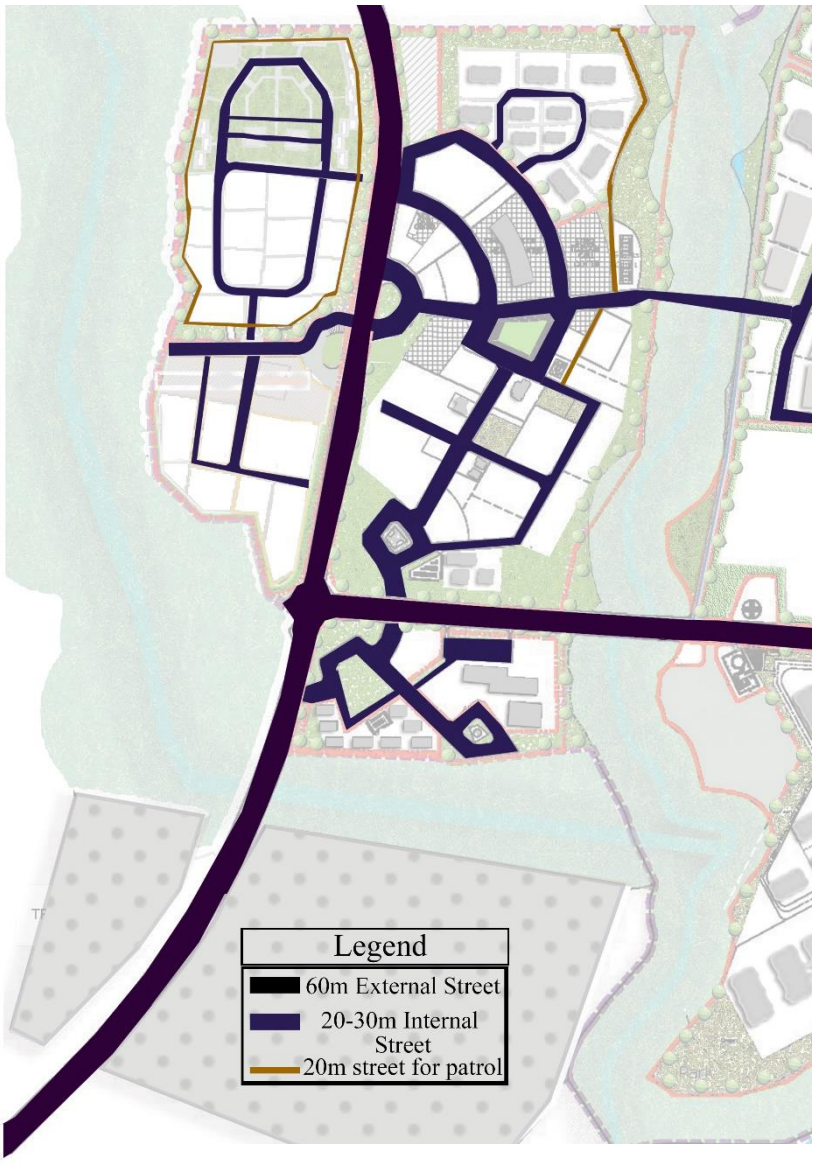
Area	Area (ha)	Population	Num. of Worker	Num. of Visitor	Remarks
Center of Excellence	16.2	1,800	500	1,200	Planned 3,000 students in the IT Center of Excellence (1,800 students stay in dormitory, 1,200 students commute) 500 staffs of university & college assumed will commute.
Warehouse & Assembly	17.7	1,867	4,668	-	17.7hax10,000x60%/ 45.5m^2/worker*2=4,600workers
R & D area	18.3		8,044	1,609	18.3hax10,000x40%x5floors / 45.5m2/worker=8,044workers 7,500workers x 20%=1,609visitors
Administration	4.8	1,920	9,600	1,920	
ICT related Business	54.9	-	68,625	13,725	Inclusive of Incubation Core, data center, etc. 54.9hax50%x5floors / 20m2/worker=68,625workers 68,625 workers x 20%=13,725visitors
Commercial area	7.1	-	18,257	3,651	7.1hax60%x3floors / 7m^2/worker=18,257workers 18,257x20%=3,651visitors
ICT Residential area	3.4	3,400	-	-	3.4hax50%x 10floors/ 50m^2/pop=3,400population
Other	50.3	-	-	-	
Total	**172.7**	**5,587**	**109,694**	**22,105**	

3.2.3 STREET NETWORK

The proposed street network for the ICT Park is designed by considering the functional and physical connectivity of the different activity centers. The design considers the surrounding city-wide road network and the already constructed streets within Bole Lemi Smart Industrial city.

Taking into this into account the proposed land allotted to streets is 24.5ha (14.19%) from the total area of the ICT Park.

According to UN Habitat Global Urban Observatory estimation (UN Habitat, 2013) Land allocated to streets should labeled within the range of: Min 6% and Max 36%.



Map 5.Proposed Street Network

And the following calculation is used to find the percentage to see whether the street coverage is within the international standard threshold or not.

$$\text{Land allotted to streets (LAS)} = \frac{100\ (\%\ \text{Land allotted to street-Min})}{\text{Max-Min}}$$

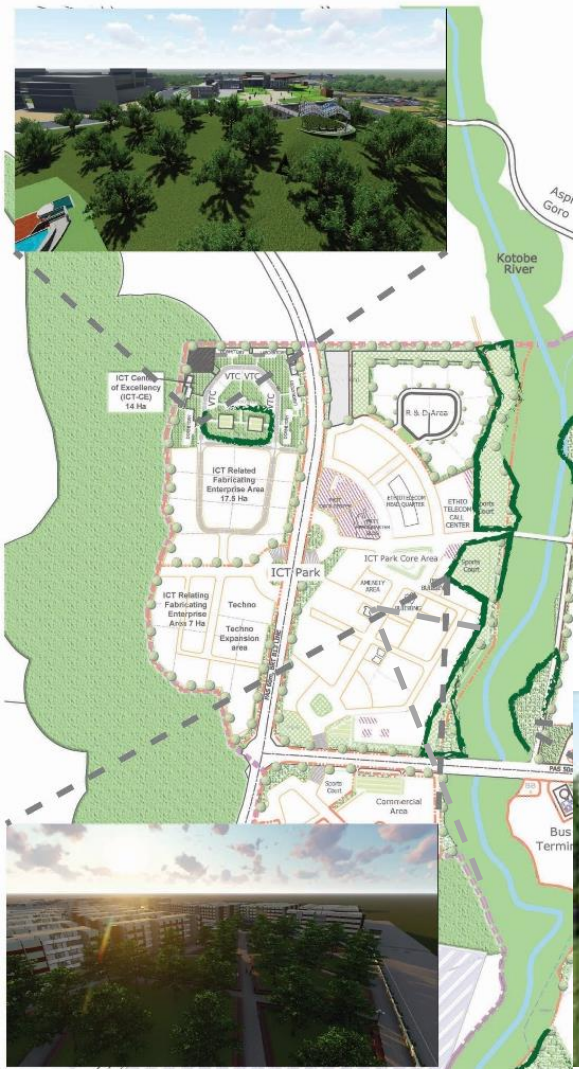
Accordingly, the proposed LAS for the ICT Park is found to be 27.3.

3.2.4 GREEN COVERAGE

Theoretically, smart city give special emphasis to the natural environment. For the creation of smart city at BLIP the JICA EIPP team gives special attention for the reservation of green area with in the Industrial and ICT Park. Accordingly, the total green area reserved for BLSIC is 158.2 hactar, which accounts 23.5 percent. The percentage of the total green area of the master plan is based on IPDC standard manuals, architectural books as well as countries experience. (See Annex I - B) Studies and existing practice indicates that green coverage in industrial parks should be high. If the BLSIC green coverage includes the existing river buffers, the portion will increase to 37.2 percent. The JICA EIPP team reserve land for river buffer developments based on the Addis Abeba river buffer development agency manual.

Map 6. Green Coverage

3.2.5 Public Space

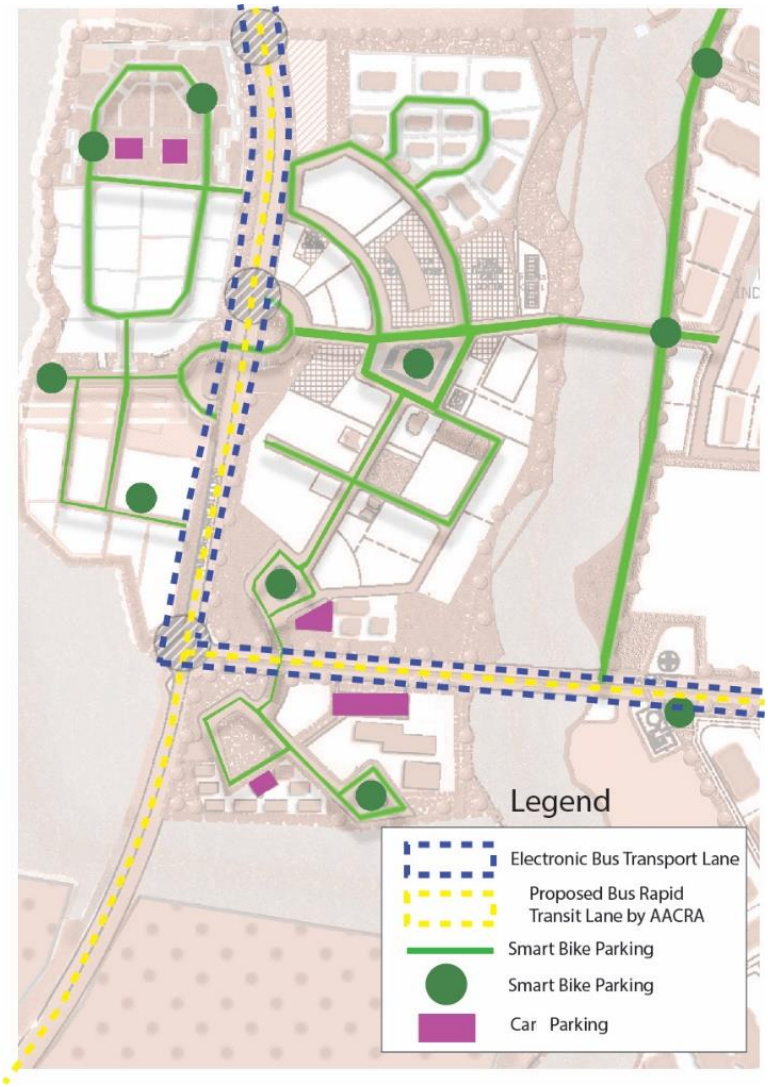


Public space and mobility in the cities of the 21st century is still one of the most important challenges of urban life. Public space plays a vital role in the social development on various levels from small neighborhood parks to large city center square. They are places of great value where people of different backgrounds come together and pick up new ideas by merely being spectators. ICT Park will have different public spaces such as play grounds and different recreational centers.

Map 7. Public Spaces

3.2.6 Integrated Smart Transport System

Integrated smart transportation system is incorporated in the master plan of the Smart city. Electric bus transportation lane is proposed along the main road that intersects both ICT and the Bole Lemi areas. The E-bus system will decrease the walking distance for the workers within the park since it has stops every 400 m intervals. In addition, smart bicycle lanes are proposed within each streets of the park. The Smart bicycles can be operated with workers ID to travel from some place to another within the park that can be controlled by the ICT P. Apart from this, such transportation system has a great role in minimizing the negative environmental impacts.



Map 8. Integrated Transportation System

3.3 ICT Park Physical Infrastructure Development Plan

The immediate need for cities in developing countries is to provide adequate urban infrastructure to meet the increasing pace of urbanization. In the process of meeting infrastructure demands, smart infrastructure applications provide a way for such cities to achieve leapfrogging in technology. In developed countries, the challenge is often to maintain legacy infrastructure systems, which cannot be abandoned due to cost, space and other considerations. In such countries, smart city applications may focus more on facilitating the optimal use of existing infrastructure resources and monitoring the operations of such legacy resources. However, in

both developing and developed country contexts, the primary motive behind smart infrastructure applications should be that they respond to the sustainable development needs of society. (United Nations Economic and Social Council E/CN.16/2016/2, PP 18)

Smart city brings enormous opportunities and exciting challenges. In general, a metropolitan area can be considered as smart when city operations and services such as healthcare, education, transport, parking, and electricity grid are supported through ICT infrastructure in order to facilitate efficiency and ease of operation.

3.3.1 WATER SUPPLY

It is notable that certain society real development can be ensured and attainable when water demand of that society is met as one of fundamental need. Such inevitable continuous dependence on this resource requires sufficient quantity and quality of water provision that serves the need of community

The 2006 design guideline prepared by the Ministry of Water, Irrigation and Electricity (MoWIE) and related International design standards for the study and design of Water Supply projects are reviewed to prepare the design criteria used as a guide for the design of ICT park Water Supply design.

Map 9. Proposed Water Source and Distribution Line

<u>Proposed Water Supply Source and Scheme</u>

Proposed Source:

The demand of the new proposed smart city is very high as compared to surrounding areas, therefore there is a need for another source option. Among the proposed options deep well is the best, because shallow wells will not be chosen as big discharge is not expected from shallow wells to install submersible pumps and it is not feasible to drill a shallow well anywhere wanted for on spot use. Surface water is also not economical and also there is no perennial stream which is suitable for

construction of dam. So, after detail study that includes geophysical survey some boreholes are needed to satisfy the water supply need of the community. The remaining areas ICT Park, will get a connection from the new ground water to be drilled.

Design Period

Water supply projects are usually designed either for a single phase of 15-year period or two phases, each 10 years' period. Considering lifetime of electromechanical parts and economic considerations, a design period of 20 years divided in to two phases, each 10 years' period is adopted.

Design Flow

Different components of the Smart City Water Supply scheme will be designed using different design flows depending on their specific use in the system.

Average Day Flow

Average day flow is the total volume of water to be supplied to a distribution network over one-year period divided by the total number of days in a year.

Table 2.Climatic Adjustment Factors

Mean Annual Temp. (^{0}C)	Description	Altitude	Factor	Examples
<10	Cool	>3,300	0.8	
10-15	Cool temperate	2,300-3,300	0.9	Goba
15-20	Temperate	1,500-2,300	1.0	Addis Abeba
20-25	Warm temperate	500-1,500	1.3	Metahara
25 and above	Hot	<500	1.5	Kebridehar

Source: MoWIE, 2006

Table 3. Socio-Economic Adjustment Factor

Group	Description	Factor
A	Towns enjoying high living standards and with high potential for development	1.10
B	Towns having a very high potential for development, but lower living standards at present	1.05
C	Towns under normal Ethiopian conditions	1.00
D	Advanced rural towns	0.90

Source: MoWIE, 2006

Peak Day Flow

Max day flow is the maximum volume of water that should be supplied from a system over one-day period within a year. The raw water pumps, the treatment plant, raw water rising mains and clear water transmission mains are designed for phase II maximum day flow.

Peak Hourly Flow

Peak hour flow is the maximum expected flow in the system on a given hour within a year. Gravity distribution mains from the service reservoirs to the distribution network and the distribution network itself are designed for Phase II peak hour flow.

Hourly Peaking Factor

There are a number of approaches to determine the hourly peak factor used to estimate the peak hour flow from the average day flow. The method based on population size as given in the 2006 guideline from the Ministry of Water, Irrigation and Electricity is used in this project. Thus, an hourly peaking factor of 1.6 that is recommended for a population size greater than 100,000 is adopted for the Smart City Water Supply.

- **Peak hour demand**: is the highest demand of any one-hour over the maximum day. It represents the diurnal variations in water demand resulting from the behavioral patterns of the local population. The peak hour demand is obtained by multiplying the maximum day demand with the peak hour factor.

The demand factors are very important for the designing of water supply system components. The recommended values are summarized in the following table.

Population Size	Minimum day factor	Peak hour factor
< 2,000	1.3-1.5	2.6
2,000-10,000	>>	2.4-2.2
10,000-50,000	>>	2.2-1.8
50,000-80,000	1.2	1.8-1.7
>80,000	>>	<1.7

Source: MoWIE, 2006

Climatic Factors

Average daily water consumption depends on rainfall. The following table is used to select climate adjustment factor for Smart City Water Supply.

Table 4. Climate Adjustment Factor

Group	Mean Annual Precipitation (mm)	Adjustment Factor
A	≤ 600	1.10
B	601 - 900	1.05
C	≥ 901	1.00

Total Projected Demand and Recommended Source

Based on the above data's and Standards the total water demand for ICT park up to 2038 is estimated 5156m3/day. The above demand cannot be satisfied from the current AAWSA source, the park has to develop its own boreholes.

3.3.2 SEWERAGE SYSTEM

Proposed sewerage system

The wastewater will be conveyed to the treatment plants through different sizes of pipe line which is conveyed to the newly proposed AAWSA sewage treatment plant.

Projected Waste Water Yield

The projected waste water yield of ICT Park up to 2038 is estimated to be 4125m3/day. The waste water from the park will be connected to the new proposed eastern catchment waste water treatment plant.

Map 10. Proposed Sewer Layout

3.3.3 STROM WATER DRAINAGE

Proposed storm water drainage layout

Generally, drainage systems will be designed to prevent flood damage during the most usual floods and to minimize the modifications in the hydrology of the area. Different returning periods are considered (annual, 10-year, 50-year, or 100-year flood, depending on the importance of the road and the type of structures)

Map 11. Proposed Drainage Layout

To reach these goals, different types of structures are incorporated in the drainage systems,

- Open channels, whether artificial or natural conveyances of the flows of water.
- Culvert and bridges, used when open channels cross embankments.
- Energy dissipaters, used to control the velocities of flows, especially at culvert outlets.
- Storm drainage facilities, used to collect the runoff of the carriageway and surrounding areas and direct it to the channels.
- Open channels, whether artificial or natural conveyances of the flows of water.
- Culvert and bridges, used when open channels cross embankments.
- Energy dissipaters, used to control the velocities of flows, especially at culvert outlets.
- Storm drainage facilities, used to collect the runoff of the carriageway and surrounding areas and direct it to the channels.

Hydrological Methods for Run off Calculations

Many hydrologic methods are available. The methods to be used and the circumstances for their

use depends on the size of area, soil type and land use types. If possible, the method shall be calibrated to local conditions and tested for accuracy and reliability.

Hydrologic analysis should include the determination of several design flood frequencies for use in the hydraulic design. These frequencies are used to size different drainage structures to allow for an optimum design, that considers both risk of damage and construction cost. Consideration shall be given to what frequency flood was used to design other structures along a highway corridor (***ERA Drainage Design Manual, 2001***). The SCS and Rational method will be used to calculate the runoff.

3.3.4 SOLID WASTE MANAGEMENT

The Management of Solid Waste is one of the essential services and it is an obligatory duty of Park Authorities to arrange for Daily Street cleaning and for the transport, processing and disposal of waste in park area. This Solid Waste Management Plan (SWMP) of Bole Lemi Smart Industrial City (BLSIC) is developed based on BLIP I, BLIP II (under construction) and the ICT Park.

Waste is defined as materials or products that are unwanted or have been discarded, rejected or abandoned. Waste includes materials or products that are recycled, converted to energy, or disposed. Materials and products that are reused (for their original purpose and without reprocessing) are not waste because they remain in use (National Waste Report 2013).

For this project waste typically arises from three streams:

- Domestic and municipal—includes all household waste and waste collected in public places;
- Commercial wastes from all business and business activities and public institutions; and
- Industrial waste that are produced by industrial activity which includes any material that is rendered useless during a manufacturing process at the fabricating enterprise area

E-waste Management

The Ethiopian Computer Refurbishment and Training Center/CRTC/ is an authorized organ in to manage, remove and recycle e-wastes. The CRTC was established in 2009 as part of a national ICT capacity building program by the Ethiopian ICT Development Agency /EICTDA/ ICT Assisted Development project (ICTAD). Currently CRTC is under the supervision Ministry of

Innovation and Technology /MInT/. CRTC is responsible for the treatment of life lasting electronic wastes..

The CRTC E-waste acceptancy rate and quantity is directly related with available storage space. So far the luck of storage space has been a big problem to accept large size of e-waste. Subsequently CRTC is planning to widen the premises of the center. The collected wastes are dismantled, trashing and compacted.

CRTC do not charge money the waste producers, it accepts the waste with open hand. The national policy of e- waste management strategy is expected to be amended recently. Following that CRTC expect private companies to engage with e-waste treatment and exportation. If the private sector engages as much as the government demands, there is a probability CRTC might withdraw from engaging with e-wastes. CRTC has failed to provide the size of periodically treated e-waste due to lack of proper documentation and inconsistent size of waste.

3.3.5 ELECTRIC /POWER

POWER DISTRIBUTION SYSTEM

I. Demand Projection

Forecasting the load is a crucial input to strengthening the network between each infrastructure. Hence the load is forecasted based on regional demographic and historical load growth patterns of different countries. The anticipated long-term load forecast is directly used as input to the long-term expansion plan.

A comprehensive Demand - and Energy forecast was required to establish:

- The basis for the distribution system expansion plan, and
- A basis for the future forecast purchases, and sales of Energy, and Maximum Demand per customer category.

II. Load Forecast

The load forecast is a crucial input to the network strengthening between each infrastructure. During this task a load forecast is developed that is based on regional demographic and historical load growth patterns of different countries. The anticipated long-term load forecast is directly used as input to the long-term expansion plan.

The load forecast is deterministic in nature where the loads were summated, taking load diversity into account, for each area. The load forecast used as basis:

- Futuristic economic information,
- Demographic data,
- Available land use data, and
- Future development initiatives.

Table 5. Electric Power Load Density Based on Type of Usage

Type of usage	Load density	Remarks
Individual/single plot	1MW Km^{-2}	Free-standing single-family houses, two-family houses
Built-up area	3MW Km^{-2}	Terrace houses, small portion of multiple-family houses with maximum of three stories
Dense land development	5MWKm^{-2}	Multiple-story buildings, multifamily houses
Business	5MWKm^{-2}	Manufacturing shops, small business areas
	0.2KW m^{-2}	Warehouses
	0.3KW m^{-2}	Supermarkets and shopping malls
Industry	Up to 15 MW KM m^{-2}	Medium-size enterprises, not very spatially expansive
General consumption	2MW KM m^{-2}	Schools, kindergartens, street lighting

Based on the above assumption the power demand of the ICT park power demand is estimated to be 65.45MVA up to 2038.

III. Distribution Model

The objective of this Task was to develop an adequate network model representing the entire Industry Park Distribution Network up-to 33kVA main feeder level. This distribution model is proposed with various load points, representing the feeder load. Since a continuous power supply system is a major element in the smart city development, below distribution model tries to make it essential to have strong and smart transmission and distribution system.

The summation hierarchy used to complete the Geographical Load Forecast is shown below:

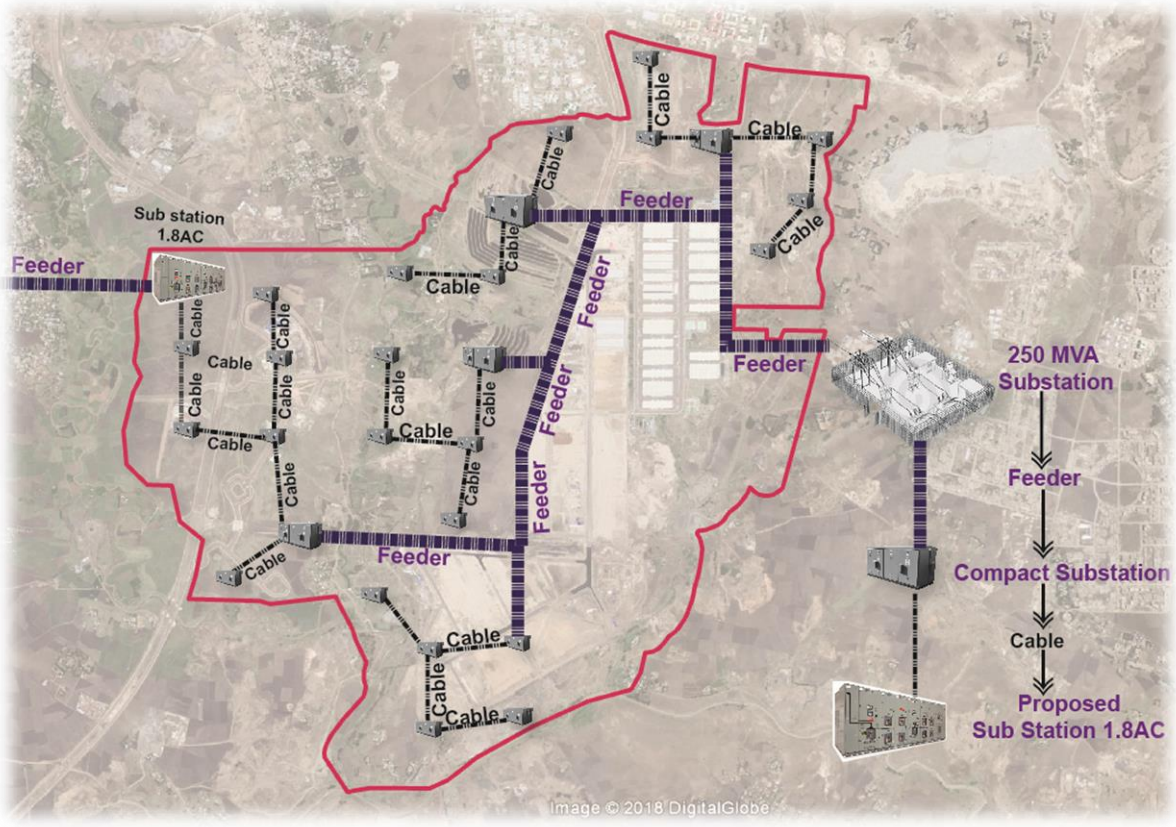


Figure 5. Power Distribution Model

A. Main 250 MVA Sub-Station

This Sub-Station is located in the east side of the industrial park with 1.5km radios, 33KV incoming utility feed power as the main intake power lines and produce 250 MVA (Mega Volt Ampere) power. In this design we use the 2-utility feeder intake power line only and distributed to each area using switch station. Electric power can be transmitted or distributed by means of overhead line until each switch stations then distributed using underground line for some reasons discussed below:

Overhead line

- Since power to ICT park area transmitted over long distance.
- Obviously, electrical power has to be transmitted at high voltages for economic reasons, thus installation costs are considered.

- Growth in power demand and consequent rise in voltage level is considered.

B. Feeder cable

A feeder is a conductor which connects the main sub-station (or localized generating station) to the area where power is to be distributed. Generally, no tapings are taken from the feeder, so that current in it remains the same throughout. The main consideration in the design of a feeder is the current carrying capacity. A feeder cable with 400 sq.mm of copper cable is used from the point of Sub-Station up to switch stations and to interconnect each switch stations and to each designated compact Sub-Station area. After the compact Sub-Station the distribution line will continue in underground with a suitable sized cable.

C. Switch Station

These sub-stations do not change the voltage level i.e. incoming and outgoing lines have the same voltage. However, they simply perform the switching operations of power lines. It is used for switching the current to backup lines or for parallelizing circuits in case of failure.

In this design we have two switch stations which are connected together with suitable sized cables. This is to increase reliability when de-energization of a transmission line is needed during maintenance and when unplanned switching events are caused. Therefore, this switching station functioned automatically while the other is de-energized due to many factors so that the system will continue working without trouble.

D. Compact Sub-Station

Compact Sub-Stations (CSS) – are used for information in secondary distribution network from MV (medium voltage) to LV (low Voltage) or LV (low voltage) to MV (medium voltage). In this case we used the CSS to convert the 33 KV, MV (medium voltage) power to LV (low voltage). It is a fully factory assembled package of various Sub-Station equipment's housed in a metal enclosure. It is divided in three separate compartments, namely, MV compartment, transformer compartment and LV compartment. In MV compartment we can fit load break switches, ring main units, circuit breakers. In the transformer compartment, we can use different types of transformers. In the LV compartments we can provide LV distribution boards, LV switches or LV control panel. All these equipment's connected together with suitable sized cables or bus bars. Additionally, a metering kiosk on HV side and HD panel and a PFC panels on LV sides can also

be provided as a separate attachment to the main compact Sub-Station.

Advantage

- The major advantage of a compact Sub-Station is that it requires almost half space, plus all the cabling from cubicle up to the LV panel is complete inside the factory so that time is saved at site. Also, dependency on labor skills and availability at site is remarkably reduced. In all the only major work left at site is connection of incoming and outgoing cables and earthing all the equipment's, everything is factory fitted.
- Another advantage of the equipment is that each and every equipment's are enclosed in the panel. Hence any accidental mishaps or thefts are forced to tubers rain, rats, and reptiles is avoided. Obviously, it is no need to mention that the maintenance cost is minimal in the case of CSS. All the cabling and wiring of the control and safety equipment's such as oil and temperature indicator, magnetic oil level gauge, winding temperature indicator etc. are done and tested in the factory. This again reduces lots of installation and commissioning time.
- Increase dependency on skilled and unskilled labor and separate technicians for each equipment's.
- Reduce huge spaces and easy transport
- Increase dependency on technicians for each technician

E. Service Mains (Cable)

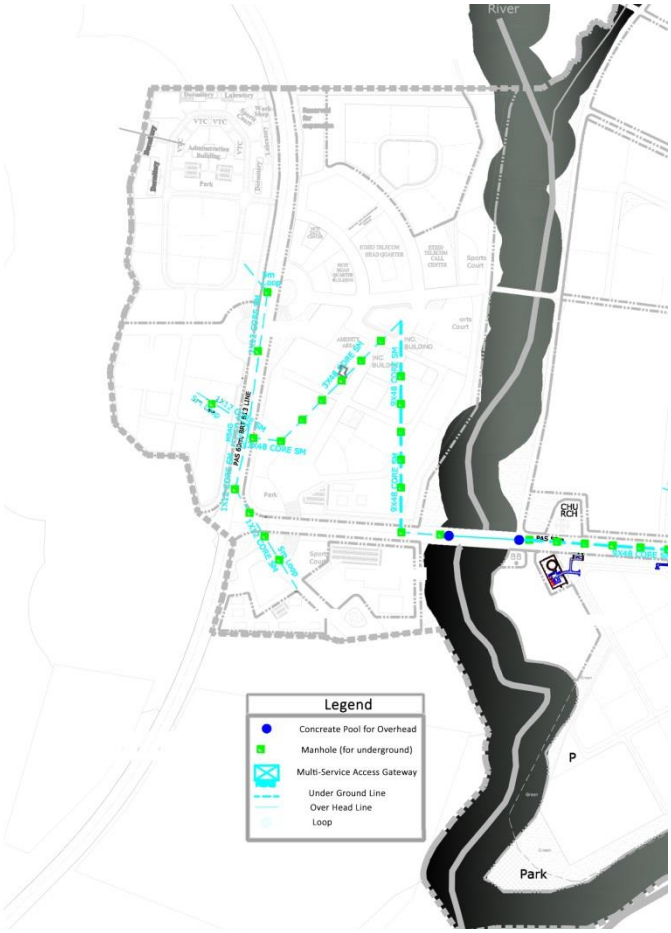
A service main is generally a small cable which connects the distributor to the consumers' terminals. In the proposed design cables are used to interconnect each compact Sub-Station to form a ring, which is 3x120/70+1x70 sq.mm cu cables and to main distribution board of each area.

3.3.6 TELECOMMUNICATIONS

A Telecommunications Pathways distribution center is currently proposed in the ICT Park of the Industrial Park. The ICT Park location should allow for almost every user to be in small radius making a cost effective and flexible means of providing telecommunications infrastructure service to the industrial park. From the scope of distribution center, an underground conduit

distribution system will be provided to all industry park areas for Utility provider's service connections. All cable placed in the park installed underground shall be rated for wet locations.

The ICT Park backbone cabling consists of fiber cable for data and video and copper cable for voice. These cables shall be run between the ICT Park and Bole Lemi Park in underground cable duct which will be constructed according to BLSIC plan.



Map 12. Proposed Telecommunication Line

The infrastructure for the building backbone cabling shall consist of conduit between control and server rooms.

Buildings shall be supplied with a building data switch and sufficient edge switches to provide network access to current users. The ICT Park shall be responsible for specifying the specific brand and model for network equipment. Using this standard equipment will ensure that the network equipment is compatible with ICT park backbone network equipment. This is the only way to ensure that performance, advanced features such as Quality of Service (QoS), multicast, security, and manageability, will exist and interoperate with ICT Park networking infrastructure.

General switch standards shall always be met. All switches will be provided with PoE+ on all ports at all times. In general, a 70% activation rate is to be assumed, that is a 30% allowance shall be made for ports that are not initially activated. Designs for Switches housed in outdoor locations will be enclosed in an electrical equipment encloser with environmental controls of heating and cooling. Also, All switches mounted in MDF/main distribution frame/or

IDFs/intermediate distribution frame/ will be secured with electrical equipment encloser boxes. Switches are not to be installed on desktops, in rooms, offices or other non- telecommunication rooms.

Wireless communication and access points

Wireless access points are defined as any device adhering to the IEEE 802.11 WiFi specifications for network access. All other devices operating in the same spectrums as the IEEE 802.11 WiFi specifications, i.g.: 2.4 GHz, 5GHz are recognized as wireless devices. At all points there must be at least two Cat6a cables to every access point location. PoE+/power over Ethernet/ must be provided over each of the cat6a cables to wireless access points. In any construction the Park will specify the type, count and location of all access points. No additional access points or devices acting as an access point can be connected to the Park network per the ICT Park IT Security Policy. An IT policy must be developed for the park that will serve as guideline concerning any IT related issues. At any time, the Park must approve the use of any wireless device that will connect into the data network. This is to ensure proper balance of devices within the available spectrums.

The figure below shows the layout of the proposed ICT Park communications distribution system. The ICT Park Infrastructure Pathway is proposed to be an underground distribution system in PVC conduit designed to accommodate telephone service, fiber service for Internet access, fiber service for point-to-point connections within the Industrial park, and point-to-point communication for Intra Company networking.

Part IV: CONTRACT MANAGEMENT AND CONSTRUCTION SUPERVISION

The client and the general contractor (or 3 parties including the consultant) shall secure quality, a process of construction and an economic efficiency assuming safety of the construction works and execute the construction under the mutual cooperation.

In a process of a series of construction management until a plan, an investigation, a design, construction, inspection in a project, the client oneself has conducted a plan, an investigation and a design in the past. In recent years, the contractor and the consultant often carry out such tasks instead of the client.

Table 6. Conceptuel Diagramme of Construction Management

Construction process	Planning	Survey	Design	Cost estimate	Order	Contract signing	Construction	Inspection
Past	Client			Contractor				Client
Present	Consultant			Client		Contractor		Consultant
	Contractor							

4.1 CONSTRUCTION CONTRACT

The construction works are normally placed an order by the construction contract each itemized construction section. The contract contents are stipulated by the contract document, design drawings, and specifications. The construction works is conducted based on the contract between the client and the contractor. Contract methods are categorized as below:

1) Open competitive bids, shortlisted bids, single source bids.

2) Lump sum contract, Division contract, Itemized contract

3) Original contractor contract, Subcontractor contract

Though some construction contractors who are designated in view of construction competence shall proceed to bid, the investment owner shall estimate the total construction cost in advance, then if the lowest bidding price is less than the budget price, the contract shall be formed.

In the case of construction requiring construction accuracy and advanced technology, it is recommended to select a contractor by a Two stage bid process, considering "Technical Evaluation" and "Financial Evaluation". The method first selects a contractor that can satisfy "Technical Evaluation". Next evaluates "Financial Evaluation" for contractor who satisfied "Technical Evaluation". Finally, it is a method of selecting a contractor with a high total evaluation.

Besides, the service contract, timeline and responsible is classified as follows, based on the scope of the contract:

Table 7. Classification of Service Contrat

Type	Overview
Construction contract (DBB)	The client including the consultant conducts a projecting, planning and designing, while the contractor is only in charge of construction works.
Design and build contract (DB)	The contractor is in charge of designing, constructing and fully responsible for the performance.
Design and build and Operation	The contractor is in charge of designing, constructing, Operation (including necessary test) and fully responsible for the performance.

Source: EIPP (JICA Team)

Type		Timeline				
Construction contract (DBB)	Task	Master Plan	Feasibility Study	Detailed Design	Construction	Inspection
	Responsible	Consultant	Consultant	Consultant	Contractor	Client
Design and build contract (DB)	Task	Master Plan	Detailed Plan	Construction (Design - Build)		Inspection
	Responsible	Consultant	Contractor	Contractor		Client
Design and build and Operation	Task	Master Plan	Detailed Plan	Construction (Design – Build)		Inspection
	Responsible	Consultant	Contractor	Contractor		Client

Figure 6. Timeline and Responsible by Construction Contract

4.2 Construction Management Organization

4.2.1 ORGANIZATION SYSTEM

The construction management works are required take conducted by Head office (supervision division) and Site office. The main tasks of the Head office and the Site office are presented below:

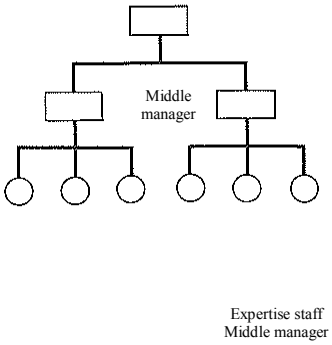
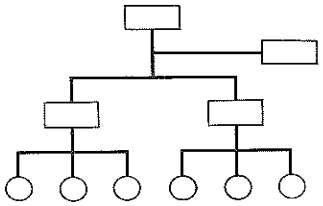
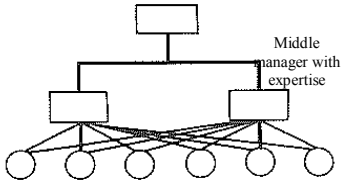
Table 8. Functions of Head Office and Site Office

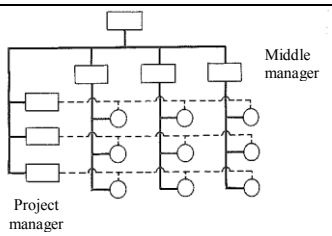
	Task Content
Head Office	1) Manage to support, assist and direct at the site. 2) Extra tasks shall be considered if needed, and discussed to resolve claim, and demanded with equipment that would be a bottleneck in the process. 3) Procure equipment and materials, conduct management and operation activities in a cost-effective way by lump sum.
Site Office	1) Proceed to apply for required permission for works construction. Depending on the works' conditions, the client shall be responsible for part of this task. 2) Conduct the construction upon the client's requirements. 3) Create documents on productivity for the client, and then send to the client and the Head office, report works progress. 4) Keep close contact with the client or designer; request for support in reading and understanding the design drawings as well as other conditions. 5) Based on the latest information to adjust, modify the drawings used on site, and notify in full to sub-contractor. 6) Store and organize neatly works images, such as works completion inspection document, design change, works profile. 7) Prepare contract document with sub-contractor upon the estimates, then request for contract with the Head office. 8) Inspect competence document from the sub-contractor, conduct payment procedures for the Head office. 9) Conduct monitoring, adjustment and inspection of work of sub-contractor to meet the purposes and expectation regarding original price, process, quality and safety of the works. If there are any issues occurred, request for support from the Head office. 10) Generate reports on works progress, labor, design change request, or other important or periodical reports.

Source: EIPP (JICA Team)

Based on the functions of the Head office and the Site, it is required to set up the management of the works appropriately so that the works operation execution can be smooth. Below are 4 types of organization models for works management are presented below:

Table 9. Organization Types Organization Structure

	Structure	Characteristic	Remarks in Management
1) Line organization		This is the type where directions system is centralized and consistent. Since the content regarding responsibilities and authorizations is clear, it is easy to thoroughly comply with the organization's principles and law regulations.	Easy to lack in the contact and cooperation with other organizations of the same level. For large organizations, there is a risk of exceeding the manager's authorization level.
2) Line and staff organization		This is the model adding staff to be in charge, and manage part of the expertise tasks of the manager, through which the management competence is enhanced.	Expertise staff does not have the authorization to lead. It is required to manage on a regular basis so that staff does not become too weak or too strong.
3) Functional organization		This is opposite to line organization's vertical method; this model is formed by focusing on allocating competence horizontally. This model helps to promote experts' strengths, transfer information or respond effectively in real time without	The Middle manager needs to adjust so that there is no inconsistent direction or order.

		having to pass through the leader.	
4) Matrix organization		This is the type where necessary resources are assigned in the control system of the organization, and make such staff get involved in the business as a team member under the project manager's direction. This could lead to many projects can be conducted at the same time and utilize the company's organization competence.	Directions and orders of project manager and the organization' control system must be consistent.

Source: Civil Engineering Handbook of Japan

4.2.2 Project Manager

Project Manager (PM) is the general manager held fully responsible for the construction of the works, and brings safely to completion of building structures to meet all requirements regarding quality, construction period and cost; and ensuring the enterprise's benefits.PM needs to have "technical knowledge" to see the entire works in charge, and capability to organize, direct and execute on site, as well as "management competence" to achieve expected goal.

4.3 Cost Estimation

This is the task to calculate cost each type of construction works and a direct cost of construction by summing those costs up, and then estimate the budget price to add expenses pursuant to the estimation standard. In case public organizations have the estimation standard, the budget price shall be estimated based on the estimation standard. The work volume used for the estimation based on the quantity calculation sheets at the detailed design stage. The structure of construction cost is illustrated in the Figure 6

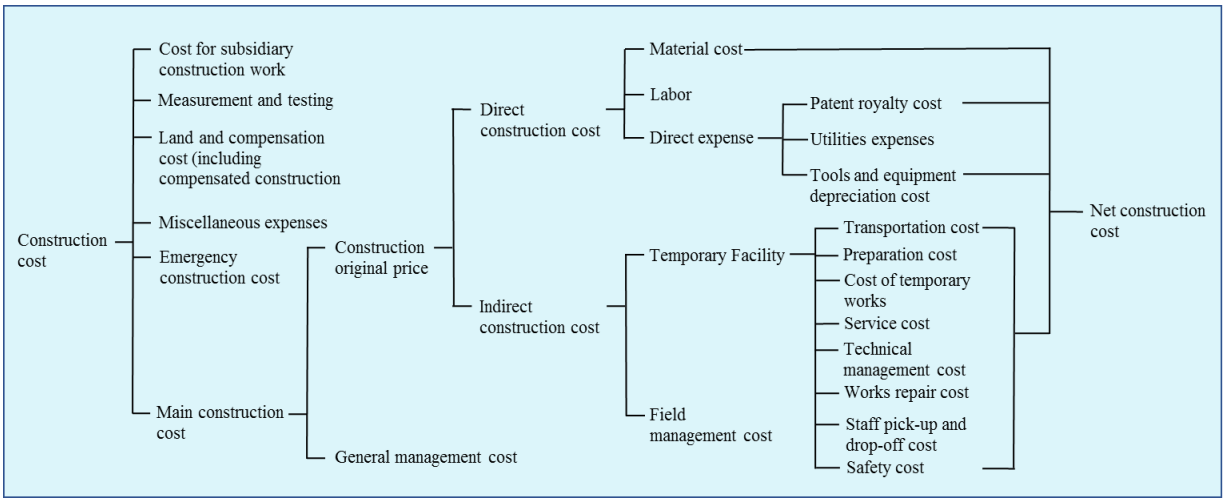


Figure 7. Structure of Construction Cost

4.4 Construction Management and Schedule Management

The planning content and management contents to be determined prior to the construction works are displayed in the table below.

Table 10. Planning and Management Content

Planning content	Management content
Construction organization, procedures	Operating organization, relevant companies (sub-contractor), various licenses / approvals
Construction plan (Labor, equipment etc.)	Construction method, negotiation with the area (Number, scope, quality, in/out time, temporary infrastructure.
Quality	Finished work quality, specified value, etc.
Processes	Daily schedule, work method, milestone, etc.
Cost	Total cost estimates, construction cost estimates, etc.
Safety and environmental management methods	Accidents, pollution, housing survey prior to construction, etc.
Administration office, accounting	Payment, billing, etc.
Others	Administration tasks, information feedback, documents, reports, etc.

Source: EIPP (JICA Team)

4.5 Construction Schedule Management

Construction planning is a task not only ensuring the construction quality, construction period and economic efficiency; but also deciding detailed methods to shift to construction, with the purpose of ensuring work and design quality as the client's requirements.

Construction planning content and sequence are described as follows:

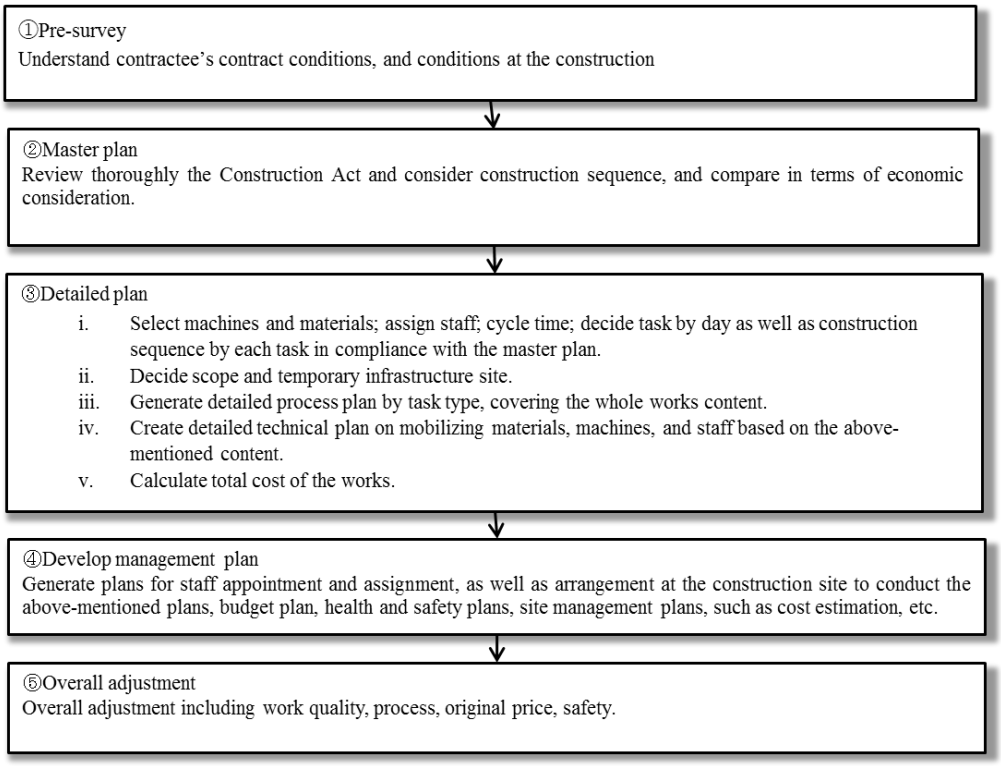


Figure 8. Construction Planning Sequence

4.6 Cost Management

Cost management involves the concept of cost control and management, with the purpose of ensuring and enhancing safety while constructing and construction quality and time, and economic efficiency of the works. Cost management must be considered during construction planning phase. Concepts of cost control and management are described in figure 9.

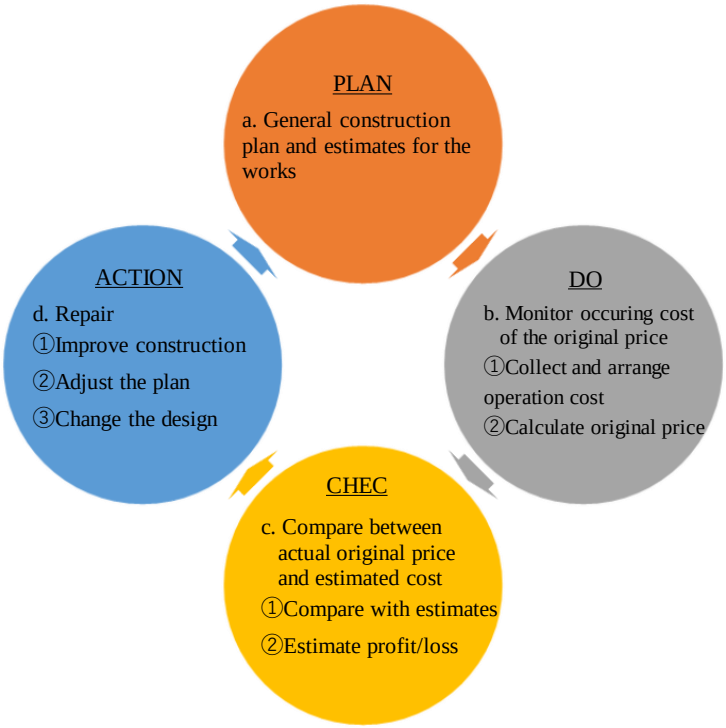


Figure 9. Cost Management Flow

4.7 Construction Schedule Management

4.7.1 UNDERSTANDING OF PROGRESS STATUS

For construction process management, it is vital to understand the works progress on a regular basis, early detect the difference between planning and actual construction, as well as have countermeasures appropriately. To understand the works progress, normally a work schedule is used to display the construction progress, pace and sequence. The figure below is an example, showing "Work schedule by horizontal chart" and "Process curve". Work schedule by horizontal chart can capture the time required for each task and the relationship among tasks. The process curve illustrates the overall progress of the works, the completion percentage in general.

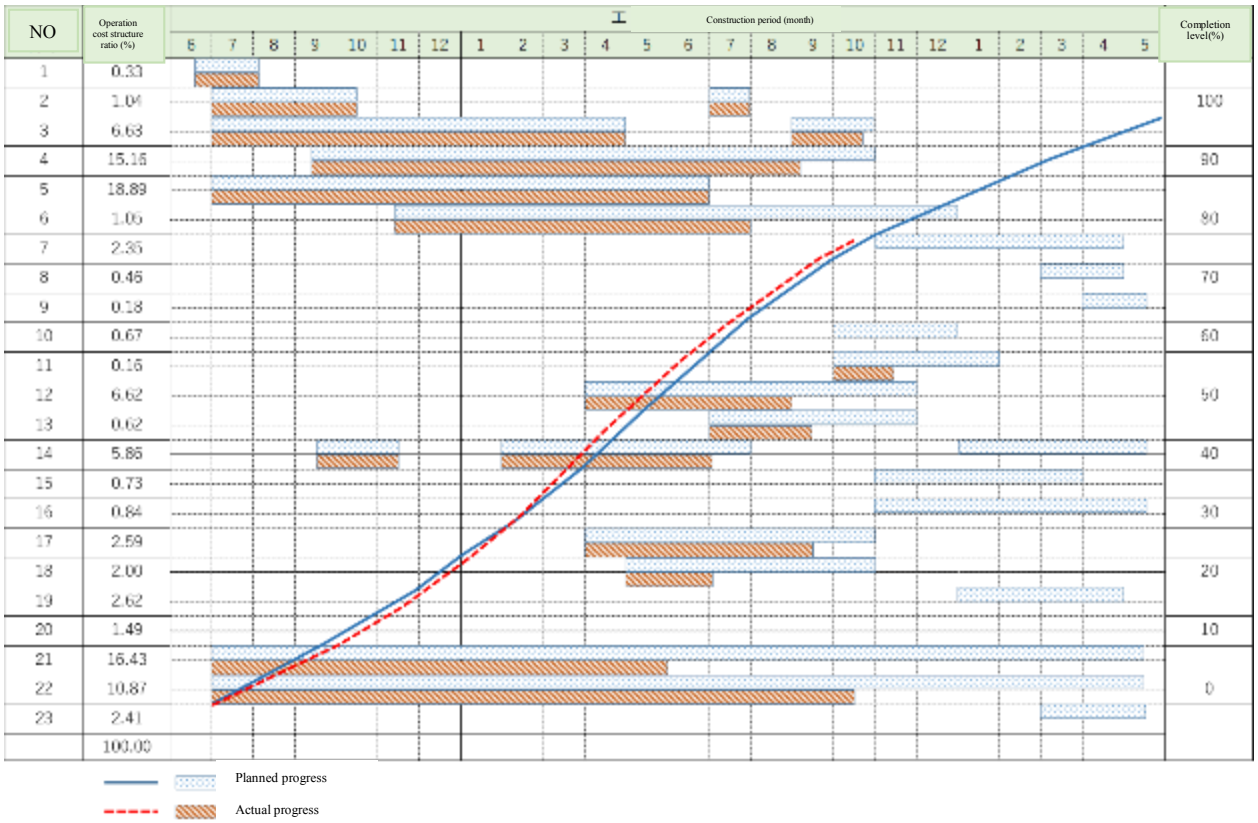


Figure 10. Construction Schedule and Process Curve (sample)

4.7.2 WORK IMPROVEMENT

In case the assumed construction context at planning is different from the actual one (construction delay, change on delivery time, etc.), to improve productivity, it is required to modify by increasing workload or adding extra materials and equipment. During the work improvement process, if weak points to be improved and overcome are detected, it is vital to

have periodical reports, works construction sequence progress, or hold meetings to review and consider solutions. When developing the improvement planning scheme, it is essential to study on how to minimize cost as well as ensure safety and product quality. The proposed improvement planning shall be added into the new construction planning, through which the process shall be managed.

4.8 Health, Safety and Environmental Management Methods

(1) Health and safety management

The person in charge of construction is required to put effort on preventing the root causes of disaster on a regular basis; meanwhile, it is essential to ensure the health and safety of employees, and consider how to prevent the impact of disaster to the community.

Below are some examples on the context of root causes leading to industrial accidents during the construction of IP.

i) Impact of hydrometeorology such as heavy rain, impact of geological change
ii) Wrong steps or risks when the scope of work is too large, as well as requiring numerous machines and equipment (the use of heavy or electrical devices, etc.)
iii) Lack of skilled workers, or incomplete awareness on safety of inexperienced staff (failure in training)
iv) Lack of preliminary survey
v) Inappropriate construction planning and management, etc.

The works manager is required to understand fully these above-mentioned contexts, conduct health and safety management appropriately once noting such points, considered as basic measures to do.

i) Ensure safety of work devices
ii) Overcome shortcomings of working materials, equipment, machines, tools
iii) Conduct safety patrol on a regular basis and collect feedback fully
iv) Train on safety for staff
v) Execute the operation and manage effectively
vi) Enhance activities to ensure health and safety

(2) Environmental and social measures

Measures to prevent pollution during the construction that impacts to natural environment and the society need to be studied thoroughly. Otherwise, this will generate major obstacle during the construction progress, as well as cause delay to construction time, increase cost for adding other measures, or lead to critical social problems, etc. Environmental issues are categorized into issues occurred during and after the construction. The Contractor need to discuss and collect opinions beforehand with local people around the SEZ based on documents such as environment impact analysis, etc.

The following are examples on root causes of environmental issues occurred during the construction of IP:

i) Air pollution due to construction equipment or dust during the construction time
ii) Water pollution caused by the flow of soil and cement
iii) Soil contamination
iv) Pollution of noise, vibration, and offensive odors
v) Land subsidence, landslide
vi) Waste water treatment (impacting residential area or surrounding agricultural land)
vii) Waste treatment
viii) The change in living environment or migration

During the preliminary survey phase, it is required to assume potential environmental and social issues, then based on that, study countermeasures. In the construction planning phase, prevention plans for such issues shall be generated.

4.9 Solution for Issues

To grasp issues to occur during the construction period, it is required to carefully conduct the day-to-day construction management, and deal appropriately with the detected issues through analyzing sources of the issues. The issue extraction flow is shown as below:

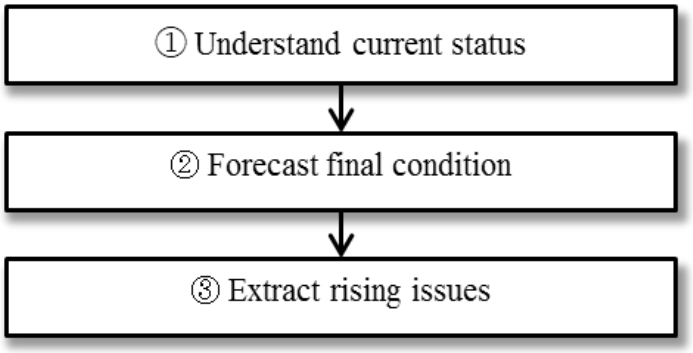


Figure 11. Issue Extraction Flow

In case the result value of the balance of accounts or the progress of work is worse during the construction period, the following causes are assumed:

Table 11. Items to Consider

Consideration factors	Remarks
Change of social condition to cause the extra costs or the delay of the construction period	・ Tax reform ・ Currency reduction ・ Strike
Change of natural conditions to cause the extra costs or the delay of the construction period	・ Geological and soil conditions at site ・ Outbreak of the natural disaster
Appropriateness of instructions on changes in the construction works	・ Guidance Contents of instructions ・ Instruction time ・ Assessment contents, etc.
Appropriateness of issue, instruction and approval of the drawings	・ Drawing contents ・ Issue time of the drawings
Appropriateness of the payment amount, assessment method, deadline	

Source: Civil Engineering Handbook of Japan

The countermeasure shall be worked out and taken properly upon consulting with Client, consultant and Contractor to settle the issue arising from the above-mentioned factors. The cost of countermeasure is normally covered by contingency founds consisting of price escalation and physical contingency.

Reference

EC, (2014) The Role of Science Parks in Smart Specialization Strategies; JCR Technical Reports; S3 Policy Brief Series No. 08/2014

ETA, (2000) License Directive for Resale and Tele center in Telecommunication Services No. 1/2002

-------, (2002) License Directive for Resale and Tele center in Telecommunication Services No. 1/2002

-------, (2004) Telecommunication License Fee Directive No.1/2004

FDRE, (2009) The National Information and Communication Technology Policy and Strategy

--------, (2003) Labor Proclamation No. 377/2003

-------, (2014) Investment (Amendment) Proclamation No. 849/2014

-------, (2014) Investment Incentives and Investment Areas Reserved for Domestic Inventors Council of Ministers (Amended) Regulation No. 312/2014

--------, (2014) Industrial Parks Development Corporation Establishment Council of Ministers Regulation No. 326/2014

-------, (2015) Industrial Parks Proclamation No. 886/2015

------- (2016) Computer Crime Proclamation No.958/2016

--------, (2016) Commercial Registration and Licensing Council of Ministers Regulation No. 392/2016

--------, (2017) Industrial Parks Council of Ministers Regulation No. 417/2017

-------, (2002) Telecommunications (Amendment) Proclamation No. 281/2002

-------, (2010) Information Technology Park Corporation Establishment Council of Ministers Regulation No. 177/2010

--------, (2012) Telecom Fraud Offence proclamation No. 76/2012

--------MCIT, (2003) Directive of private VISAT Permit No. 2/2003

FDRE-MCIT, (2011) Value Added Services License Directive No. 3/2011

FDRE-MCIT, (2018) The National Open Data Policy of Ethiopia

FDRE Ministry of Industry, (2013) Ethiopian Industrial Development Strategic Plan (2013-2025), Addis Abeba

GESCI, (2017) Assessment of Knowledge Society Development in Ethiopia June 201; Publisher Global e-Schools and Communities Initiative (GESCI), Nairobi, Kenya

Hanna, N.K., (1994) E-Transformation: Enabling New Development Strategies

ITU, (2017) Measuring the Information Society Report Volume 2. ICT Country profiles

MCIT-ADB, (2017) Development of a Roadmap for ICT Park Phase II

MoI, (2005) Value Added Service Directive No. 2/2005

-------, (2002) License Directive for the Installation and Maintenance of Cable, Wireless Local Loop, Exchange and Maintenance of Terminal Equipment in Telecommunication Service No. 2/2002

UN, (2018) United Nations E-Governance Survey 2018: Gearing E-Government To Support Transformation Towards Sustainable And Resilient Societies; United Nations, New York

UN-HABITAT, (2013) Global Urban Observatory Estimations

UNIDO, (2018) Industrial Park Development in Ethiopia Case Study report

-------, (2018) Strategic Framework for Leveraging a New Generation of Industrial Parks and Zones for Inclusive and Sustainable Development. Vienna.

WEF, (2018) Global Competitiveness Report 2018

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Industrial Park Development Corporation

(IPDC)

Draft Proposal: To transfer E-waste management facility from CRTC to IPDC

Addis Abeba

Ethiopia

Industrial Park Development Corporation (IPDC)

Draft Proposal:

to Transfer E-waste Management Facility from CRTC to IPDC

"From E-waste to E-economy"

Addis Abeba
Ethiopia

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Acronyms

AACA	Addis Abeba City Administration
CRTC	Computer Refurbishment And Training Center
CRTC-DMF	Computer Refurbishment And Training Center De-Manufacturing Facility
DMF	De-Manufacturing Facility
EEE	Electrical And Electronic Equipment
EFCCC	Environment Forest & Climate Change Commission
EIC	Ethiopian Investment Commission
EICTDA	Ethiopian ICT Development Agency
EPA	Environmental Protection Authority
EPR	Extended Producer Responsibility
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IBLF	International Business Leaders Forum
ICT	Information Communication And Technology
ICTAD	ICT Assisted Development Project
ICTDA	Information Communication And Technology Development Agency
Inh	Inhabitant
IPR	Individuals Producers Responsibility
IT	Information Technology
Kg	Kilogram
Kt	Kilotons
LCA	Life Cycle Assessment
MCA	Multi Criteria Analysis
MCIT	Ministry Of Communication And Information Technology
MFA	Material Flow Analysis
MinT	Ministry Of Information And Technology
Mt	Million Metric Tons
NNP	Net national product
PPP	Polluter Pays Principle
TVET	Technical Vocational Educational Training Center
WEEE	Waste Electrical & Electronics Equipment

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Part I:

INTRODUCTION

1 INTRODUCTION

1.1. Background

E-waste is considered as used electronics which are destined for refurbishment, reuse, resale, salvage, recycling through material recovery, or disposal. The Ethiopian legislative defines Electronic waste or E-wastes as all types of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use (MoEF, 2017).

With economic growth and rise of information age, the current generation became dependent on smart and up-to-date technology. This smart technology is produced by one of the foremost critical industry sectors i.e. the electronic industry. The rapid expansion of smart technology and the "consumption driven society" is resulting in the creation of a very large amount of waste (E-waste). Studies indicate that globally about 50 million tons of E-waste is generated each year, which is approximately 5 % of all solid waste generated in the world (Baldé, 2017). Due to this waste generation and waste management is receiving increasing attention nowadays.

E-waste contains toxic and hazardous materials such as mercury and lead (Veit & Bernardes, 2015). As a consequence, untreated electronic wastes have major impacts both on human health and on environment. In addition to the environmental problems, waste recovery and final disposal involves significant financial costs for a nation. Given the volumes being generated and the content (both toxic and precious materials), E-waste has become an emerging problem.

Because of their craving for advanced technology; developing countries are exposed to be considered as a damping site for obsolete products. The developed nations, on the other hand, used the 'global south' as replacement market which invigorated the high obsolescence rate of the e-products. With its two to three-fold growth each year, E-wastes became one of the fastest growing wastes in the world.

In Ethiopia the amount of per-capital E-waste generated is very low (0.5kg/inhabitant) compared to other Sub-Saharan countries. However, the growth of E-waste generation is very high; because, it has a direct nexus with economic and population growth of the country.

To address this impending danger the Ethiopian government designed different policies, strategies and regulations as well as ratified relevant international legal instruments. For the realization of these legal instruments the government in collaboration with development partners established an E-waste treatment and training center[1] in 2009.

1.2. Objective of the Document

The main objective of this document is to analyze the pros and cons of integrating CRTC –DMF within IPDC. Through this, the document tries to address the following specific objectives:

- To assess the current status of CRTC-DMF
- To examine potential, contribution and prospects CRTC-DMF in E-waste management of the country in general and for the Industrial Parks in particular.
- To show the comparative advantages of formal e–waste management for environmental benefits
- To show the financial benefits of e waste recycling industry

1.3. Scope of the Document

The document addresses the following four major issues. The first one gives general information about E-waste. Then it examines the existing situation of CRTC-DMF to handle E-waste management. The document synthesizes the various alternatives of transferring CRTC-DMF to other stakeholders for healthier management. Finally, it proposes a way forward for IPDC to take initiatives to embrace CRTC-DMF for better economic and environmental benefits.

[1] Computer Refurbishment and Training Center/CRTC/

Part II:

THE WORLD of E- WASTE

2 THE WORLD OF E-WASTE

2.1 The Notion of E-waste

As it was mentioned earlier E-waste comprises of data and correspondence innovation (ICT) appliances, for example, PCs, cell phones, screens, wires and all things of electrical and electronic hardware or its parts that have been disposed of without expectation to reuse.

> *"Globally, society only deals with 20% of E-waste appropriately and there is little data on what happens to the rest, which for the most part ends up in landfill, or is disposed of by informal workers in poor conditions. Yet E-waste is worth at least $62.5 billion annually, which is more than the gross domestic product (GDP) of most countries."* [2]

The Federal Democratic Republic of Ethiopia E-waste Management regulation (2017) define electronic waste as all types of electrical and electronic equipment and its parts that have been discarded. Electrical and electronic equipment refers to equipment which is powered by electric currents or electromagnetic fields including those used for the generation, transmission and measurement of electric currents and electromagnetic fields and designed for use with a voltage rating not exceeding 1000 Volt for alternating current and 1500 Volt for direct current. This regulation categorized E-waste based on sources: households; offices of governmental and non- governmental organizations; producers; retailers.

2.2 Category of E-waste

There are different ways of classification for E-waste. Gill (2011) classifies E-waste based on: composition and components. Accordingly, there are six categories of materials reported for E-waste composition[3]. These are:

a) Ferrous metals (silver, gold, platinum etc.); these has significant commercial value.
b) Nonferrous metals (copper, aluminum etc.)
c) Glass,
d) Plastics,

[2] https://www.weforum.org/reports/ accessed 07/12/2019
[3] Electronic waste: https://www.britannica.com/technology/electronic-waste; accessed on August, 06/2019

e) Pollutants: the most known pollutants are lead, cadmium, mercury, and brominated flame retardation etc.

f) Other

Zhang & Klumdick (20011) categorized E-waste based on their source as: household appliances, IT and Telecom and Consumers Electronics (Zhang & Klumdick, 2011).

The most widely accepted categorization is the European Union classification. These are:

- Large household appliances:
- Small household appliances
- Information technology (IT) and telecommunications equipment
- Consumer equipment
- Lighting equipment
- Electrical and electronic tools
- Toys, leisure equipment, and sporting goods
- Medical devices
- Monitoring and control instrument
- Automatic dispensers

The newly promulgated E-waste management regulation (2017) of Ethiopia also followed the EU classification mentioned above.

2.3 Undesirable & Affirmative Impacts of E-waste

The reduced life span of electronic equipment and the growing number of E-waste in our municipal solid waste is requesting our attention. Worldwide E-waste comprises 2-5% of the municipal waste and this is growing by two to three times each year.

As per documents from the Basel convention, E-waste might contain toxic and hazardous materials like mercury, lead, and cadmium (Veit & Bernardes, 2015). As a consequence, untreated electronic wastes have major impacts both on human health and physical environment (Veit & Bernardes, 2015).

Here are listed four important effects that should be taken into consideration when in thinking about E-waste. Most electronics contains poisonous materials, for example, lead, zinc, nickel, fire retardants, barium, and chromium. On the off chance that these are discharged into the earth, they can poison human blood, kidneys, Nervous system.

- At the point when E-waste is heated up, lethal synthetic compounds are discharged into the air affecting the atmosphere and the ecology.
- When electronic waste is thrown away in landfills their toxic materials seep into groundwater, affecting both land and sea animals. This can also affect the health of the people in the developing countries where most of the electronic waste in dumped.
- When electronic waste is discarded in landfills their harmful materials seep into the groundwater, affecting both land and aquatic animals.
- In addition to its environmental effect, if untreated e waste also becomes an economic loss.it will lead us to the loss of materials that could be salvaged

2.4 Potential Advantage of Proper E-waste Management

According to EPA recent research in support of E-waste recycling indicated recycling 1 million computers would forbid greenhouse gases from emitting, that would otherwise happen with annual emissions from 17,000 automobiles. Therefore, if recycling E-waste is given a power boost, it will not only conserve natural resources but also save a versatile advantage environmentally, economically, and socially. Generally, E-waste management plays its role through achieving sustainable development of the company.

2.4.1 Growth in Economy

The whole procedure involved in recycling is a vast industry growing substantially within itself. E-waste management requires a stepwise sorting out, shipping and refurbishing the non-usable electronics into a completely new product. With recycling, more and more employment opportunities can be created. With more e waste recycling facilities being set up and the existing Refurbishment and De-Manufacturing Facilities hiring more employees for the reprocessing. This will be able to save nature and support the economy by improving GDP/NNP.

The giant global companies in the ICT sector have a number of pre requisites on countries to invest on in the first place. Among this the presence of E-waste processing facilities is one of them. Following that it’s possible to attract batter foreign direct investment, FDI that are

related to IT, and ICT sector. This process will also stimulate the ICT production value chain eventually.

2.4.2 Social Improvisation

A careful analysis indicates that conventional method of incineration and landfilling produces 6 to 7 jobs at the maximum. On the other hand, recycling produces approximately 30 jobs at best. Owing to the number of jobs in recycling, economy stabilises and gets stronger than ever. The E-waste management facilities play a great role in job creation to assist the social dimension.

2.4.3 Environmental Advantages

> *"E-waste is one of the most serious environmental threats that remains currently unmanaged by companies." Dan Esty, director of the Center for Business and Environmental at Yale and author of Green to Gold."*

Globally E-waste represents over 90% of the long-lived toxic material disposed of by a typical white collar firm. Unregulated and improper E-waste recycling has linked to massive fish die-offs and other ecological catastrophes (Iles A, 2004)[4].

E wastes have a lot of toxic chemicals which are harmful for the health of human beings, as well as the environment. Improper electronic waste handling has a risk of suffering from some serious ailments and health disorders, due to breathing of toxic chemicals. Once E-wastes are allowed to remain on the land in an unprocessed form, they can contaminate ground resources. By recycling e waste matters, it's possible to reduce the amount of pollution in soil, water and air. Most of the natural resources happen to be non-renewable in nature. Proper E-waste management is important to create livable and planned environment.

Also, with E-waste recycling, the valuable components can easily be separated and allowed to recover. This allows the production of new items with the use of the same components. This allows reducing pollution, save the resources and also redaction of energy.

Exposure to elements such as nickel, cadmium, lithium, mercury, glass and various other components contained within electronic materials can cause long-term damage to health and

[4] Iles, A. 2004. "Mapping environmental justice in technology flows: Computer waste impacts in Asia." Global Environmental Politics 4:4 Pp. 76-107.

the environment. There can also be cancerous developments in some cases, which is not uncommon. Other than humans, domesticated animals and pets may also suffer from cancers and other conditions. This can affect livestock and meat products, and affect the health of grown-ups as well as kids. With recycling, it's possible to prevent all such. Also, by opting for electronic waste recycling, you can lower the amount of space required for landfills which are the areas that are needed to cover waste materials.

2.5 E-waste Generation and Management in Africa

Little information is available on the amount of E-waste documented that is collected and recycled by the formal sector in Africa. Most of the Recycling activities are conducted by ill-equipped informal sectors, with related inefficient resource recovery and environmental pollution. Only a handful of countries in the continent have enacted E-waste-specific policies and legislation.

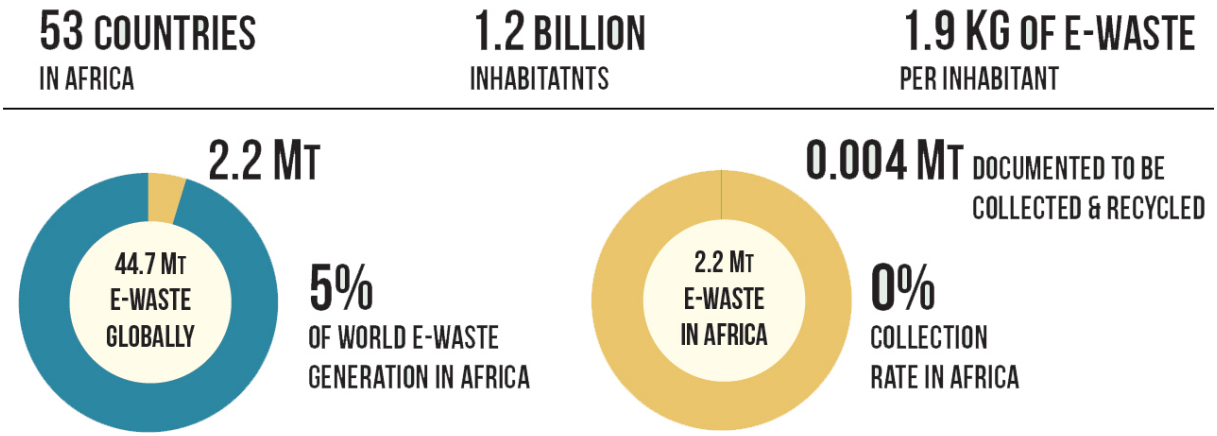


Figure 1.E-waste in Africa (Global E-waste Monitor 2017)

In 2016, 44.7Mt of E-waste was generated globally which represents a 2.9Mt increase from 2014, which was 41.8 million tons (Baldé et al.2017). This number is expected to increase to 52.2 Mt in 2021.This constant growth is closely linked to the increasing demand of electronic products, which is fostered by the continuous development of new products and falling prices, alongside rapid obsolescence of electronics and decreasing product lifetimes.

Figure 2. Global E-waste generated (Source: Baldé et al.2017)

In 2016, domestic E-waste generation in Africa was approximately 2.2 Mt, and with highest contributions from Egypt, South Africa, and Algeria. [5]

Table 1 African countries relative domestic E-waste production

	COUNTRY	DOMESTIC E-WASTE
1ST	Egypt	497 kt
2ND	South Africa	321 kt
3RD	Algeria	252 kt
	Ethiopia	**49 kt**

The top three African countries that have the highest E-waste generation per inhabitant are: Seychelles, Libya, and Mauritius. Which constitute more than the average amount in Africa (1.9 kg/ inh) and the world (6.1 kg/ inh).

[5] The Global E-waste Monitor, 2017

Table 2 African countries relative E-waste generation per inhabitant

	COUNTRY	E-WASTE GENERATION PER INHABITANT
1ST	Seychelles	11.5 kg/ inh
2ND	Libya	11 kg/inh
3RD	Mauritius	8.6 kg/inh
	Ethiopia	**0.5 Kg/inh**

E-waste management in Africa is dominated by thriving informal sector collectors and recyclers in most countries, as take-back schemes and modern infrastructure for recycling are non-existent or grossly limited. Government control of this sector is at present very minimal and inefficient.

Handling of E-waste is thus characterized by manual stripping to remove electronic boards for resale, open burning of wires to recover few major components (copper, aluminum, iron), and the deposition of other bulk components, including CRTs, in open dumpsites.

Resulting from such practices is the severe pollution of the environment, very poor efficiencies in recovery of expensive, trace, and precious components, and the exposure of laborer's and the general populace to hazardous chemical emissions and releases.

In this context, the use of standardized modern E-waste recycling plants should have been a good solution. It is noteworthy, however, that a few modern recycling plants that were established in some east African countries (e.g. Kenya, Uganda, Tanzania) have suffered business failures and closures due, in part, to adoption of inappropriate business models. Notwithstanding such failures, there is now renewed interest by private business outfits to establish recycling plants in many parts of the continent. Ethiopia must take advantage of this business and establish the country as one of advanced E-waste management center.

However, the multifaceted nature of the procedure is labor -intensive organizations without economy of scale will discover it a test to continue. Some electronic scrap components contain potentially harmful materials such as lead, cadmium, beryllium, or retardants. Hence, Recycling and disposal of E-waste may involve significant risk to health of workers and communities and great care must be taken to avoid unsafe exposure in recycling operations.


Part III:
An Overview
of E-WASTE
Management
in ETHIOPIA
E-WASTE

3 E-WASTE MANAGEMENT IN ETHIOPIA

3.1 Introduction

With about 105 million people (2017), Ethiopia is the second most populous nation in Africa after Nigeria, and the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of $783. Ethiopia aims to reach lower-middle-income status by 2025[6]. Following that the general waste generation including E-waste is increasing. Generally, the volume of E-waste at this time is still relatively small – an estimated 4,300 tons of non-functioning computers, televisions, mobile phones and refrigerators – and generally confined to urban areas, particularly Addis Ababa[7]. The country is trying to develop the legal/ normative, technical /institutional, and administrative capacity to handle the expected growth in E-waste in a socially- and environmentally-sound manner.

3.2 Normative Framework

The Ethiopian government gives special attention for E-waste very recently. Prior to the promulgation of Electrical and Electronic Waste Management Regulation (2017), Ethiopia used different related parliamentary legislations and international conventions that are ratified by the country to regulate E-waste. The worth mentioning legislations which have a direct nexus with E-waste are:

- **The 1995 FDRE Constitution**: Article 44 of the constitution stipulates the right to live in a clean and healthy environment;
- **The Environmental Pollution Control Proclamation No. 300/2002**, evolved on municipal waste management;
- **Hazardous Waste Management and Disposal Control Proclamation No. 1090/2018**: as the name indicates it regulates hazardous waste management.

There are also international conventions, which ratified by Ethiopian. The prominent E-waste management related international conventions that have a binding nature in Ethiopia are:

- **The Basel Convention:** this convention was adopted on March 22, 1989 and came into force on May 5, 1992. It deals with the control of trans-boundary movements of

[6] https://www.worldbank.org/en/country/ethiopia/overview
[7] https://open.unido.org/api/documents/3261729/download/UNIDO%20Ethiopia%20Press%20Release_final.pdf

hazardous waste and its deposits. This Convention stipulates that hazardous waste must be disposed of in the country of origin. The Base Convention considers electronic waste as hazardous and its export could be allowed only under special conditions on the Control of Trans-boundary Movement of Hazardous Waste and their Disposal[8],

- **The Bamako Convention*:*** this Convention is a treaty of African nations prohibiting the import into Africa of any hazardous (including radioactive) waste. The convention is a response to Article 11 of the Basel convention which encourages parties to enter into bilateral, multilateral and regional agreements on Hazardous Waste to help achieve the objectives of the convention and it came into force in 1998 on the Ban of the Import of hazardous waste into Africa and the Control of Trans-boundary movement and Management of Hazardous Waste within Africa.

The new Council of Ministers Regulation of Electrical and Electronic Waste Management is a well-balanced document that:

- defines the waste management hierarchy as 3RD: *reduction* of waste generation, *refurbishing* and reuse of waste, *recycling* of waste, and *disposal* of waste/3RD/;
- introduces the Extended Producer Responsibility concept and also defines the responsibility of EEE consumers;
- makes it mandatory for waste collection center operators as well as for WEEE dismantling center operators and for persons engaged in the transportation thereof to register and secure a certificate of competence;
- imposes defined obligations on WEEE refurbishes and recyclers; and
- makes it mandatory for WEEE in temporary storage to be sorted, recorded, and examined.

3.3 Institutional Framework

In Ethiopia, the use of many types of Electrical and Electronic Equipment (EEE) is mostly restricted to urban centers, as the lack of electricity and purchasing power in rural communities often hampers the prevalence of devices such as TVs, refrigerators and computers. (Abenezer & Solomon, 2018) Nevertheless, the trend of using this equipment like TV and Mobile phone are

[8] Basel Convention. http://www.basel.int/. Accessed 12 August 2019

on the raise. In addition, the rural communities do use battery powered devices such as torchlights and radios. In general, E-waste generation in Ethiopia reflects the existing rural-urban disparities with small E-waste volumes in rural areas (predominantly waste batteries, radios and torch lights) and a much broader E-waste mix in urban communities (Abenezer & Solomon, 2018).

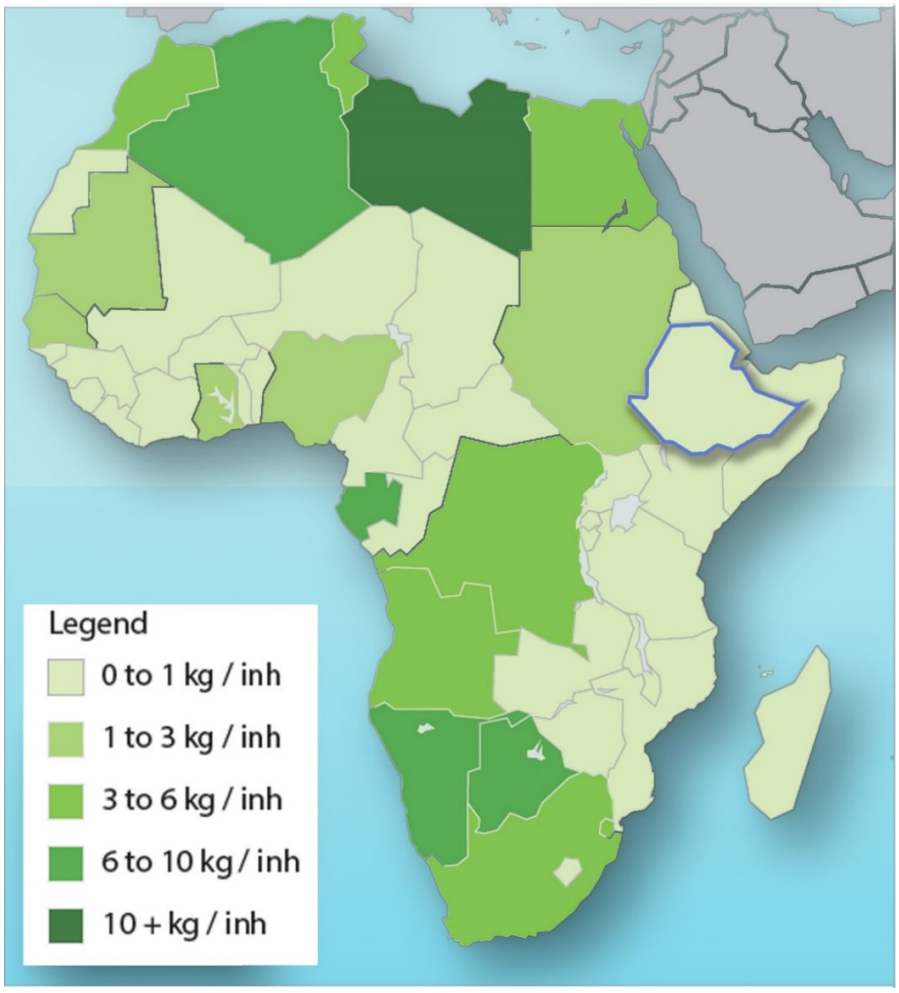


Figure 3: E-waste in Ethiopia (Global E-waste Monitor 2017)

Due to its volume E-waste is not yet a major source of environmental pollution, currently has not yet caused major health effects in Ethiopia. Compared to other African countries, such as Ghana and Nigeria, the volume of E-waste is still quite moderate. There are no indications that unsound recycling and disposal are practiced systematically. Although there are some hints that E-waste is disposed of in an uncontrolled manner, the majority of obsolete EEE is currently stored within government buildings, offices, international organizations and households or

awaiting future solutions (Manhart et al. 2013). While there is no fully functional E-waste management system in place yet, some promising efforts serve as starting points for the creation of environmentally-sound E-waste management systems.

Table 3. Domestic E-waste generated per country in 2016

Country / Economy	Region	Population (1000)	E-waste generated in 2006 (kg/inh)	E-waste generated in 2006 (kt)	National regulation in force in January 2017
Dominica Republic	Americas	10088	5.8	59	No
Ecuador	Americas	16529	5.5	90	Yes
Egypt	Africa	91047	5.5	497	No
El Salvador	Americas	6146	5.8	36	No
Eritrea	Africa	6938	0.6	3.8	No
Estonia	Europe	1312	14.4	19	Yes
Ethiopia	**Africa**	**91196**	**0.5**	**49**	**No**
Fiji	Oceania	895	5.1	4.6	No

Part IV:

Status of CRTC-DMF

4 ASSESSMENT OF COMPUTER REFURBISHMENT & E-WASTE FACILITY

4.1 Background

The Computer Refurbishment Training Center (CRTC) was evolved from the Information Communication Technology Assisted Development (ICTAD) project. ICTAD project was launched in 2005 as unique project in partnership between the Ethiopian Information Communication Technology Development Agency (EICTDA), the World Bank (WB) and the German Development Service (GDS).

The ICTAD project had been implemented with the aim of building national ICT capacity, assisting Ethiopian communities to improve their livelihood through the use of appropriate ICT that facilitates increased access to markets, development information and public/private services. In line to this a number of projects were implemented in education, health, agriculture sectors and community service areas gird towards ICT assisted service delivery. Of these projects, CRTC is the prominent one that engaged in refurbishment activities and provision of training in ICT and business skills to young graduates. The CRTC project has also provide De-manufacturing (DMF) facility in accordance with the international standards of electronic waste disposal.

In January 2007 the International Business Leader's Forum (IBLF) made an agreement with EICTDA to provide consultancy services for the implementation of the ICTAD project and establishment of CRTC-DMF. In April 2009, IBLF renewed the contract and possessed the operation and management role of CRTC-DMF. The contract was concluded in 2010, since then CRTC-DMF has been providing refurbishment, training and de-manufacturing services. For quite some time the company was successful especially in the refurbishing computers and selling them. It had a successful track record on receiving old computers and refurbishing the items and delivering with low price for different governmental institutions including schools and health centers. However, lack of proper exit strategy form project to appropriate legal entity, makes CRTC-DMF incapable to execute its major functions. This section of the document presents the existing organizational, human resource and service delivery situations of CRTE-DMF.

4.2 About CRTC-DMF

CRTC-DMF is located in Addis Abeba, Akaki Kality sub-city, which lays in the south of Addis Abeba, 20km from the center. It is bordered with Steel factory in the north, main road in the east, public bus terminal in the south and subsidiary road in the west. CRTC-DMF has an area of around 80,472 m^2. In this area four major buildings exist to serve as: warehouse, high-tech service room, network lab, offices, training rooms, conference room, dining and kitchen, toilet rooms.

Figure 4: Location of Computer Refurbishment and Training Center; Source: Google Maps

4.3 Purpose/ Function of the Company

The CRTC is driven by the objectives of Ethiopia's poverty alleviation directive and aims to enhance the growth of ICT assisted development throughout the country. The CRTC supports this objective through the provision of high quality, affordable computers for community use, whilst providing practical ICT and business skills training to Ethiopian TVET college graduates.

- Computer Refurbishment
- Training
- E-waste Re-Cycling

4.3.1 Computer Refurbishment

The CRTC aims to perform professional computer refurbishment to international standards. This includes; Data wiping, testing, troubleshooting and maintenance of faulty equipment,

loading licensed Microsoft Authorized refurbished software onto each computer, loading free anti-virus software and Monitor maintenance.

The technicians provide reports of any data wiping carried out at the CRTC for donors as required, and any equipment that may have been damaged in transit and cannot be maintained is passed to the DMF for end of life processing.

4.3.2 Training

The CRTC is a learning organization, providing hands-on practical ICT training to help and shape the staff on the ICT sector. It provides different trainings. The training comprised theoretical and practical sessions. The center provides advanced computer Maintenance, Office Machine Maintenance, Fundamental of Networking and Server Administration. The CRTC also aims to explore a new way of providing training in a more efficient like of e-learning.

The center provides high-quality training in ICT to build ICT capacity across Ethiopia by sharing of knowledge and experience. The trainings will provide practical ICT knowledge and skills to trainees to develop their potential and enhance career opportunities.

4.3.3 E-waste Re-Cycling

The Computer De-Manufacturing Facility (DMF), which is part of the CRTC's facility has been established in 2009 by the then Ethiopian ICT Development Agency (ICTDA), the current Ministry of Information and Technology, (MInT), as a project financed by the World Bank and in conjunction with the London based consultant named International Business Leaders Forum (IBLF).

At its inception the DMF has started its operation in 2010 and become fully operational in February 2012. It started by disassembling/de-manufacturing/dismantling different computer systems collected from mainly government organizations located in Addis Ababa and its surroundings and very few Addis based non-governmental organizations like World Food Program, World Bank, African Development Bank to mention a few.

The main objectives of the DMF are to manage environmentally unsafe disposal of E-waste streams in the country, create green jobs, and conserve precious minerals in the environment.

"This will pave the road to minimize pressure on the environment and public health by reducing and making use of piled up E-waste stream, pollution, and reliance on virgin materials."

4.4 Human Resource & Organizational Structure of CRTC-DMF

4.4.1 Human Resource

In order to achieve organizational objectives qualified person at a right position is mandatory. When IBLF administered the overall activities of CRTC-DMF there were 28 staffs. Of this 13 were main staffs and the remaining 15 were supporting staffs. (See Annex Table 3) In 2017 when UNDP conducts project termination report for DMF, the CRTC-DMF had a total number of 45 staff with expanded number (from 6 to 10) of technicians who engaged in manual dismantling works. At that time CRTC-DMF had 5 executives, 8 guards, 8 cleaners and the remaining were supporting/office staffs (UNIDO, April 2018). Bothe he CRTC and DMF directors have received training abroad in Kenya and in Belgium, respectively. Six technicians also received the training locally (UNIDO, April 2018).

Currently the number of staffs reached 49, of these solely one MSC holder and few (three) BSC holders in IT and Computer science. Majority of the employees have below BA academic background. This indicates that the center needs higher skilled and qualified staffs (See Annex Table 4).

4.4.2 Organization Structure

As stated above, CRTC-DMF has been operating as a project. The CRTC-DMF project was implemented by IBLF until November 30 of 2010 (IBLF, 2010). Although, IBLF has developed exit strategy to transfer CRTC-DMF project to Ministry of Communication and Information Technology (MCIT), the hand over process was not materialized. As a result, CRTC-DMF still used an organizational structure, which was developed by IBLF. (See Figure below)

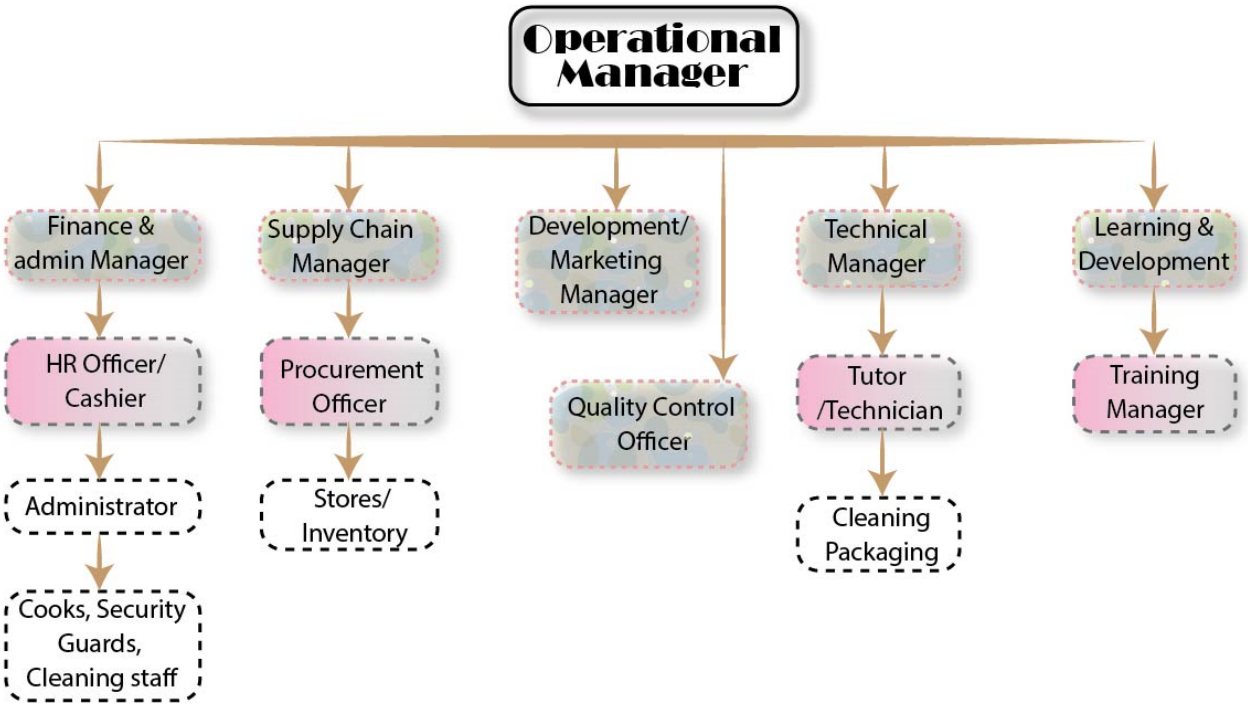


Figure 5. CRTC-DMF Organogram During IBLF Administration

Without official handover the project, MCIT was overseeing CRTC-DMF. Based on this CRTC-DMF designed draft organizational structure, that gives mandate for MCIT to supervise CRTC-DMF through steering committee. Unlike the existing organogram the draft one gives emphasis for E-waste; however, on the site auditing the team identified absence of E-waste management and treatment service in CRTC-DMF. See the draft organizational structure below.

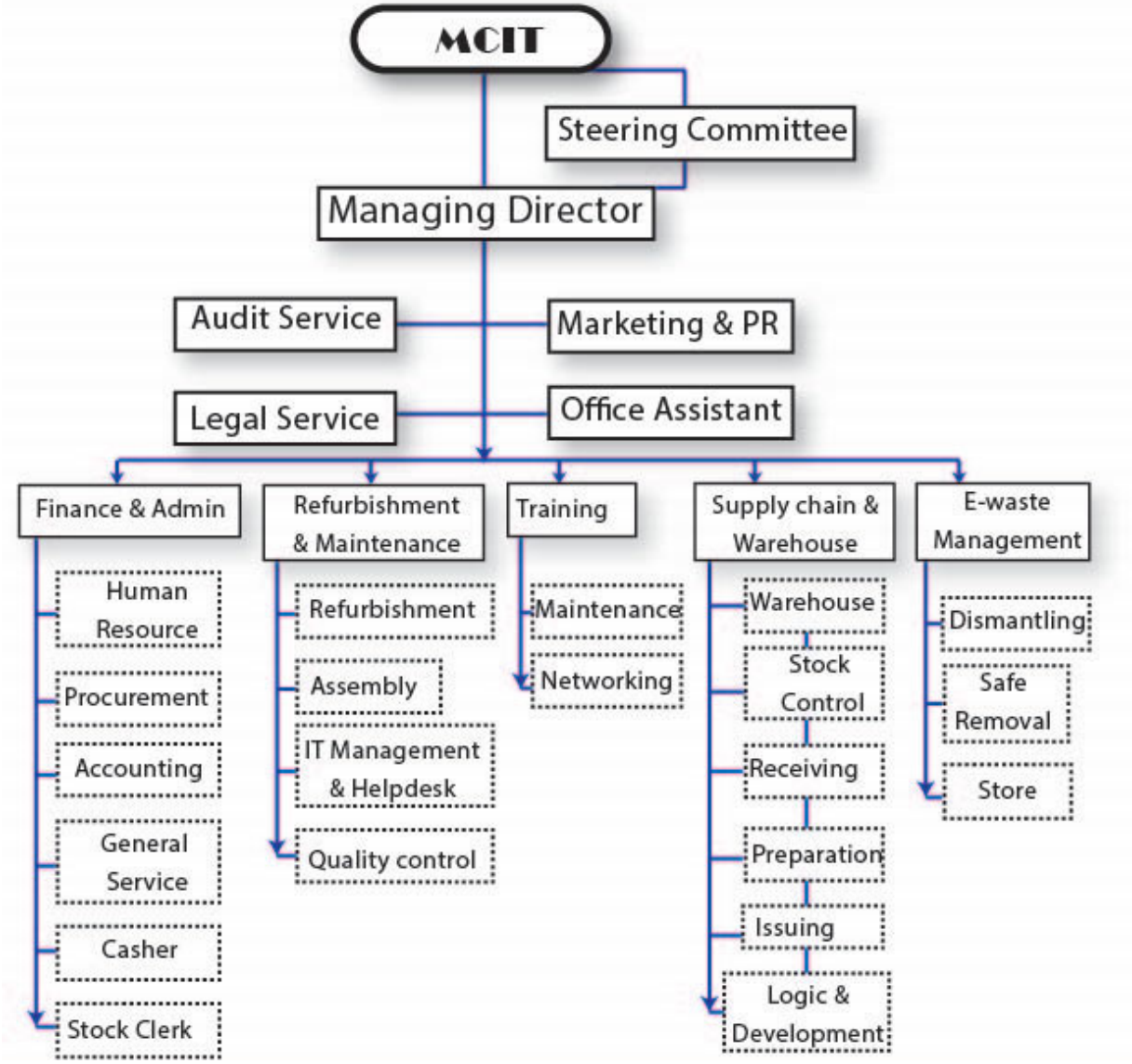


Figure 6. Draft Organogram of MCRT-DMF Developed by CRTC

4.4.3 Physical Asset & Infrastructure

4.4.3.1 Building & Machineries

At the time of this document preparation the CRTC-DMF, had two large buildings designated as: 'old' one and the 'new' one. The former building has different unites that serves for the management offices and two meeting/training rooms with a capacity of 25 trainees each. Apart from this, the old building is used mainly for manual refurbishing of used computers and for

storage of the disassembled components of which it has lately been filled up to overflowing. There is also a separate, small Director's office building combined with a staff dining area.

Figure 7. The Ground Floor of the old Building (Source: IBLF/CRTAD PMU PROJECT HANDOVER, 2010)

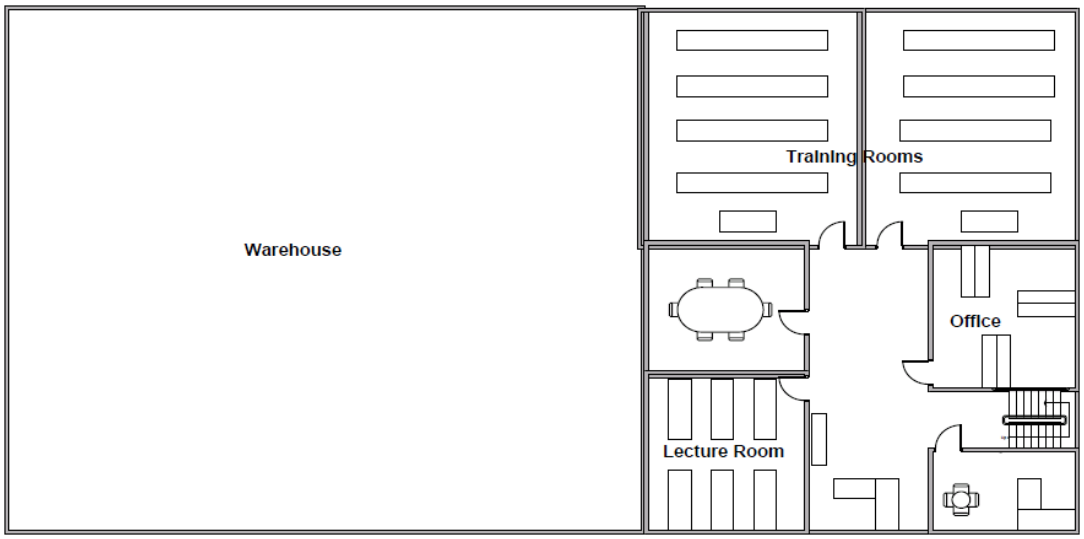


Figure 8. Mezzanine Floor of the Old Building (Source: IBLF/CRTAD PMU PROJECT HANDOVER, 2010)

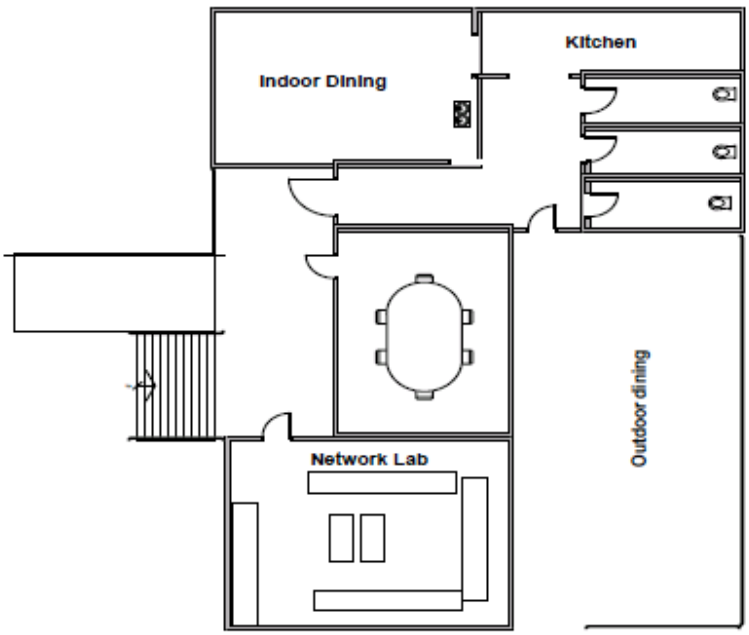


Figure 9. CRTC Outbuilding (Source: IBLF/CRTAD PMU PROJECT HANDOVER, 2010)

There is also a new building designated for both workshop and warehouse. This building currently serves mostly for manual dismantling of old computer equipment, rather than for semi-automatic dismantling. This new building also even more than the old one, is filled up to the ceiling with heaps of computer components, mostly left uncrushed and un-compacted.

In the CRTC-DMF some machinery is installed like the crusher line and the glass cutter, with cable connecting the machine to an outside generator. In order to upgrade the facility of the Akaki DMF different development partners like UNIDO, provide both technical services and equipment, which worth USD 220,000 (UNIDO, April 2018). The equipment/machineries delivered to Akaki DMF by UNIDO are: two shredders, a cable stripper, a CRT cutter, and auxiliary equipment (hydraulic baler, scale, degausser, forklift) (UNIDO, April 2018).

4.4.3.2 Infrastructures

Electricity

- The CRTC-DMF gets power form the national grid.

Water

- CRTC-DMF obtains water from Addis Ababa Water and sewerage authority.

Road

- The location of CRTC-DMF is on the main road that runs from the old Akaki town to Dukem. Within the compound there are roads that covered with asphalts.

4.4.3.3 Information Technology

The center is equipped with high-specification IT infrastructure to support all CRTC current functions and future expansion demands. Using the existing IT infrastructure CRTC provides the following services:

- domain service: Microsoft windows 2003 enterprise edition
- exchange server & secondary DNS server: Microsoft exchange server 2007
- asset & accounting server, refurbishment server, and training: DMF server

All servers are in high specification rack in the service room.

CRTC has refurbished computers for its office and training rooms. In each computer Microsoft Authorized Refurbished Software and Symantec Anti-Virus software are installed.

CRTC has also a 512MB broadband and two wireless routers that provides internet connection for employees and trainees.

4.5 Challenges of the Company

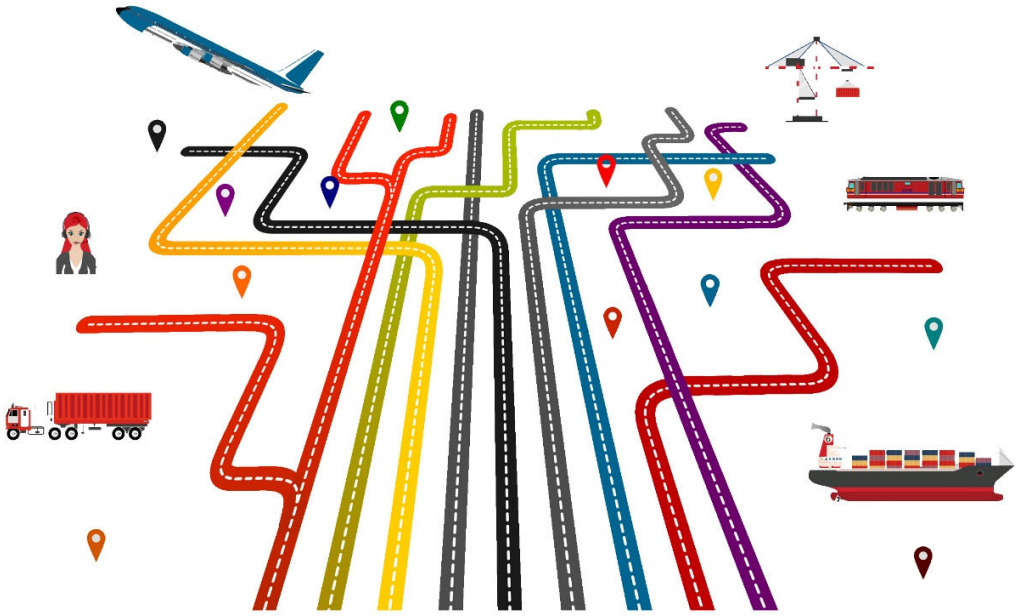
4.5.1 Organizational Challenges

CRTC was established as a project; however, when it completed its project phase, an exit strategy was prepared for the transfer. However, the exit strategy to transfer it as an independent legal entity or merged with other organizations didn't consider its nature. CRTC is established as a profit organization which contradicts with the purpose of the ministry (MCIT).

CRTC has been floating independently for the last ten years or so. Due to this it suffered financial, capacity and employees' related problems.

4.5.2 Financial Challenges

CRTC doesn't have clear legal framework. For reasons mentioned above, the institution doesn't belong to any ministry or government corporation and, it doesn't have any formal budget source. For the last few years the staff didn't have career development plan and incentives which created a moral decline on the staff resulting high worker's turnover. The institution is not working to its potential due to financial restrictions.



Part V:

A WAY FORWARD

5 A WAY FORWARD

5.1 Introduction

The Computer Refurbishment and Training Center De-Manufacturing Facility (CRTC-DMF) was transferred to International Business Leaders' Forum (IBLF) on contract basis for two years. The goal was to eventually transfer the institution to the Ethiopian government under the former Ministry of Communication and Information Technology (MCIT) and the forum prepared a transfer plan entitled IBLF/ICTAD PMU PROJECT HANDOVER and was working closely with MCIT. But for reasons that were not clear the handover did not happen. Currently, CRTC-MDF is not owned by a specific ministry, institution, government or NGO.

MInT (the Ministry who is de-facto owner of the project) is unable to administer CRTC, due to this it conducted a study to decide on the future of the project. The study came up with five possible alternative scenarios, which includes transfer to the employees through safety-net scheme, PPP, selling to private company etc. After this alternatives MInT reached on a consensus to sell CRTC to private company. This section discusses the future administrative owners of the center and its functional process.

5.2 A Stride to the Future

As stated in the previous parts E-waste is one of the fastest-growing waste types in the world. It became one of the growing problems worldwide given the presence of a variety of toxic substances which can contaminate the environment and threaten human health, if disposal protocols are not meticulously managed.

It is known that many African countries receive second-hand equipment. Most electronic equipment exports to Africa are not pretested for functionality (Veit & Bernardes, 2015). Consequently, it is not possible to assess whether these exports are legally defined as hazardous waste under the Basel Convention[9]. Apart from the Republic of South Africa, data on the recycling of WEEE in Africa is scarce (Veit & Bernardes, 2015). Studies indicate that the informal collectors, dismantlers and recyclers in Africa are playing an increasingly important

[9] Basel Convention. http://www.basel.int/. Accessed 12 August 2019

role in the processing of WEEE (Veit & Bernardes, 2015). Likewise, the informal sector plays pivotal role in E-waste collection, recycle and dismantling in Ethiopia.

In order to mitigate and properly manage E-waste, several studies have been conducted and several tools have been developed and applied. The prominent E-waste management tools (Veit & Bernardes, 2015) are:

- Life Cycle Assessment (LCA),
- Material Flow Analysis (MFA),
- Multi Criteria Analysis (MCA),
- Individuals Producers Responsibility (IPR),
- Polluter pays' Responsibility (PPP), and
- Extended Producer Responsibility (EPR)

The EPR addresses the responsibility at the "start of the production chain of a product", while the PPP addresses the responsibility at the "end of the production chain" at the moment a product is turned into waste (Goodship & Stevels, 2012).

Most EU member countries and Non-EU member countries (Switzerland, Sweden, Norway and Denmark) followed EPR approach for E-waste management in their legislations. These countries followed privately owned E-waste management method. Particularly, in those EU and Non-EU countries, company owner's/ industry owners who engaged in EEE productions makes an association to provide E-waste management facilities.

To create a formal WEEE management system, Ethiopia has taken some initiatives in designing, planning and executing E-waste management center (CRTC-DMF) at Akaki-Beseka. The initiative also encompasses policy formulation activities. Due to this an Electrical and Electronic Waste Management Regulation was promulgated in 2017. This regulation like the EU legislatives followed Extended Producer Responsibility (EPR) management method (Goodship & Stevels, 2012).

The established CRTC-DMF project and the existing regulatory framework creates conducive environment for investors to work in Ethiopia. Particularly, the existing facility and regulatory frame work has a comparative advantage for investors to work in the ICT Park.

By examining the current powers and duties of Ministry of Innovation and Technology (MInT), CRTC-DMF is not laid within its mandate (Art. 20 (1) of Proc. No. 1097/2018)[10]. Because of this MInT conducts an assessment with possible options to transfer the CRTC-DMF in to an appropriate legal entity. Based on the field visit, it was confirmed that MInT reached on a consensus to transfer the CRTC-DMF to privet developer. The study conducted by MInT does not consider the nexus of CRTC-DMF with Industrial Parks in general and ICT Parks in particular.

The current Ethiopian E-waste law was adopted from the EU legislatives; CRTC-DMF has been established by MCIT/government organ in collaboration with development partners in line with the Basel convention. Since there is a high potential in increasing the number of ICT investors in the ICT Park and the existing E-waste management law propagate EPR approach, CRTC-DMF should be transferred to a state owed enterprises and/or private enterprise.

To see the pros and cons of transferring CRTC-DMF the team has been evaluating different possibilities. In the table below is the summary of the assessment.

[10] Definition of Powers and Duties of the Executive Organs of the Federal Democratic Republic of Ethiopia Proclamation No. 1097/2018; *Federal Negarit Gazette,* 25th Year, N0. 8.

Table 4. Summary of Comparative analysis to Transfer CRTC-DMF

Broader Category	Potential Specific Organ	Advantage	Disadvantages	Remarks
Public Organization	MInT	• Has a capacity to train high-level professionals. • Have a regulatory role • Can access international Loan/ Technical Support	• No mandate to run a profitable organization • Might create Conflict of Interest	
	EFCCC	• Have a regulatory role • Can ensure environmental Safety in Recycling • Can access international Loan/ Technical Support	• No mandate to run a profitable organization • Might create Conflict of Interest	
	MoiT	• Have a regulatory role • Can promote investment on E-waste management • Can create a one window service on E-waste management for ICT investors	• No mandate to run a profitable organization • Might create Conflict of Interest	
	AACA	• Can incorporate the new E-waste management system with the existing solid waste management • Most of the E-waste generated and informally recycled in the city • Creation of additional Job Opportunity • Can access international Loan/ Technical Support	• Might not have sufficient capacity to manage additional waste • Might incur additional cost for sources from other regions & other organizations like Industrial Parks • It may have problems to implement EPR	

Broader Category	Potential Specific Organ	Advantage	Disadvantages	Remarks
Public Enterprises	IPDC/ ICT Park	• Profit making industry • Fulfill the proper responsibility of handling wastes generated within the park (EPR). • Helps to attract Investors on the ICT industry • Creation of additional Job Opportunity	• Additional administration burden	Can collaborate with private developers
	CRTC-DMF	If it is established as a public enterprise: • It has skilled manpower • It has an already established experience • It has an already established organizational framework	• Contradiction with the national policy of privatization • Lack of ability to fulfill the overall E-waste management process (From Collection to Disposal-3RD)	
Association	Share Company (SC)	(If it is established as a domestic share company): • To introduce waste management as a new business type to the country • Creation of Job Opportunity • Better service delivery • Opportunity for public enterprises to own share	• Since it is a new experience it might face operational and management difficulty • Relatively expensive service delivery	

Broader Category	Potential Specific Organ	Advantage	Disadvantages	Remarks
Private Investor		• Better service delivery • Creation of Job Opportunity • Might attract internationally experienced companies	• Lack of transparency • Lack of sensitivity to the environment • Might focus on the profit • Relatively expensive service delivery	

5.3 Recommendations

E-waste management is a “labor intensive” industry and it is highly integrated with ICT industry. The benefits of owning the existing CRTC-DMF facility is rewarding for IPDC/ICT Park and EIC at Large. Specifically, IPDC will have the advantage:

- To fulfill one of its obligation of providing basic infrastructure i.e. E-waste management facility;
- To Resolve the existing and upcoming E-waste related problems that arise in the industrial parks;
- It can be considered as a pre-condition for investors within the IPDC and specifically in the ICT park;
- Can help to achieve the aim of promoting eco-industry; and
- To Achieve social responsibility by abating the looming E-waste problem

Considering the global E-waste business capacity, opportunity and social benefits, E-waste business must be managed under government agency and/or public entity, due to the less of financial benefit to be run under private business entity.

It is recommended to establish legal frame work on the E-waste management; e.g. law on tax on IT relevant manufacture/merchandise to pay a treatment fee in advance or electrical goods purchase tax, to save the environment from E-waste, to secure business opportunity and its sustainability. In case above legal frame work can be implemented by the Government, IPDC is recommended to acquire and run this facility.

IPDC can use Private Public Partnership to run the facility. In this model instead of completely selling CRTC/DMF to private organization, IPDC can co-own the facility with a well-established E-waste management company. Once IPDC possess the CRTC-DMF facility the proposed E-waste management system demonstrates under Figure 10 and 11.

Figure 10 indicates the overall E-waste source, collection and disposal process. On this diagram there are two main sources of E-waste: IPDC and Other sources. The main IPDC’s sources of E-waste emanates from: ICT park, office and shades; while other sources of E-waste originates from ICT park product users and other sources like governmental and non-governmental offices,

academic institutions, and domestic users. From these two major sources there are three collection strategies: using IPDC's collection site and SME door to door collection service. Pertaining to ICT park product users they return back the waste to ICT Park in fulfilling extended producers principle. All these wastes deposited at CRTC/DMF and the overall collection and deposition process will be regulated by IPDC.

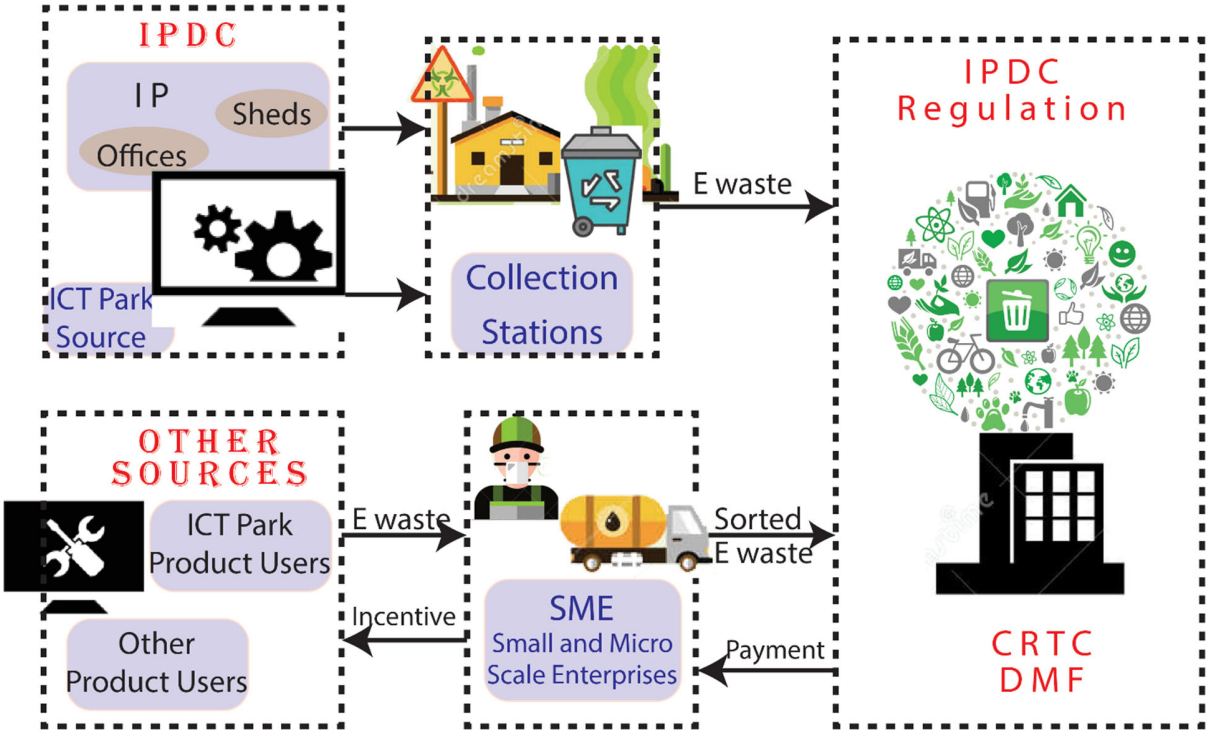


Figure 10. Proposed E-waste Management System part I

Figure 11 depicts the income generation process from E-waste treatment/management process. Once all the E-waste damped at CRTC/DMF, the CRTC/DMF will do: storage, sorting and maintenance acts for marketable electronic products. The remaining waste like, glass, wire, plastic and precious metal, needs farther processing, to reduce the environmental impact of waste and to become high valuable products.

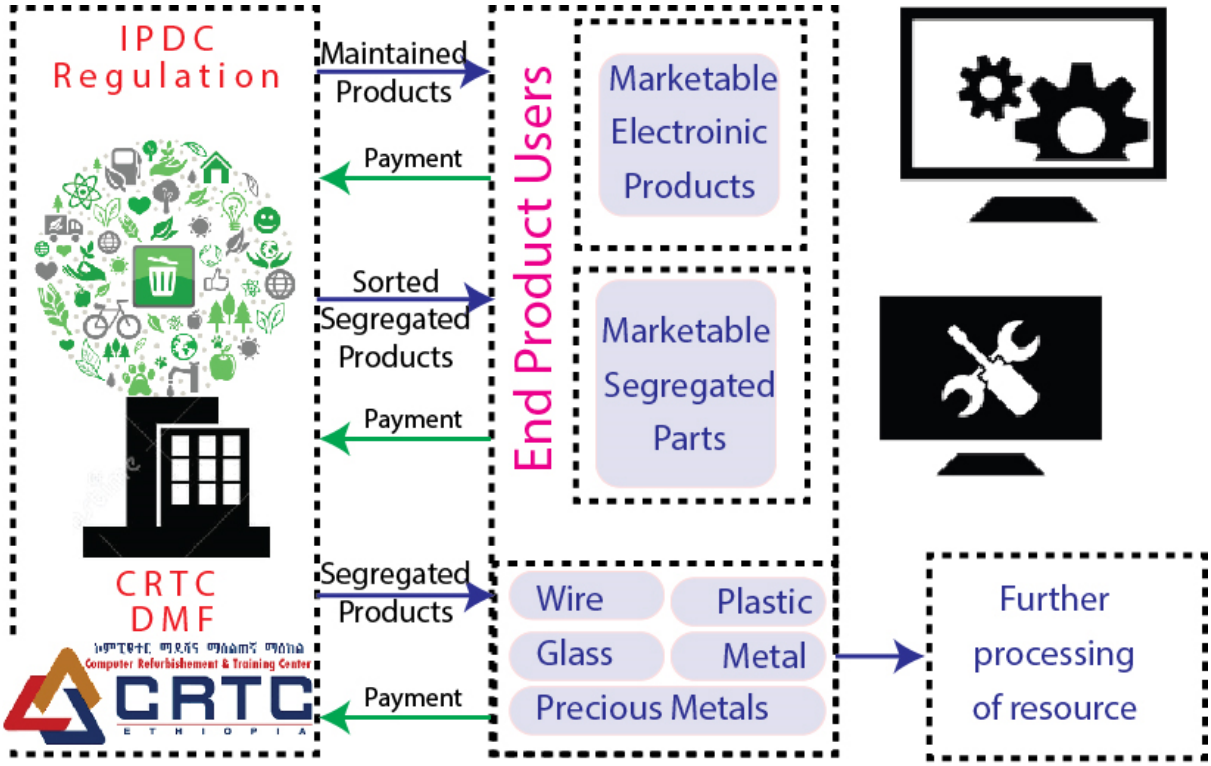


Figure 11Proposed E-waste Management System part II

6 References

Abenezer, W. K., & Solomon, M. W. (2018). Waste Electronic and Electric Equipment Management in the Educational Institutions and Governmental Offices ofAddis Ababa, Ethiopia. *Elsevier- Waste Management*, 30-41.

Baldé, C. F. (2017). *The Global E-waste Monitor – 2017.* Bonn/Geneva/Vienna: UNU and ITU.

Goodship, V., & Stevels, A. (2012). *Waste Electronic and Electric Equipment /WEEE/ Handbook.* Cambridge : Philips Woodhead Publishig .

IBLF. (2010). *IBLF/ICTAD PMU Project Handover.* Addis Ababa.

Iles A. (2004). Mapping environmental justice in technology flows:. *4:4,* pp. 76-107.

MoEF. (2017). Management of Electrical and Electronic Wastes. *Management of Electrical and Electronic Wastes*. Addis Abeba, Ethiopia: Birhanina Selam Printing Press.

UNIDO. (April 2018). *Independent Terminal Evaluation: Investment Promotion on Environmentally Sound Management of Electrical and Electronic Waste in East Africa with Focus on Ethiopia.* Viena : United Nations Industrial Development Organization .

Veit, M. M., & Bernardes, A. M. (2015). *Electronic Waste Recycling Techniques.* Switzerland: Springer International.

Zhang, L., & Klumdick, G. K. (2011). Recycling of Electronic Waste II Proceedings of the Second Symposium .

Annex

Table 5. CRTC-DMF Staff During IBLF Administration

Function	Staff Category		Salary	
	Main	Supporting		
Learning and Development Manager	√		8000	1
Training Manager	√		6000	1
Supply chain/Warehouse Manager	√		8000	1
Deployment/Marketing Manager	√		8000	1
Acting IT Manager	√		5500	1
Quality Control Officer	√		4500	1
Tutor Technician	√		4000	7
DMF Technician	√		2000	2
Finance & Administration Manager		√	8000	1
HR Office/Casher		√	4500	1
Administrator/Secretary		√	4000	1
Procurement officer		√	2000	1
Stores/Inventory officer		√	4000	1
Cleaning/Packing Assistant		√	1500	4
Driver/Warehouse Assistant		√	1500	1
Head Cook		√	2000	1
Assistant Cook		√	1500	1
Driver		√	1750	1
Total				**28**

Source: CRTC-DMF, 2019

Carton

Table 6. Educational background the Current CRTC-DMF Staff

Department	Educational Background		Number	Remark
	Educational Stream	Level		
Human Resource	Accounting	BA	2	
	Accounting	Dip	1	
	Purchasing	Dip.	1	
	IT	Dip.	1	
	High school	Grade 10	1	
IT	IT	BSC	2	
	IT & CCNA	BSC	1	
	Applied Computer science & CCNA	BSC	1	
	IT & CCNA	Diploma	1	
	IT Technician & CCNA	Diploma	2	
DMF & Packing	IT	Diploma	1	
	Computer science	MSc	1	
	Electricity	10 +1	1	
	Electronics	10+2	1	
	Hardware & Networking	Diploma	1	
	Accounting & HNs	Diploma	1	
	Accounting	Diploma	2	
	ICT	Certificate	1	
	Auto	Certificate	2	
	High school	Grade 10	2	
	High school	Grade 12	1	
	High school	Grade 8	2	
	High school	Grade 7	3	
Cleaning and Packing	IT	Level-2	1	
	High school	Grade 11	1	
	High school	Grade 10	2	
	Elementary	Grade 6	1	
Janitor	Elementary	Grade 8	1	
	Elementary	Grade 6	1	
	NA		3	
Security Guard	High School	Grade 10	1	
	Elementary	Grade 8	1	
	Elementary	Grade 4	1	
	NA		3	
Food Preparation	NA		1	
Total			49	

Source: CRTC-DMF, 2019

The Role of the ICT Park in Digital Transformation

Strategic Framework and Implementation Roadmap

March, 2021

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Acronyms

AAWSA	Addis Ababa Water and Sewerage Authority
AFDB	African Development Bank
BPO	Business Process Outsourcing
CRTC	Computer Refurbishment and Training Centre
DSL	Digital Subscriber line Service
EBA	Ethiopian Broadcasting Authority
EEU	Ethiopian Electric Utility
EICTDA	Ethiopian ICT Development Agency
ETA	Ethiopian Telecommunication Agency
ETC	Ethiopian Telecommunication Corporation
FDI	Foreign Direct Investment
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
GTP I	First Growth and Transformation Plan
GTP II	Second Growth and Transformation Plan
GVCs	Global Value Chains
HGERA	Home-Grown Economic Reform Agenda
ICT	Information Communication Technology
ICT4D	ICT for Development
IDI	ICT Development Index
IDS	Industrial Development Strategy
INSA	Information Network Security Agency
IoT	Internet of Things
IPDC	Industrial Park Development
ISP	Internet Service Provider
ITES	IT-enabled services
ITU	International Telecommunication Union
JICA	Japan International Corporation Agency

JICA-EIPP	Japan International Corporation Agency-Ethiopian Industrial Park Promotion
MCIT	Ministry of Communication and Information Technology
MINT	Ministry of Innovation and Technology
MOFED	Ministry of Finance and Economic Development
MSMEs	Small and Medium-sized enterprises
NESB	National Enterprise Service Bus
NICTP	National ICT Policy and Strategic Paper
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PKI	Public Key Infrastructure
PPP	Public-Private Partnership
PSTN	Public Switched Telephone Network
RCP	Rural Connectivity Program
ROI	Return on Investment
SDPRP	Sustainable Development and Poverty Reduction Strategy Paper
SNNPR	Southern Nations, nationalities, and Peoples' Region
STI	National Science, Technology and Innovation Policy
TEP	Telecom Expansion Project
TVET	Technical and Vocational education and Training
UGI	Universities, Government, and Industries
UNCTAD	United Nations Conference on Trade and Development
WEF	World Economic Forum
WIPRO	West Indian Products Limited
WLAN	Wireless Local Area Network

1. Introduction

In Ethiopia, policies towards the ICT sector begun in earnest in 1996 when the government established the Ethiopian Telecommunication Agency (ETA) and the Ethiopian Telecommunication Corporation (ETC) to manage the regulatory and commercial aspects of telecommunications respectively. Three years later, the government established another agency - the Ethiopian Broadcasting Authority (EBA) with a mandate to oversee the broader media and communications-related regulations, including the ICT sector. The EBA was initially located in the Ministry of Information but was later transferred to the Government's Communications Office. Then in 2003, the government established the Ethiopian ICT Development Agency (EICTDA) with a mandate to support information technology (IT) applications and IT-related capacity building in the public sector (GESCI, 2017).

While the responsibility of the EBA was confined mainly to the broadcasting sector, the ETA and EICTDA continued to share the regulatory divides across many aspects of the ICT sector until the Federal Government decided to establish a new high-level organ - the Ministry of Communication and Information Technology (MCIT) in 2010 – which incorporated all their functions (GESCI, 2017). The MCIT assumed all ICT-related development in Ethiopia by consolidating the three former agencies: the EICTDA, ETA, and the communication department of the former Ministry of Transport and Communications. MCIT also inherited the responsibility of administering and managing the Information and Communication Park (ICT Park), which was previously managed by EICTDA.

The construction of the Addis Ababa ICT park (from now on the 'ICT park') began before the establishment of MCIT, although it was completed under the responsibility of MCIT. Since the abolition of MCIT in 2018, the Industrial Park Development Corporation (IPDC) has become accountable for the governance and management of the ICT park.

As initially envisaged, the objectives of the ICT park were focused largely on attracting Foreign Direct Investment (FDI) to initiate IT-related activities for export. This is in line with the objectives of other industrial parks that Ethiopia established in different parts of the country to produce light manufacturing goods for export. Thus, although the initial objectives of the ICT park included stimulating the development of local digital entrepreneurship and inter-firm linkages – hence the inclusion of an incubator in the initial design of the park - in reality, the main focus of the ICT park was to attract international anchor investors and other foreign digital enterprises. Thus, the initial objectives of the ICT park were:

- to attract Foreign Direct Investment (FDI);
- boost exports of IT-related products and services;
- create nearly 300,000 direct and indirect jobs over a period of five years;
- stimulate the emergence of local entrepreneurship in the digital economy; and
- promote knowledge linkages among IT enterprises and with academic institutions.

This study would argue that while the government's desire to attract foreign investors into the ICT park is understandable and should remain the primary goal of the park – particularly given the national objectives to create thousands of jobs and increase foreign exchange earnings – the ICT park must also host local digital start-up companies, tech entrepreneurs, incubators and well-established local digital enterprises creating a cluster that enables inter-firm learning and cooperation and technological upgrading through linkages. As shown from the experiences of successful developing countries, creating a co-working space in a digital innovation hub accommodating both foreign companies and local digital start-ups could create a conducive learning environment for the latter. Consequently, there should not be a conflict between the investment destination objectives of the ICT park and its role as a host to local technology entrepreneurs and IT-service providers.

When the idea of an ICT park was first discussed in 2010, it was decided to allocate 200 hectares of land, although eventually the amount was scaled down to 172 hectares. The land was previously used for farming purposes. A total of US$45 million was budgeted for constructing the park. It is estimated that a total of US$35 million was already spent largely for constructing primary and arterial roads and to build the Headquarters of the Ethiopian Telecom Corporation (not completed yet) and other buildings to serve as an incubator facility and administrative offices. Proximity to the city of Addis Ababa and Bole international airport and the Bole Lemi industrial park (Bole Lemi I) were factors that influenced the decision on the location of the ICT Park.

Nearly ten years on, the ICT park has very little to show to justify the substantial resources devoted to the project and to warrant the opportunity cost of acquiring land that could have been used for farming or other productive activities. Except for a single investment by a Chinese company (Techno) assembling mobile phones and employing about 1200 workers, the other investment activities in the park are small and inconsequential, especially when compared with the expectations and goals envisaged when the park was established nearly a decade ago. The park has remained a vast open space with a few buildings (some of them unfinished) and a few tenants - consisting largely of small start-up companies - that take advantage of subsidized rent that the park offers.

This outcome is well below what was expected of the park in terms of FDI flows, exports of IT products and IT-enabled services, employment creation, stimulating innovation, and promoting tech entrepreneurship and digital transformation. At the time of its establishment, the park lacked a strategy, a fully-fledged business plan, and the management and governance structure appropriate for a technology park. Essential facilities such as high-speed internet connection and a reliable power supply that an ICT park requires to attract 'anchor' investors and create a clustering of IT-related businesses were also missing. A review of the decision-making process that led to the establishment of the ICT park suggests that there was limited understanding of the complex, multi-dimensional, and fast-changing nature of the new digital technologies among the top policymakers.

The objective of this study is to explore how the ICT park could be made an attractive destination for investment and an important driver of Ethiopia's digital transformation. We hope also that the outcome of this study will serve as a '*wake-up call*' and a reminder to policymakers that – given the lessons learned from the Covid-19 experience - *urgent* and *bold policy actions* are needed to transform the ICT park from its current dormant state into a vibrant site that attracts and accommodates serious investors and enable Ethiopia to catch-up with other developing countries, particularly neighboring countries in East Africa. If this call for urgent action is ignored, the park will likely continue to linger in its current inactive state and suffer the same fate as some technology parks in developing countries that have been labeled "*white elephants*".

This document will argue that the timing is right for transforming the ICT Park into a Digital Innovation Hub, a place where technology entrepreneurship thrives, a home for IT-enabled service providers, and a major driver of Ethiopia's digital transformation strategy. The reasons are two-fold: First, a major impact of the Covid-19 pandemic and economic crisis has been to put the spotlight on the importance of digital technology and the disadvantages of remaining behind in digitalization. It has also underlined the global digital divide, differences in e-readiness and market power in the digital economy, and the need for new policies and regulations to ensure a fair sharing of the gains from digital technologies. Second, there is now a new policy thinking in Ethiopia. Prime Minister Abiy's vision of building a knowledge-based economy by accelerating the country's digital transformation has created a renewed hope that the policy approach towards the ICT park will be different this time. Indeed, in June 2020, Ethiopia's Council of Ministers approved the National Digital Transformation Strategy aimed at promoting the application of digital technologies across key sectors in Ethiopia and creating an inclusive digital economy.

Building on these changing realities and learning from past mistakes, this study proposes that the role and operational modalities of the ICT park should be reviewed. In addition to attracting FDI, particularly 'anchor' investors, the ICT park should also host local digital enterprises, start-up digital companies, and incubators (both private and public) that nurture young digital entrepreneurs. In other words, the ICT park should function as a Digital Innovation Hub and a self-contained ecosystem that provides not only co-working spaces and the digital infrastructure that enterprises need for digital transformation but also the environment that fosters inter-firm collaboration, nurtures technology entrepreneurship, and stimulates digital innovation. This is the best-practice model that has evolved from the experiences of industrialized countries (and more recently from China). There are no reasons why Ethiopia cannot replicate the same model for the ICT park, as part of the digital transformation agenda.

1.1 The Impact of Covid-19: Reinforcing the Importance of Digital Technology

The Covid-19 shock has challenged the whole world in different ways and at different levels: individual, community, country, and international levels. At a personal level, it has posed challenges on the ability of individuals to keep their jobs and sustain their income and livelihoods while maintaining self-isolation to control the community spread of covid-19. At the community level, it is testing the discipline of societies to maintain social distancing and help each other with compassion and generosity to overcome the challenges posed by the Covid-19 outbreak. At the national level, it is testing the leadership and governance capacity of governments and the resilience of countries to endure the health and economic crisis instigated by a global pandemic. Above all, it is testing countries' e-readiness and the level of their digital transformation, which has become key to sustaining work and social life and advancing the search for a vaccine and other preventative medicines. At the international level, it is testing the cohesiveness and unity of the multilateral system to take the leadership required to find global solutions to what is a global problem.

In the absence of an effective vaccine to fight Covid-19, governments around the world have opted for the next best solution to control the spread of Covid-19 and minimize its fatalistic impact. They have introduced complete or partial lockdown at a national level, which means stopping or closely monitoring cross-border movements of people and goods, forcing citizens to stay at home and away from their work place or places where they gather in large group – such as, factories, offices, schools, markets, shops, restaurants, theatre halls, etc. Also, social distancing had to be enforced to ensure that the virus does not spread through close contact with other persons. For infected individuals and those who have had contact with infected people, a quarantine procedure was introduced where they have to isolate themselves or move into specially designated quarantine quarters for at least 14 days.

These extraordinary measures have dramatically changed the way people interact, conduct business, and manage their normal day-to-day routines. Homes have been turned into workplaces and schools; street shopping was substituted by e-shopping; office meetings moved to online meetings; on-site seminars were replaced by webinars; family visits were changed with interactions over WhatsApp and Zoom; and so on. All these alternative options were possible because of one crucial factor: digital technology.

With reduced costs of collecting, storing, and processing data, and greatly enhanced computing power, digital technologies have emerged as the most important new technologies in the last three decades. Today, Information and Communication Technologies (ICTs), e-commerce, and other digital applications can be leveraged to foster productive capacities and entrepreneurship − including the empowerment of women as entrepreneurs and traders –, promote creativity and innovation, and generate millions of decent ICT-related jobs. They have also become key drivers of growth in micro, small and medium-sized enterprises (MSMEs), including through

providing access to ICT-enabled financial services. Digital solutions can also be leveraged to increase access by individuals - including those who do not have bank accounts - to financial services (online and mobile payments) and markets (e.g. leveraging virtual marketplaces) and enable their participation in the marketplace as consumers. Moreover, e-commerce has become increasingly important for export promotion from developing countries.

It was these multidimensional roles of digital technologies and their applications in diverse economic and social areas that enabled countries to maintain certain economic activities, work schedules, education of students at home, online commercial transactions, and social interaction while still adhering to lockdown and social distancing protocols. Not all countries and individuals within countries have equal access to the services of digital technologies. The digital divide between countries and within countries is still a critical feature of the development of digital technology. Interestingly, however, countries do not have to be more advanced and technologically more developed to have access and benefit from the application of the new technologies. Even less developed, low-income and agrarian-based economies such as Ethiopia could take advantage of digital technologies if they pursue the right policies and strategies and kick-start the process of digital transformation.

In this respect, the Covid-19 experience has given additional impetus to Ethiopia's determined efforts to build its digital economy by nurturing the development of technological entrepreneurship and enhancing the country's competitive advantage in the provision of IT-enabled services such as Business Process Outsourcing (BPO). With the advancement of digital technologies, the BPO industry has been reinventing itself in a variety of ways thereby increasing the opportunities for different countries and communities to benefit from the provision of outsourcing services. The range of services that developing countries can offer through the application of digital technologies ranges from functions such as call centers to accounting, payroll, employee benefits, tax preparation, radiology analysis, films and cartoons production, and even research and development. The role that the ICT park can play as a digital hub and self-contained ecosystem that enables enterprises to provide IT-enabled services and empower technology entrepreneurs to innovate and develop their digital business are the main issues addressed in this study.

The rest of this document is divided into six sections. Section II briefly reviews the focus of previous studies on the ICT park and analyses the key factors that influenced the decision to establish the ICT park. Section III examines Ethiopia's national development objectives and national ICT policies. From this analysis, it would be possible to establish whether the objectives of the ICT park are aligned with the country's development vision and ICT policy objectives. Section IV will focus on Ethiopia's national ICT ecosystem, its level of development, and its capacity to support digital transformation. ICT parks or Digital Innovation Hubs often compensate for weak digital infrastructure and a fragile enabling environment for technology entrepreneurship development at a national level. Section V identifies lessons from the experiences of other countries focusing mainly on the principles of ICT policy-making rather than specific policies as such. There is no one-size-fits-all approach to technology entrepreneurship and digital transformation. Each country will have to find its own path

identifying policies that match its own needs and starting conditions. However, useful lessons could be drawn on the approaches to policy-making, which is often as important as the policy itself. Section VI will propose a strategic direction for the ICT park and will explain why functioning as a Digital Innovation Hub is the most realistic option for Ethiopia and the 'value drivers' of stakeholders that need to be considered when establishing a Digital Innovation Hub. Finally, Section VII will present the action lines required to transform the ICT park into an effective Digital Innovation Hub supported by a five-year implementation roadmap.

2. Origin of the ICT Park and its Current Position: Diagnostic Review

The ICT park was established after a lengthy debate among key policymakers on the location, size, and scope of the park. A feasibility study was undertaken by WIPRO IT consulting, an Indian company with previous experience in conducting feasibility studies. The design of the park was proposed by WIPRO, which also helped to prepare a Master Plan. Initially, 200-hectare land was identified near Addis Ababa, on the Eastern side of Bole International Airport. The land was previously used for household farming. Proximity to Addis Ababa, the Bole Airport, and two industrial parks (Lome I & Lome II), which were then scheduled for construction, were important factors for the selection of the site. The long-term plan was to create an "Ethio ICT Village", similar to the "Konza Technology City" park established by Kenya.

As noted above, the main responsibility for overseeing the completion of the construction of the ICT park was given to the former Ministry of Communications and Information Technology (MCIT), which was also responsible for the implementation of the Master Plan. The Plan specified the vision and objectives of the park and the types of facilities to be developed. Subsequently, another major study on the ICT park was prepared by CISCO, followed by two other studies on the ICT park conducted by JICA and AFDB respectively. Altogether, three substantive studies were conducted on the ICT park, none of them are available in the public domain. However, they symbolized the efforts by the government to acquire information and knowledge on technology parks before and during the establishment of the ICT park. Thus, given their relevance as inputs towards the decision to establish the ICT park, they warrant a closer scrutiny to determine whether they provided the comprehensive information and understanding necessary to construct a sustainable ICT park.

2.1 A brief summary of previous studies on the ICT park

An abridged summary of the key issues addressed by the three studies and the questions that they tried to answer and those they failed to ask are presented below in a matrix format. After a thorough review, this report concludes that while the three studies were of the highest quality and insightful, their predominant focus has been on 'what' needs to be done or 'what' is required to establish a technology park rather than how to make an ICT park sustainable and attractive to investors. For example, adequate attention was given to questions such as how much land should be allocated to the ICT park? Where should it be located? What are the basic infrastructures (i.e. roads, water and power supply, sewage system, etc,) required for the ICT park to operate like any other industrial park? Demarcation of zones within the park such as warehouse and assembly area, IT Research & Development area, commercial sites, residential, etc.

These are important questions but they are not, by themselves, sufficient for establishing a thriving technology park that aspires to be a major driver of the country's digital transformation and contribute towards national goals such as employment creation and the development of an inclusive digital economy. What was generally missing was the 'how' and 'why' questions –

for example, 'how' should the ICT park attract quality investment? 'How' could local talents and entrepreneurs be incorporated into the park? 'How' should the park be managed – by the State, private management, or PPP? 'Why' should the ICT park promote one set of activities rather than others? 'How' much should the park charge for land-leasing or does it need to lease land? 'How' could the park achieve the right balance between manufacturing and IT-enabled service activities? and so on. It would seem that generally these key questions were given less attention in the studies conducted before and during the establishment of the ICT park.

Table 1: Summary of key issues/topics covered in previous studies on the ICT park

Study by	Focus & main topics addressed	Questions asked and recommendations
CISCO	**Issues addressed** • Description of current physical, telecom, and utilities infrastructure in Ethiopia. • Description of infrastructure standards needed. • General political, economic, and social facts about Ethiopia. • Telecom sector context in Ethiopia. • List of regulations and norms related to the sector, investment, and consumers. **Development plan** • Distribution of land. • Projection of production-related employment potential (employment was projected based on the size of the park instead of domestic or external aggregate demand). • Assessment of the park's future needs - in terms of transport, water sources, wastes management, electricity and telecom capacity, etc - based on the projected employment/population growth within the park. • Characterization of needs, options, and roles in terms of contracts and organization	**Questions asked** • What should the park contain in terms of physical infrastructure, connectivity, and utilities? • What is the potential for creating job opportunities? • What are the skills and management expertise required to manage an IT park? • What are the current gaps in infrastructure? What else is missing to reach full capacity and achieve competitive standards? **Questions not asked** • Why establish an ICT park? How should the park prioritize investment activities? Should it be based on national priority goals or first come first serve bases? Does the park need a strategy? • How was the investment and employment target estimated? • How will the ICT park achieve the targets? • What is the timeframe for implementing the targets? • Although the report refers to the types of management and other skills normally required by IT parks and the areas of responsibil-

		ities, it does not specify how Ethiopia should develop the necessary skills. • The report does not elaborate on what kind of IT-related services should the IT park offer beyond real estate?
African Development Bank	**Issues addressed** • Assessment of potential Challenges (nascent industry, investment in training, weak telecom infrastructure, poor linkages between industry and academia, lack of regulations, lack of seed or venture capital for start-ups). • Estimates of employment potential. It is envisaged that the ICT Park will generate about 10% (i.e, 30,000) of the originally estimated number of jobs. • Recommendations on upgrading of infrastructure, facilities, and services. • Financial analysis for the second or upgrading phase. • Discussion of service facilities required for companies to add value as the number of companies in the IT park increases. • Elaboration of organizational model. • Implementation roadmap for expanding the ICT park, particularly extending competencies and capabilities for job creation and innovation	**Questions asked** • Deeper detail on needs and steps • Deeper detail on timelines and stages of implementation • Recommendations on Services and value proposition • More detail on the "what" • Proposed road map (what is the progress?) **2017-2018** (external consultants) - Develop a detailed master plan - Marketing plan - Plan for capacity building **2018-2019** -Construction plan **2019-2020** -Consolidation of facilities and job creation (10,000 IT – 30,000 others) **Questions not asked** • Less clarity on the "how" • What should the master plan include?
JICA-EIPP	**Issues addressed** • Description of current physical, telecom, and utilities infrastructure. • Description of infrastructure standards needed.	**Questions asked** • What is the vision for the park in terms of physical infrastructure, connectivity, and utilities?

	• General political, economic, and social facts in Ethiopia. • Telecom sector context in Ethiopia. • List of regulations and norms related to the sector, investment, and consumer. **Development plan** • Distribution of land • Projection of employment. • Needs and standards based on the projected population, in terms of transport, road, water sources, waste management, electricity, and telecom capacity, • Characterization of needs, options, and roles in terms of contracts and organization	• What types of skills and management positions would the ICT park require? • What are the current gaps in infrastructure? **Questions not asked** • What is the mission of the park in terms of specific purpose, objectives, and strategies? • How were the targets and demand estimated? • How will the IT park achieve that target? • How will the development plan be implemented? • How will the park implement the stated targets? • What are the priority activities that the park should encourage? • How should it attract investment?

Table 1 Summary of key issues covered in previous studies on the ICT park

2.2 Key factors that influenced the decision to establish the ICT Park

Further assessment of the strategic thinking and expectations that led to the establishment of the ICT park points to two important factors that influenced and shaped the evolution of the park. They are:

The growing recognition by the government of the importance of the ICT sector as a driver of economic and social development.

It was evident that Ethiopia was lagging behind other East African countries, particularly Kenya and Rwanda, in digital transformation. The media hype about digitalization, digital revolution, and how the application of ICTs was transforming developing economies and making them efficient and competitive was difficult to ignore even for a government determined to keep telecom service delivery under State control and closed to private investment. At the same time, a growing number of reports on the IT sector began to emerge written by international organizations such as the United Nations Conference on Trade and Development (UNCTAD)

and others highlighting the close link between the application of ITs and macro-economic growth and economic prosperity.[1] Among the key linkages stressed by these reports were:

- The contribution of the ICT sector to productivity improvements;
- The contribution of IT to Gross Domestic Product (GDP) through its impact on economic activities, production, and trade;
- ICT usage by citizens resulting in a more informed and connected society;
- ICT deployment by governments enabling efficient service delivery, improving transparency and effective monitoring;
- Businesses leveraging ICTs for upgrading core processes such as supply chain, trade logistics, trade facilitation, financial transaction, boosting trade through e-commerce, etc.

Thus, despite the government's continuing reluctance to de-regulate the telecom industry, there was increasing awareness among policymakers that unless the country moves rapidly from analog-based to digital-driven economy and catches up with other developing countries, its ability to deliver services efficiently and compete in international markets will be negatively affected. The flurry of ICT-related policy actions and institutional restructuring undertaken during the preparation and launch of the first Growth and Transformation Plan (GTP I) confirms that there was a belated awakening among policymakers on the importance of the ICT sector and the need to take action. Three important policy actions taken between 2009 and 2011 are worth noting since they represent the policy backdrop and the strategic thinking (or lack of strategic thinking) underlying the decision to establish the ICT park. These are:

a) The launch of a National ICT Policy and Strategy in 2009, delineating, for the first time, the government's determination to leverage IT as a tool for socio-economic development as well as promote and enhance the ICT sector and its contribution to Ethiopia's social and economic transformation.[2] Among the key goals identified were: to build an accessible ICT infrastructure throughout the country; create the skilled human resources required for the proper development and application of ICTs; develop the necessary legal framework for the application of ICT, and promote the use of ICT for modernizing the civil and public services to enhance efficiency and effectiveness for service delivery.
b) The upgrading of the ICT sector into a Ministerial level responsibility in 2010. Pursuant to Parliamentary proclamation No 691 in October 2010, the government established the Ministry of Communications and Information Technology (MCIT) to strengthen the institutional framework for policy planning, development, and implementation of ICT-

[1] See various annual issues of the '*Information Economy Report*' published by UNCTAD. For example, https://unctad.org/en/Docs/sdteedc20051_en.pdf

[2] Ethiopia's National ICT policy was first issued in 2002. At that time, the key vision was to improve the social and economic wellbeing of Ethiopians through increased usage of ICTs. Emphasis was put on good governance and efficient public service delivery through application of ICTS. However, the revised 2009 ICT policy included a 'strategy' for digital transformation by developing the infrastructure, skills, regulatory and policy framework required to build a digital economy.

related policies in a coordinated manner.[3] The Ministry was responsible for setting and implementing standards to ensure the provision of quality, reliable and safe communication and information technology services. MCIT was also responsible for Licensing and regulating telecommunication and postal service operators and for effective implementation of the National ICT policy and strategy. In addition, MCIT developed frameworks for the development of communication and information technology in sectors such as agriculture, industry and commerce, education, health, etc. The Ministry was also the regulator of the IT-related activities such as Ethio-Telecom and Postal subsectors. [4]

c) The establishment of the ICT park in 2011. The completion of the ICT park project, which started before the MCIT was established was the first major initiative taken by the Ministry to advance the development of the ICT sector. MCIT was managed by a Senior Minister who was also, at the same time, one of the three Deputy Prime ministers.

The influence of export-led industrialization strategy on the development of the ICT park. Timing matters.

A better understanding of the national development policy framework and the strategic thinking that inspired the establishment of the ICT park will help to shed light on why the park was designed the way it was; why the main focus was on attracting FDI rather than leveraging the park as a tool to nurture local investors; why priority was given to export-orientation and the basis for expecting export growth in ICT products and services, why it was felt necessary to construct the Headquarters of the national telecom company within the park; why constructions of key building in the park remained incomplete; why the park was successful in attracting investment in manufacturing/assembly activity but not services; why it continues to encounter difficulties in attracting investment in IT-enabled services; how the management of the ICT park was initially envisaged; and so on.

The ICT park was established at a time when the government was fully engaged in the implementation of export-led industrialization strategy, which begun with the launch of an Industrial Policy in 2002 and the formulation of the Industrial Development Strategy (IDS) in 2003. Both these documents propelled the new export-led industrialization agenda, anchored in the manufacturing sector. They were also instrumental in the growth of the floriculture industry, which rose from nothing into one of the most dynamic export sectors in East Africa. Specific manufacturing sectors were identified as priority areas for export: textile and apparel, leather and leather products, and agro-processing. Two additional sub-sectors were earmarked for import-substitution industrialization: pharmaceuticals and chemicals. The logic was to

[3] MCIT was the result of the merger of three public agencies: The Ethiopian Information and Communications Technology Development Agency (EICTDA), The Ethiopian Telecommunications Agency (ETA) and the Communication wing of the former Ministry of Transport and Communications.

[4] As a result of a government restructuring, which began in 2018, the number of mainline Ministries were reduced. As a result, in October 2018, MCIT was merged into the Ministry of Innovation and Technology (MiNT) to function as a department within MiNT.

build on the country's agricultural foundations by moving toward new tradable activities in manufacturing that absorb large numbers of young and semi-skilled workers.

Initially, the export promotion strategy encountered several binding constraints. The domestic private sector was weak and lacked the capability to kick-start export growth. Access to urban land was another difficulty faced by investors, along with poor infrastructure, insufficient power supply, and underdeveloped trade logistics. The country's skill base was also in an early stage of development, as was the local technological capability, which restricted the country's ability to produce quality goods for export.

To alleviate these constraints, the country adopted an industrialization strategy that depended on three key pillars for its success.

1. Identifying a large piece of land within the proximity of major urban centers and constructing industrial parks. The parks were designed as a specifically designated site containing all the basic infrastructure and services – energy, water, transport, customs, and other regulatory-related administrative support, etc. – that enterprises need to produce manufactured goods. This enabled firms to operate more efficiently than firms outside the parks, where the process of initiating an investment project can be cumbersome.
2. Attracting FDI, especially the so-called 'efficiency-seeking FDI' (i.e, export-oriented FDI), to mobilize capital and encourage the transfer of technology, technical know-how, and skills and gain access to international markets.

3. Export promotion at any cost. As one of the fastest-growing economies, a typical feature of Ethiopia's growth experience has been a rapid expansion of imports, leading to a widening current account deficit. Increasing export capacity is essential for narrowing or eliminating the deficit.

In short, these are some of the policy imperatives that moulded the pattern of development of the ICT park and shaped its objectives and business model. In formulating a new strategic direction for the ICT park, consideration should be given to the specificity of digital technology and the ICT sector and whether a policy framework designed for sectors that are more traditional is relevant for promoting digital transformation at the enterprise and national level.

2.3 Initial vision, mission, and zones

Vision

'To establish Ethiopia as the premier IT hub of Africa'

Mission

- "To provide impetus for the development of ICT sector in the country by offering a world-class business environment along with a conducive policy and regulatory regime, state-of-the-art infrastructure and a value proposition geared towards positioning Ethiopia as the preferred IT hub of Africa".
- "To create a destination for overseas investment and ongoing generation of foreign earnings".
- "To create employment and career opportunities for Ethiopian citizens".

Facilities

- An incubator to accommodate start-up ICT enterprises
- Convention center
- Supportive facilities, such as a food court, restaurants, medical facilities, financial services, postal, and banking services.
- Institutional support facilities such as child care centers, training centers, estate management, a fire station, police customs, and recreational facilities.

Zonal areas

- Business center,
- assembly and warehouse,
- commercial zone,
- administration and
- knowledge Park/incubation

Target

It was projected that the ICT park will accommodate a total population of 137,386. Of this 109,694 and 22,105 were expected to be workers and visitors respectively.

Size of land allocated

The initial plan earmarked for the ICT park was 200 hectares but the final amount allocated for operational purposes was 172.7 hectares

Original Design of ICT Park, 2011

Figure 1 Original Design of the ICT Park

Current State of the ICT Park, 2019

Figure 2 Current State of the ICT Park

2.4 The Current Status of the ICT Park

As noted above, prior to the establishment of the ICT park, several studies were conducted to determine the objectives and vision of the park and its mode of operation. A master plan was also prepared.[5] A brief review of these studies is already presented above. The studies focused mainly on the physical infrastructure aspects of the ICT park and a description of the various facilities that an ICT park needs and should comprise. None of the studies paid much attention to key questions such as why would an ICT park - which strictly is a technology park - require 200 hectares of land (which was the initial allocation, although now the size of land within the jurisdiction of the park is reduced to 172 hectares). Nor did the initial master plan consider the question of why would an ICT park be located in the outskirts of a city - 22 kilometers from

[5] None of the studies and the master plan have been published.

the center of Addis. Also, what is the rationale for a State-owned national telecom Company (Ethio telecom) to build its Headquarters in the middle of the park?

The only goals specified in the Master Plan were the aspirations to attract efficiency-seeking (or export-oriented) Foreign Direct Investment (FDI), generate 300,000 new IT-related jobs, and the vision of transforming Ethiopia into "a premier IT Hub in Africa". However, no clarifications were given on what types of FDI would be attracted and how investment would be targeted. Similarly, it was not clear on what basis the projected that 300,000 IT-related jobs could be created was made. To date, the total number of employments created in the ICT park is less than 2000. Attracting FDI requires investment a targeting and promotion strategy and the introduction of incentives and regulations that are tailored to the specific sectoral activities to be promoted. In fact, in the last few years, nearly 200 foreign investors have made inquiries about the ICT park, most of them expressing strong interest to invest in it. Of these, about 27 foreign enterprises have submitted project proposals. However, with the exception of a single Chinese company assembling mobile telephones, other expressions of interest have not resulted in the actual implementation of investment projects. The main reason is the lack of a clear guideline and business model to direct the management and administrator of the park on how to allocate land and facilitate investors. A summary of the current mode of operation of the ICT park, which glaringly elaborates the lack of a strategic direction and business model, is presented in table 1 below.

Summary of the current business model of the ICT park

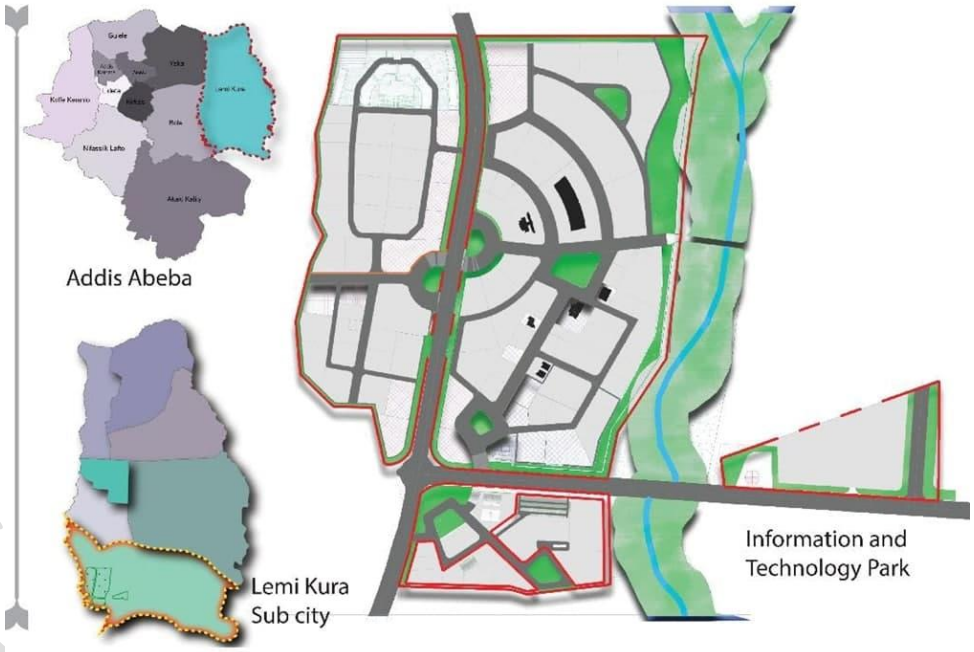
Vague vision and objectives	The lack of clarity on purpose, priority, and vision generates confusion on the strategy and business model to be followed and the goals to be achieved.
Confusion on 'who' are the clients' and their expectations or 'value drivers'.	Lack of awareness on who the main clients are and their needs. This has led to a lack of a strategy on how to reach them. The ICT park currently does not have a strategy or a protocol on how to attract investors, what incentives and services to offer them, and what to expect from them. There has never been an assessment of demand for the services of the park and the enterprises wishing to locate in the park.
Confusion on 'what' the park can offer in terms of infrastructure and services.	Currently, what the ICT park can offer is limited to leasing land and renting the limited number of office spaces available to it. Even these services cannot be implemented because of a lack of clarity on how to allocate land, at what cost, and with what logic.
Confusion on 'why' enterprises should be located in the park, which segments of ICT activities should be allowed to invest.	Due to the lack of a strategic direction, the ICT park does not have a program that helps entrepreneurs to understand why they should be located in the park. The incentives offered by the ICT park is the same as other industrial parks. The specificity and uniqueness of innovation-driven digital technology and the need for a specialized ecosystem do not feature in the park's program.
Revenue stream	Currently, the main revenue source of the ICT park is from the rent and leasing services to existing tenants, which are few. A large part of the park remains an empty space. Sustainability of revenue stream is a major challenge, especially since the limited number of office spaces available are rented at subsidized rates.

Lack of strategic partnership	Currently, the ICT park is operating in isolation, including in investment promotion, managing the incubation located in the park, and servicing the needs of start-up companies.
Lack of performance evaluation	The ICT park lacks key performance indicators. There are no targets on the quantity and quality of investment to be attracted, the number of digital companies to be located in the park, annual revenue, export performance, etc.

Figure 3 Summary of the Current Business Model of the ICT Park

Location

The ICT Park, formerly known as 'Ethio ICT Village', is located in the south-eastern part of Addis Ababa, at the Bole Lemi Industrial Zone. At the time of its establishment, the expectation was that the proximity to the Bole international airport, the city of Addis Ababa (the largest business center in the country), and the Bole Lemi industrial park will make the ICT park an ideal location for attracting investment and creating an integrated Bole Lemi Smart Industrial city in the future. The idea of creating a smart city is still part of the vision for the future of the ICT park although, in the short term, the main focus will be to improve the facilities and infrastructure available in the park and transform it into a dynamic digital Innovation Hub.



Map 1 Location Map of the ICT Park

Human Resources

As shown in table 1 below, when the ICT park was established in 2011, it was anticipated that up to 63 people would be required to fully operate the park. In addition to a CEO to manage the park, it was foreseen that three Deputy CEOs would be required to take up the position of Executive Officers in charge of ICT Village Administration Affairs, ICT Park Development & Service, and Investment Affairs respectively. However, currently, there are only 27 employees and almost half of them (48% - 13 out of 27) are on temporary contract. Moreover, with the

exception of the CEO, almost all of the high and middle-level managerial positions are vacant. Indeed, some departments do not have any staff at all.

The Employment Situation of the ICT Park

Department/Directorate	# of Required Employees	# of Existing Employee
CEO	1	1
CEO's Advisor	1	1
Deputy CEOs of ICT Village Administration Affairs Executive Office	1	0
Deputy CEOs of ICT Park Development and Service Executive Office	1	0
Deputy CEOs of Investment Affairs Monitoring Executive Office	1	0
Corporation Audit Directorate	2	0
Corporation Legal Service Directorate	2	1
Corporation Communication Directorate	3	1
Human Resource Development and Administration Directorate	5	1
Finance, Procurement, and Property Administration Directorate	8	7
Building Administration & General Service Directorate	3	3
ICT Park development & Cervices	6	2
ICT Park Expansion Construction Monitoring and Contract Administration Directorate	7	3
ICT Directorate	7	3
Corporate Investment Planning Directorate	6	2
Market Study and Marketing Directorate	4	0
Incubation Centre Business development, Monitoring & Support Directorate	5	2
Sub total	**63**	**27**
Other (Drivers/4/ & Janitors/8/ & plumber/1/)	13	13
Total	**76**	**40**

Table 2 The Employment Situation of ICT Park

Organizational Structure

The organizational structure of ICT Park has been adjusted twice since its establishment in 2011. The first structural change was introduced when the ICT Park was administered and managed by MCIT (see Figure 1). The objective was to give the ICT park a more independent management structure while it is still administered by MCIT. Although the park was still at an initial stage of its development, the experiment with an independent management structure was in line with the practice commonly applied among technology parks in other countries.

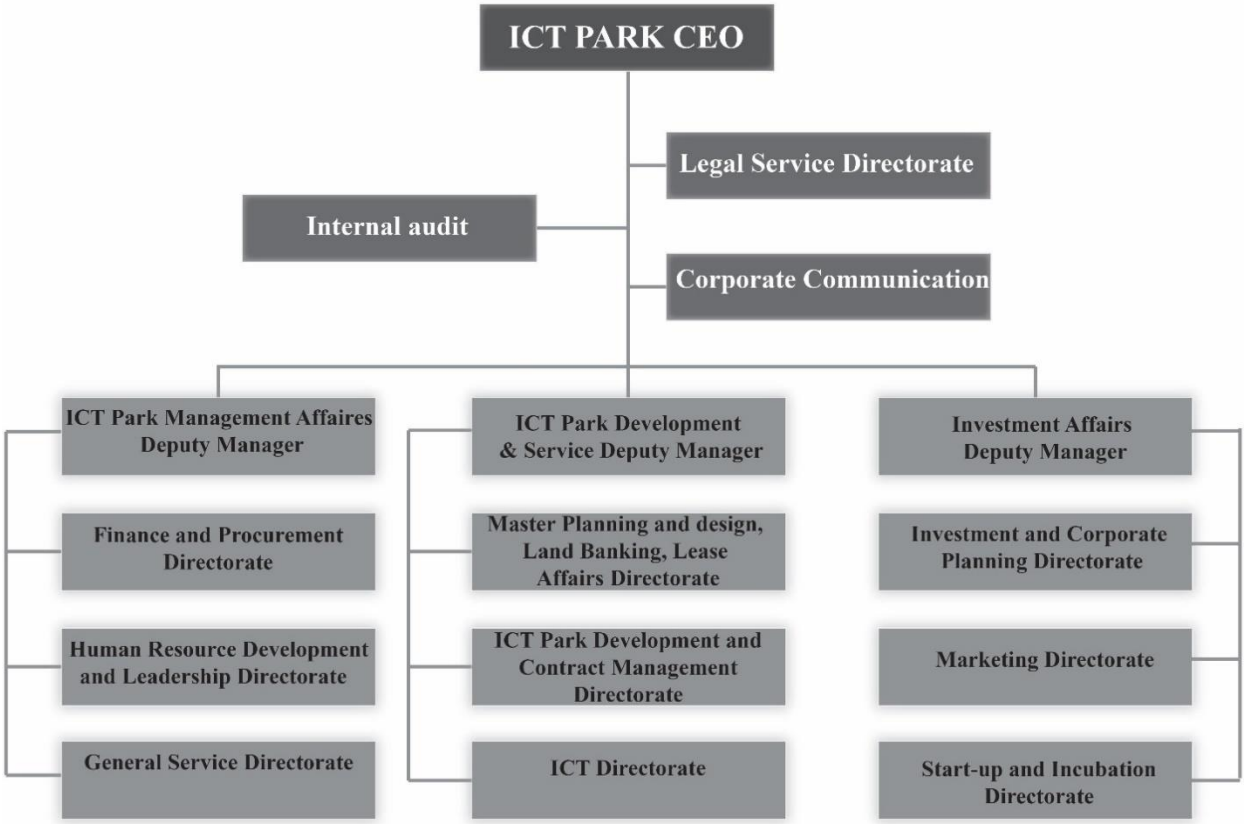


Figure 4 Organizational Structure

Currently, the ICT Park is administered by IPDC and considered as one of the branch offices of IPDC (see Figure 2). This arrangement contradicts the experience in successful countries where technology parks are in most cases managed as independent business entities, even in cases where the parks are publically owned. Great importance is attached to the sustainability of technology parks and their ability to compete with other businesses and manage their finances without becoming liabilities to the public sector.

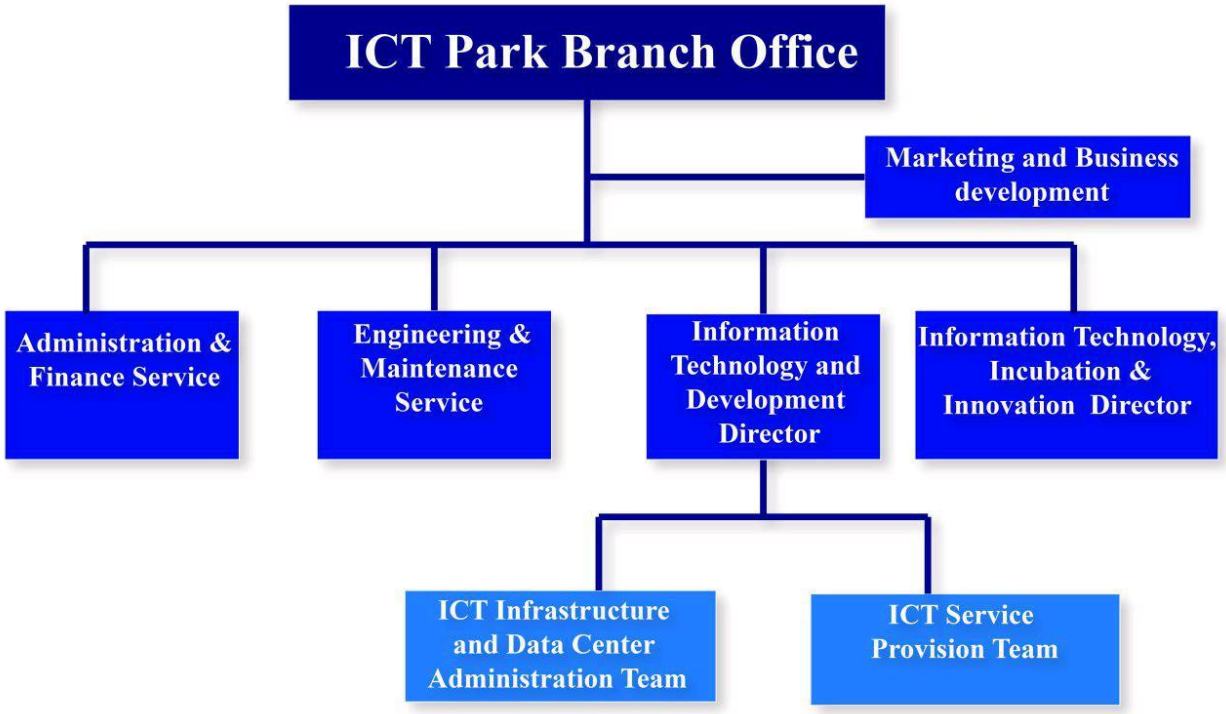


Figure 2 New ICT Park Structure

Physical Infrastructure

A foundational requirement for establishing an efficient and functional ICT park is the construction of basic infrastructure that the park needs to operate a digital hub. In addition to internet connectivity and power supply, the park should also have access to adequate water supply, a sewerage system, solid waste disposal capacity, telecommunication infrastructure, and other physical infrastructures. This section will review the challenges in physical infrastructure that are currently faced by the ICT park and possible solutions on how to resolve the observed gaps in physical infrastructure. Projections on what could be done to remedy the observed challenges or shortages are presented in Annex X.

A. *Electric Power Supply*

A reliable and sufficient electric power supply is one of the most important foundational infrastructures needed to make the ICT park functional. Unfortunately, however, the ICT park lacks both a standard grid system and a reliable and adequate power supply. From a field survey, it is observed that an unplanned electric power line with a capacity of 15 Kilo Volt/KV/ passes through the park. This is not only hazardous but also renders a certain part of the park's space unusable. In principle, the electric power lines should pass underground using a cable duck system. However, all grid lines laid inside the park are above the ground. This is in violation of accepted safety, architectural, and engineering standards.

It is estimated that the park will need more than 135mw electric power when it becomes fully operational. At present, the park has access to 3MW only, which is substantially less than the projected power needs. In its current capacity, the park will not be able to attract investors in some IT-enabled services such as datacentre, which require a significant amount of power capacity. A single datacentre would require 3 to 5MW to operate properly.

Although, as initially designed, ICT Park was envisaged to be an integral part of the Bole Lemi Industrial Park, it has no access to the Bole Lemi Industrial Park sub-station. Rather, the ICT Park receives electric power from the main grid administered by the Ethiopian Electric Utility (EEU). To ensure the success of the park, installing an adequate electric power supply must be considered as a top priority and IPDC must find ways to resolve this issue.

B. Water Supply

Currently, the ICT Park receives water from Addis Abeba Water and Sewerage Authority scheme system. IT is projected that the water demand will increase substantially when the ICT park becomes fully operational. It is estimated that when fully operational, the water requirement of the ICT park will reach on average 5,156m3 per day. Since the current source will not satisfy the estimated water demand, an additional source has to be identified. Other options such as digging boreholes to satisfy the demand should be explored.

C. Rain Water Drainage system

Storm water drainage is part of the essential infrastructure of ICT Park. Separate systems are provided for the collection and disposal of storm water and sewage. Due to the high rate of urbanization and climate change resulted in heavy rainfall. Hence, life and property are often under threat of flooding. Based on the Ethiopian Metrology Agency climate data, the average rainfall of Addis Abeba is >1000 millimeters.

If we examine the ICT Park territorial trait the slope gradient is ranging from 2.1 to 7 percent. The Park is also engulfed with rivers. There are some drainage structures in the existing ICT Park in line with the road network. Considering the future development, the slope, groundwater, and the surrounding rivers; the ICT Park needs a proper stormwater drainage plan.

D. *Sewerage System*

The decomposition of the sewage ingredients in wastewater treatment plants commonly produces methane/CH4 (65 to 75%), carbon dioxide/CO2 (30%), and a trace of other inert gases such as Nitrogen/N2, hydrogen sulfide/H2S, etc. If the emission of these gases is not controlled early and with appropriate measures, the damage to the environment could be significant. Moreover, the park will lose its competitive advantage as a positive contribution to climate change through an effective waste treatment system is one of the factors that contribute to the attractiveness of the park as an investment destination.

The existing building for the sewage system in the ICT park is directly connected to individual septic tanks. This method is not only outdated but also cannot sustain the needs of tenants in the long term. Therefore, wastewater must be conveyed to government treatment plants through different size pipelines. The newly proposed AAWSA sewage treatment plant will be a suitable option for the ICT Park.

E. Solid Waste

Proper solid waste management is one of the key requirements for an ICT park to achieve smooth and sustainable operation. Most of the waste generated on the ICT Park is dumped on open fields for subsequent degrading. All wastes currently produced in the park are organic or domestic wastes with null? e-waste and hazardous waste character. However, over time the ICT park will start to generate hazardous wastes and e-wastes when it reaches full operation.

E-waste is one of the most harmful by-products of ICT industries. Incorrect disposal and dumping of old equipment such as computer parts and peripherals can be detrimental to the environment and can cause serious health hazards. Dumping of electronic equipment can lead to the release of toxic substances like Lead (Pb), Cadmium (Cd), and Mercury (Hg) into the environment. These chemicals can contaminate soil and groundwater. It is therefore critical and mandatory for the ICT park to establish an e-waste management manual and strategy to tackle the issue of solid waste management before it becomes unmanageable. The park can either collaborate with an institution that specializes in waste management such as‘ CRTC’ or build its facility to manage the waste.

F. *Telecommunication Infrastructure*

The park has fiber network installation within the administration Zone connecting all buildings within the park. The park uses this installation to provide internet services to tenants within the park. It has the capacity of handling up to 40Gbs network traffic. Each building has 1GB per second on all edge node ports. Currently, the park leases internet service from Ethio telecom and sells it back to tenants without any profit. The Park can provide up to 40Mb per second of internet service for tenants.

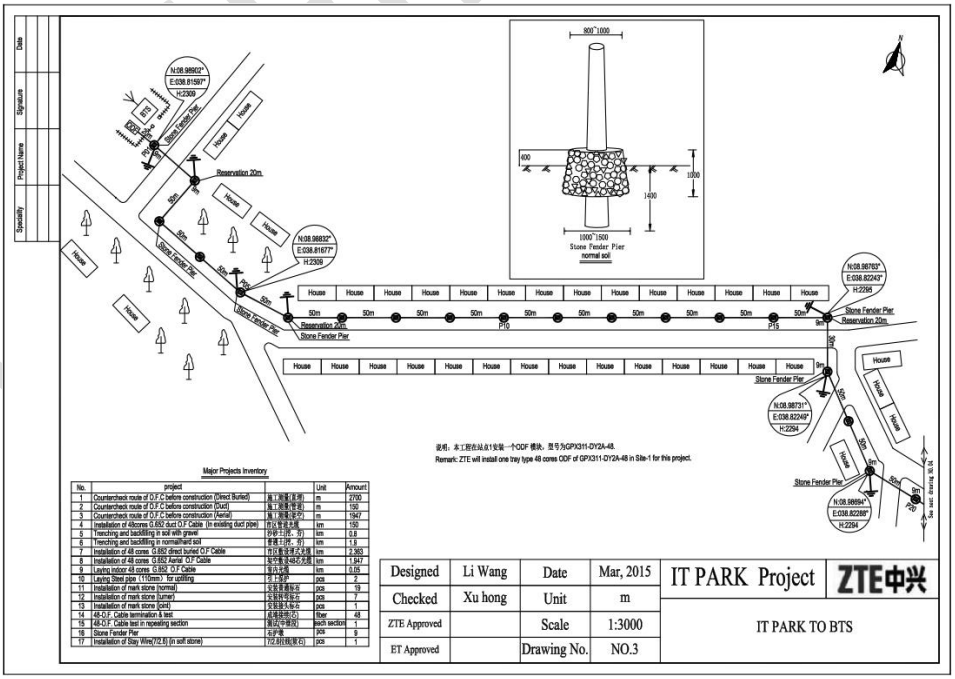


Figure 5 Fiber Optic Cable Installation Within the Admin Zone; Source: ICT Park

The park has an outside connection with Ethio telecom with two main nodes. One comes from a Bole node and the other comes from the Yeka node. However, parts of the cables are laid on the surface exposed to different damages and risk of being stolen. Damages and stealing of the cables have happened before, which caused internet blackout within the park.

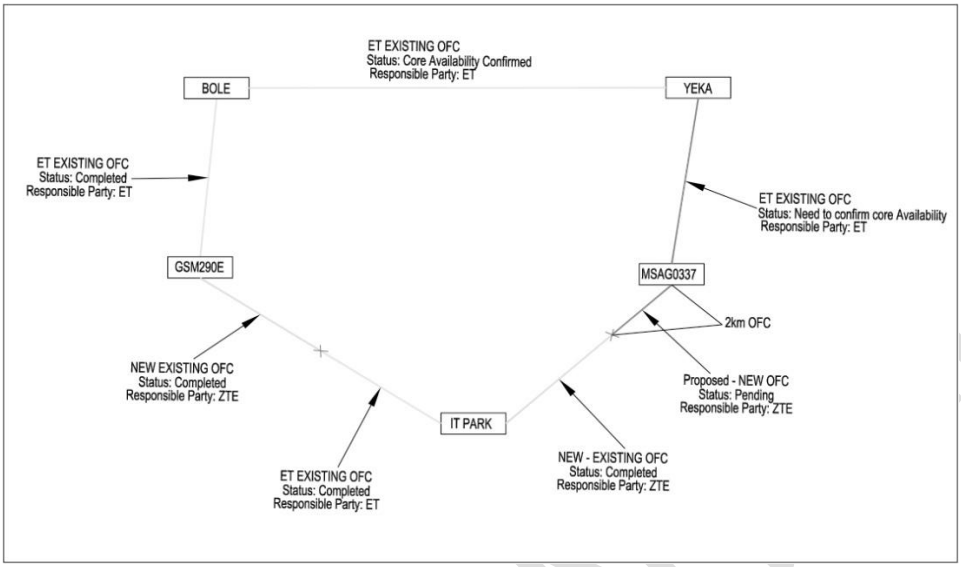


Figure 6 Optical Fiber Implementation Outside The Park; Source: ICT Park

G. *Datacenter*

The ICT park datacentre can be classified as a Tier-2 datacentre. Currently, it has a storage capacity of 38.4 terra byte. Most of it is used for email, security service storages, ISP, and storage services. The current datacentre cannot accommodate and fulfill the demands that tenants will have when the park becomes fully operational. So, building an advanced and state-of-the-art datacentre will be essential for the park's future.

Fig A. Backup Power Supply

Fig B. Power Managment System

Fig C. Control Room

Fig D. Data Center

- Existing storage capacity is 38.4 terra byte
- It is mostly used on email, security, ISP, storage services
- Not enough capacity to provide hosting and other storage services
- Capacity of internet traffic is 40 Gbps
- Currently providing internet at Ethio-telecom rate up to 40 Mbps
- Buildings connection capacity at 1 Gbps
- Currently tier-2 data center
- Plan to upgrade it to tier-4
- Plan to have their own gateway

Figure 7 ICT Park Data center

3. Aligning the ICT Park with National Policy Objectives

3.1 Ethiopia's national development goals and vision

Ethiopia has been among the fastest-growing economies in Africa and also globally since 2003, with an annual growth rate consistently well above the African and global averages. From 2003 to 2013, the growth of real GDP averaged 10.8 percent per year, enabling the country to double its per capita GDP (reaching just over US$ 800 in 2018/9) and reducing extreme poverty by half. The main drivers of this unprecedented growth rate were the unorthodox, bold and ambitious national development policies pursued by the government since early 2000. The policies adopted incorporated, among other things, a big push in public investment, particularly in agriculture, education, the health sector and infrastructure development, agriculture-led industrialization strategy, and active involvement of the State in the economy.

The building blocks in Ethiopia's national development strategy have been the five-year plans that the government instituted mapping the stages of development from agriculture-led industrialization to export-led growth, anchored in the manufacturing sector. Since 2001, the Government of Ethiopia has launched four consecutive five-year development plans - namely the Sustainable Development and Poverty Reduction Strategy Paper (SDPRP) (2001-2005), the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005 -2010), the First Growth and Transformation Plan (GTP I) (2010 - 2015) and the Second Growth and Transformation Plan (GTP II) (2015- 2020) - to guide the overall development of the country. The first three five-year plans gave due priority to pro-poor economic sectors including agriculture, while GTP II gave more emphasis to export-led industrialization. It is important to review the key elements of the latest five-year plan (GTP II) since it sets out the national development goals and vision that guided Ethiopia's development trajectory in the last five years and will serve as a building block for the next five-year plan.

It is difficult to say, at this stage, how the post-Covid-19 recovery efforts will affect Ethiopia's vision 2025 and the sectoral priorities spelled out in the last two five-year growth and transformation plans. However, the national development goals that Ethiopia wishes to achieve for the coming five to ten years are unlikely to change. For purposes of this study, therefore, the key national development goals and the country's vision 2025 as elaborated in the latest five-year plan will be reviewed. This will allow us to align the objectives and contributions of the ICT park to the country's national development goals and vision.

The main objective of GTP II was to lay a foundation for industrial development and structural transformation through rapid economic growth and diversification from agriculture to manufacturing. The latter is expected to play a leading role in job creation, technological learning, and innovation, and in enhancing Ethiopia's export capacity and redressing the current trade imbalance. Thus, the development of the ICT sector and the role of the ICT park should be viewed from this perspective and the contributions of digital technology to export-led industrialization agenda and the modernization of the economy. The short-term Home-

Grown Economic Reform Agenda (HGERA) and the Ten-Year Perspective Plan that the government introduced since 2018 foresee the strengthening of production and knowledge linkages between sectors, and improvements in the quality, productivity, and competitiveness of the key economic sectors as major drivers of the country's growth and development vision.[6]

3.2 Home-Grown Economic Reform Agenda and the Ten-Year Perspective Plan

Since 2018, the Ethiopian government has launch major economic reforms aimed at consolidating the growth trajectory achieved in the last decade and reframing the policy orientation from State-led to private-sector-driven growth process. In addition, the government had to correct economic imbalances built over the years due to slow growth in merchandize exports and the expansion in import needs, which led to worsening current account deficits and increasing external debt. Sustaining the economic progress achieved over the last two decades required correcting macroeconomic imbalances, easing structural and institutional bottlenecks to doing business, and creating new sources of jobs and productivity growth. To assist with these adjustments, in 2018, the Government launched a comprehensive and well-coordinated home-grown economic reform agenda aimed at stabilizing the country's economy within the next three years. The home-gown reform agenda has three pillars:

- Macroeconomic reforms to correct foreign exchange imbalances, control inflation, safeguard financial stability while promoting intermediation, and ensuring debt sustainability.
- Structural reforms to ease institutional and structural bottlenecks to productivity and job growth; and Sectoral reforms to address institutional and market failures inhibiting productivity growth in key strategic sectors.
- Key priority sectors where reforms are particularly targeted include agriculture, manufacturing, tourism, mining, and ICT.

In addition, the government proposed a Ten-Year Perspective Plan to guide the strategic and policy directions for the coming decade and point to the priority pillars that will shape the country's investment and growth agenda. The overarching goals of the Ten Year Perspective Plan rest on seven key pillars:[7]

a. Consolidation and further development of the agricultural sector, building on progress made in the last two decades. Agriculture is regarded as the backbone of economic growth and industrialization and a major source of inputs, including labor, to the manufacturing sector.
b. Enhance the role and contribution of the private sector in the economy as a whole and create a dynamic, efficient, and internationally competitive enterprise sector. There has been a gradual shift from State-led to private sector-driven economic growth during

[6]Federal Democratic Republic of Ethiopia (FDRE) (2016), The Growth and Transformation Plan, National Planning Commission.

[7]For details, consult ibid.

GTP II, including through incentive measures aimed at encouraging private sector investment – both local and foreign – in the services and manufacturing sectors. In fact, the shift towards private sector-led growth has gained an additional boost in the recent economic reforms that began towards the end of 2018. The core features of the recent economic reforms include partial and full privatization of major State-owned entities[8], liberalization of investment laws and policies, commitment to encourage public-private partnership (PPP) in mega projects, and a major overhauling of the "doing business" environment in Ethiopia with a view to streamlining and simplifying the policies, rules, regulations, and procedures that govern the process of starting and sustaining new businesses.

c. Transfer of technology, supporting the emergence of a strong ICT sector and the development of a skills base. Special incentives and policies have been introduced to encourage the transfer of technologies from abroad. They include duty-free imports of capital goods and other technology embodying products and increased public expenditure in Research and Development (R&D).
d. Identification of specific sectors as priority areas for export-oriented industrialization and import-substituting activities. The sectors that are targeted for export-oriented activities include areas where the country has revealed a comparative advantage and where the agricultural sector can serve as the major source of raw material/input supply. They include: (a) textile and apparel, (b) leather and leather products, and (c) agro-processing. From the services sector, tourism and ICT-enabled services such as BPO are also identified as a priority export-oriented activity. Indeed, the Home-grown Economic Reform Agenda and the Ten-Year Perspective Plan identifies ICT as one of the priority sectors for investment and export promotion.
e. The establishment of specialized Parks to create a more favorable business environment for investment in export-oriented activities. A proclamation on Industrial Parks was approved by Parliament in 2014 and the first Government-sponsored Industrial Park was inaugurated in 2015. Four additional parks have opened since then and it is envisaged that by 2025, more than 15 additional Industrial Parks will have been constructed.
f. The formulation of a set of medium-term national development goals to be achieved by 2025 (Vision 2025). The main elements of Vision 2025 are:
    I. Becoming a middle-income economy;
    II. Doubling, if possible, tripling, the country's total export capacity;
    III. Becoming a leading manufacturing hub in Africa;
    IV. Increasing the share of the manufacturing sector in GDP from its current level of 5 percent to 17 percent;
    V. Ensuring that the manufacturing sector contributes 40 percent of exports;
    VI. Creating 2 million jobs in medium and large businesses, including the Industrial Parks; and
    VII. Regaining a double-digit growth rate and sustaining it beyond 2025.

[8]The Government's intention is partial equity sales in four strategic areas – telecom, energy, logistics and the national airline – and full privatization of railways, industrial parks, sugar plants, etc.

In implementing the post-GTP II national development plans, the government intends to continue to rely on some of the policy tools that it has utilized so far, in particular: encouraging linkages between agriculture and manufacturing; supporting private sector investment in manufacturing; encouraging technology transfer into targeted sectors, and investing in human capital development. As the country embarks on the post-Covid-19 economic recovery phase, however, it may prove increasingly difficult to rely exclusively on the same policy mix as sources of growth and industrialization. Recovery from the impact of the Covid-19 shock will require paying greater attention to digital transformation and e-readiness; attracting not only efficiency-seeking but also market-seeking FDI, including in ICT and pharmaceutical-related activities; ensuring that foreign investment in industrial parks benefits the local economy through linkages and spill-over effects; developing the national quality and standards infrastructure; improving trade logistics; and broadening the domestic knowledge base and absorptive capacity. Equally important is the development of technology entrepreneurship through active government support of start-up companies, particularly those engaged in IT-enabled services.

All these measures will require, moreover, building a strong technological base, particularly new digital technologies, and e-commerce and nurturing innovative enterprises that are capable of manufacturing and exporting higher-value and technologically advanced products and services. The Covid-19 pandemic has exposed the limitations of international trade based on Global Value Chains (GVCs) and the scattering of production of goods around the world where wages are low and semi-skilled labor is in adequate supply. It has also shown that export-led industrialization driven by GVCs is unsustainable and cannot be expected to lift latecomer countries such as Ethiopia up the value and technology ladder.

Moving up the value, productivity, and technology ladder is essential for catching up with middle-income economies but such transitions in the twenty-first century require building local technological capability and creating enterprises that compete on the basis of new digital technologies and innovation rather than low labor cost. Thus, sustained development in Ethiopia will require digital transformation and 'productive capacity' needed, not only to reach the middle-income level but also to sustain growth beyond the 'middle-income trap'.[9] In short, learning from the Covid-19 experience and Ethiopia's desire to become a leading trading hub in Africa and catch up with middle-income economies, it is critical that Ethiopia creates a policy and regulatory environment conducive to successful implementation of the Digital Transformation Strategy that the Ministerial Council approved in June 2020. The ICT park can serve as a policy instrument for achieving these seminal goals.

[9] The 'middle-income trap' refers to a situation where middle-income countries are unable to move beyond middle-income level. According to the World Bank, for example, "of 101 middle-income economies in 1960, only 13 moved up from middle income level by 2012. This means that most middle-income economies have not been able to escape the middle-income trap in spite of a half century's efforts" (Lin, 2017, p.5). Lin associates this phenomenon to the inability of middle-income countries to make headway in technological development and innovation capability building. He notes that, "the middle-income trap is a result of a middle-income country's failure to have a faster labour productivity growth through technological innovation and industrial upgrading" (Lin, 2017, p.5).

3.2 The Articulation of the ICT Sector in National Policies

A review of Ethiopia's five-year development plans and national policy and strategy papers since early 2000 show that progressively the ICT sector was given importance in the country's growth and transformation agenda. However, interestingly, the focus has been mainly on the role of ICTs in social sectors and as effective instruments for expanding the government's capacity to deliver services. The latter, in particular, was given greater importance and often presented as crucial for economic development. Moreover, the role of ICTs was perceived in the context of State-led growth and development trajectory, and the role of the private sector in digital transformation was accorded less attention.

It was only in the last two five-year development plans namely, the Growth and Transformation Plan I (GTP I) (2010-2015) and the GTP II (2015-2020) that the government began to articulate the potential transformative power of ICTs and lay down plans and a timeframe for the development of the basic infrastructure and skill-base necessary to enable increased utilization of ICTs. The articulation of ICT-related issues in the two five-year plans benefited greatly from several policies and strategy papers that were formulated over the years as part of the Government's efforts to gain an in-depth understanding of the ICT sector and arrive at well-informed policy decisions. Important among the strategy papers was the *National ICT Policy and Strategy Paper (NICTP- 2016)*, which was an update of the *National ICT Policy* issued in 2009. The NICTP-2016 gave greater visibility to the ICT sector as a priority policy area and introduced strategy pillars to enable the government's vision of ensuring that 'Every aspect of Ethiopian life is assisted by ICT'.

Other policy and strategy papers that had both direct and indirect bearing on the formulation of NICTP were the *National Science, Technology and Innovation (STI) Policy* (2012), the National Information and Communication Technology Policy and Strategy (NICTPS-2009), the *ICT for Development (ICT4D) Action Plan*, *ICT Infrastructure Master Plan*, *Rural Connectivity Program* (RCP) and *National e-Government Strategy*. Moving forward, the government may need to revise the NICTP in view of the increasing attention given to ICT and digital transformation in general in the Home-Grown Economic Reform Agenda (2020-2023) and the new Ten-Year Perspective Plan (2020-2030). In both the short-term reform agenda and the ten-year perspective plan, the ICT sector has been identified as one of the six priority 'pillars' (along with other sectors namely, agriculture, manufacturing, mining, services, and tourism) that will drive the country's growth and transformation agenda and its vision of becoming a middle-income economy and a leading manufacturing and trading hub in Africa by 2025.

Compared with the lack of development and stagnation during the 1980s and 1990s, by the 2000s there was an awareness that the ICT sector in the country was relatively underdeveloped. The lack of regulatory and policy frameworks, an underdeveloped private sector, and most of all lack of hard ICT infrastructure and human resource capacity were identified as the main reason for the poor state of the ICT sector development by the government's ICT Policy and Strategy Paper (2009). It seems this realization has been central to the significant improvement

in the development of communications infrastructure in the decade culminating in 2010. In fact, a large part of the advanced communications infrastructure and digital technological capability that currently exist in the country was developed during this decade.

The 2000s saw the planning and implementation of important national communications infrastructure, such as the development of a National Optical Fibre Backbone Grid, a national intranet that linked Woreda offices (Woreda-NET), schools (School-NET), and an explosive growth of public universities by a factor of four. There was also a marked increase in telecom connectivity with the spread of fixed and wireless telephone, and slow but sustained growth of the mobile telecom sub-sector. Unfortunately, the speed of Internet connectivity was slower than many other African countries and it remains at a very low level of development as shown below. Consequently, the potential benefits of internet-based services and technologies remain largely underexplored and underutilized.

It is clear, therefore, that the task of formulating a strategy to shape the future strategic direction of the ICT park and how the park should prioritize its activities and investment focus will not be complete without a comprehensive review of the policy framework under which the ICT park operates. A better understanding of the policy framework will also help to clarify the level of ambition of the government and the scope and depth of change that the government is willing to take in pursuing the digital transformation agenda in the coming decade. The next section will shed light on the specific measures taken to expand the country's ICT ecosystem during the last two five-year development plans.

3.3 ICT Sector Development Under GTP I & GTP II

GTP I focused mainly on improvements in ICT infrastructure and the expansion of subscriptions to mobile networks. In fact, one could argue that serious development work on communications infrastructure was done during the first GTP, which helped to lay down the foundation for ICT sector development. Several goals and milestones were identified for priority attention and public sector finances were earmarked and major ICT-related infrastructure projects were implemented under the framework of 'Telecommunications Sector Development Plan'. The plan included ambitious goals to expand network infrastructure and a set of yearly targets to increase the subscription and use of telephony and internet services. Broadening network coverage beyond major cities was also another objective identified for implementation under GTP I. Thus, the overall policy goal under GTP I was to address the country's low use of ICT tools and create a "conducive environment to use latest telecommunications technologies" and "increase the revenues" that can be generated from the utilization of ICT infrastructural resources such as IP addresses, National Frequency, and telecom numbers.

The revenue issue is an important component of government policy towards ICTs and perhaps also one of the reasons for maintaining the role of the State as the only provider of telecommunication services. In 2018, halfway through GTP II, the newly appointed Prime Minister, Dr. Abiy Ahmed signaled his new administration's intention to reform and privatize key strategic sectors that were dominated by State-owned-enterprises. Sectors to be reformed

include telecommunications, energy, aviation, and logistics. Ethiopia is only one of a handful of African countries to retain a complete monopoly on all telecommunications services.

Throughout its history, and despite being one of the first to adopt telecom technology, Ethiopia's telecom sector has remained under State control. Despite early expectations of liberalization of the sector, the sector continues to be managed and regulated by the MCIT and a state-owned enterprise, Ethio Telecom. Under the supervision of the Ministry, Ethio-telecom maintained a monopoly over fixed, mobile, internet, and data communications. Many of the decisions on infrastructure development and digitalization were taken through a narrow lens of maximizing revenue and meeting targeted subscription numbers. It is possible that Ethio Telecom's monopolistic control may have slowed down the scale of infrastructure development or even stifled innovation, restricted network expansion, and limited the scope of services on offer during GTP I.

However, in summing up achievements during GTP I, it is important to note that although not all targets were achieved, investments undertaken during this period helped to kick-start the development of the telecommunications sector in Ethiopia. In 2005 there were only 0.56 million mobile subscribers, 20,000 Internet service subscribers, and 620,000 subscribers fixed-line telephones. When GTP I was launched, the number of mobile service subscribers had reached 6.5 Million, Internet users were only 187,346 while the number for fixed-line users was 1 Million. An important driver of the rapid progress during GTP I was the planning and execution of the Telecom Expansion Project (TEP) with an investment amounting to US$1.6 Billion. By the end of GTP I, mobile subscriptions had reportedly reached 39 Million, and Internet users 10 Million.

Under the current five-year plan (GTP II), the strategic direction shifted towards developing the whole ICT sector going beyond the predominant focus on the underlying infrastructure. While some unfinished infrastructure projects that began under GTP I continue to be implemented, the priority distinctly shifted towards the strengthening of the ICT sector as a whole and increasing the sector's competitiveness. Sectoral development plans for the ICT and electronic industries (ICT manufacturing) were also prepared, though they are yet to be implemented. Furthermore, more attention was paid to the ongoing construction at the ICT park, which had already started under the previous five-year plan. Unfortunately, none of the renewed focus on the ICT park resulted in the completion of the building constructions that began under GTP I, including the Headquarters of Ethio-telecom. The only additional development was the establishment of a Chinese electronic manufacturing enterprise to assemble mobile telephones – *Transsion (Techno Mobile)*.

In short, more was done under GTP II to create a conducive environment for the ICT sector and to address the remaining infrastructural deficits, and improve the legal framework. The ICT park also received more attention but primarily as a site where manufacturing of ICT products takes place rather than as a provider of a diverse range of IT-enabled services (ITES). Foreign investment was expected to come to the ICT park but there were no targeted investment promotion efforts. Nor was there any strategy and roadmap on what types of investment that the park should attract.

An overall assessment of the ICT policy framework in Ethiopia suggests that in general the ICT policymaking process did not lead but lagged behind the development of the ICT sector always catching up with the needs of the sector for infrastructure, regularity, and legal requirements rather than leading the way. This contrasts with the experiences of more successful countries where ICT policies led the way by creating opportunities for key players in the economy to keep up with the latest technologies.

3.4 ICT Policy and Strategy Papers

The 2009 national ICT policy and strategy paper (NICTPS-2009)

The National ICT Policy and Strategy Paper of 2009 conducted a stocktaking of the ICT sector's underdevelopment. It identified five indicators that explain the sector's lacklustre performance – especially compared to its regional peers: lack of appropriate legal and policy framework, lack of soft (human resources) and hard (technology, systems, and equipment) infrastructure, and an underdeveloped private sector. The national vision outlined in the NICTPS-2009 was to transform the country from one *"associated with poverty to a middle-income economy and society with deep-rooted participatory democracy and good governance based on the mutual aspirations of its peoples."* Although the document reiterated the government's increased understanding of the significance of the ICT sector, its role was primarily as an instrument in enabling the national vision of socio-economic development, and democratization, and good governance.

Accordingly, the objectives of the ICT policy and strategy were crafted to meet this end. They were to build ICT infrastructure throughout the country and make it accessible, create the necessary skilled human resources required for the proper development and application of ICT and expand the society's basic knowledge and usage of it, develop the necessary legal framework to avert the misuse of ICT, promote the use of ICT to improve service delivery, good governance and reduce wastage and strengthen the role of the private sector in the development of ICT. The objectives of the NICTPS- 2009 were accordingly focused primarily on the instrumentality of the sector to improve the efficiency of the government's overall socio-economic development and less emphasis was given to the development of the ICT sector itself. The latter was viewed as subservient to the national vision that saw ICT as an instrumentality – a technology to introduce efficiency of service delivery and hasten socio-economic development. The role of the ICT sector in modernizing and improving the efficiency of the private sector itself was not sufficiently explored. Indeed, the preparation of the NICTPS-2009 involved little consultation with the private sector.

The 2016 national ICT policy and strategy paper – NICTPS-2016

The NICTPS-2016 stemmed from a review of the 2009 Policy and Strategy paper and an aspiration to make the country a leading hub for ICT in the East African sub-region. The 2016 paper retains some of the overarching elements of the 2009 strategy, including the national vision of utilizing ICT to transform the country into a middle-income economy and democratic society. It introduces a revamped view of the sector, highlighting that the ICT sector is not only

an instrument of change but also a sector in its own right that plays a vital role in the economic growth of the country.

Overall, the latest policy and strategy introduces a relatively proactive approach to the development of the ICT sector. A major improvement from the NICTPS-2009 is the recognition of the key role of the private sector in making the ICT sector efficient, keeping it abreast with technological development, and producing applications and services to end-users utilizing the hard ICT infrastructure already developed. The elevation of the ICT sector into one of the strategic priority areas of GTP-II foreshadowed this more proactive approach. The NICTPS-2016 also notes the need for constant review of policy and takes into account the unique and dynamic nature of the ICT sector. It looks beyond the goal of 'expanded digital adoption' that was the aspiration of the NICTPS-2009.

Taking stock of challenges and envisioning solutions

The NICTPS-2016 main objective is to ensure that *'Every aspect of Ethiopian life is assisted by ICT'*. However, the current state of development of the ICT sector suggests that the challenges that were identified by the NICTPS-2009 largely remain unchanged. The NICTPS-2016 enumerates the challenges that continue to bedevil the ICT sector in Ethiopia and the measures that need to be taken to modernize the sector. They include:

- The need to update legal and regulatory frameworks to deal with new technological advances and, with recent infrastructure growth, to enhance monitoring of service affordability and quality;
- The need to increase the usage of broadband service in the country;
- Limited access to ICT services in rural areas by citizens, businesses, and health and educational institutions due to lack of services and awareness;
- The need to avail affordable ICT devices and services for the poorer sections of the population;
- An under-developed ICT sector with limited private involvement;
- Challenges in developing locally relevant applications and services and scaling up of innovative entrepreneurs; and
- Low levels of internet penetration, as compared with access to mobile services, and low levels of fixed broadband penetration, as compared with the take-up of mobile broadband.

The persistence of these challenges over the past seven years indicates the failure of the policies and strategies implemented under the NICTPS-2009 to bring meaningful progress in the development of the ICT sector. Many of the constraints identified in 2009 remain unresolved. Although the supply of ICT infrastructure has increased over the past 7 years, particularly since the adoption and implementation of NICTPS-2009, there has been little improvement in the affordability and reliability of services provided. Moreover, the lack of content and low levels of usage was indicative that the increased supply of ICT infrastructure has neither satisfied existing demand nor succeeded in increasing the expanded adoption of ICT services. Furthermore, the regulatory and legal framework had not kept up with some of the changes that

characterize the sector. While the NICTPS-2009 had acknowledged the underdevelopment of the private sector, it did not have targeted and detailed policies to encourage private sector engagement across the ICT sector. The failure to have clear strategies to engage and encourage the private sector role in ICT had inevitably resulted in poorer participation of the private sector in the utilization of the existing ICT infrastructure, particularly in the production of local content and service.

Envisioning solutions: Foundation, Pillars, and Focus Areas

During the preparations for NICTPS-2016, several challenges were identified that require further attention moving forward. These included the need for better coordination among government agencies and the need for targeted engagement of the private sector, and other important stakeholders such as civil society, development partners, consumers, and ICT professional bodies. The NICTPS-2016 was adopted following an extensive stakeholder consultation, which enabled it to address some of the shortcomings of the previous national policy and build on its successes.

In the NICTPS-2016, the role of ICT in the economy is divided into seven strategic ICT pillars, government services, the ICT sector, and cross-cutting issues that relate to jobs, entrepreneurship, and universal access (Figure 1). This approach enables the instrumentality of ICT, the role of ICT as an economic sector, and a cross-cutting issue to be addressed in a predictable and structured manner. Thus, the development of e-government services, and the use of ICT to modernize the education, health, and agriculture sectors are guided by specific sectoral objectives and strategies, which require a collaborative approach among the relevant government ministries and agencies. This allows for flexible implementation modalities to be developed and integrated into the ministries' regular planning and strategy development processes. This approach differs from the format used for the implementation of NICTPS-2009. At that time, the responsibility of policy implementation was entrusted to a single agency - EICTDA – which was expected to undertake numerous tasks requiring considerable capacity and coordination of numerous agencies and stakeholders.

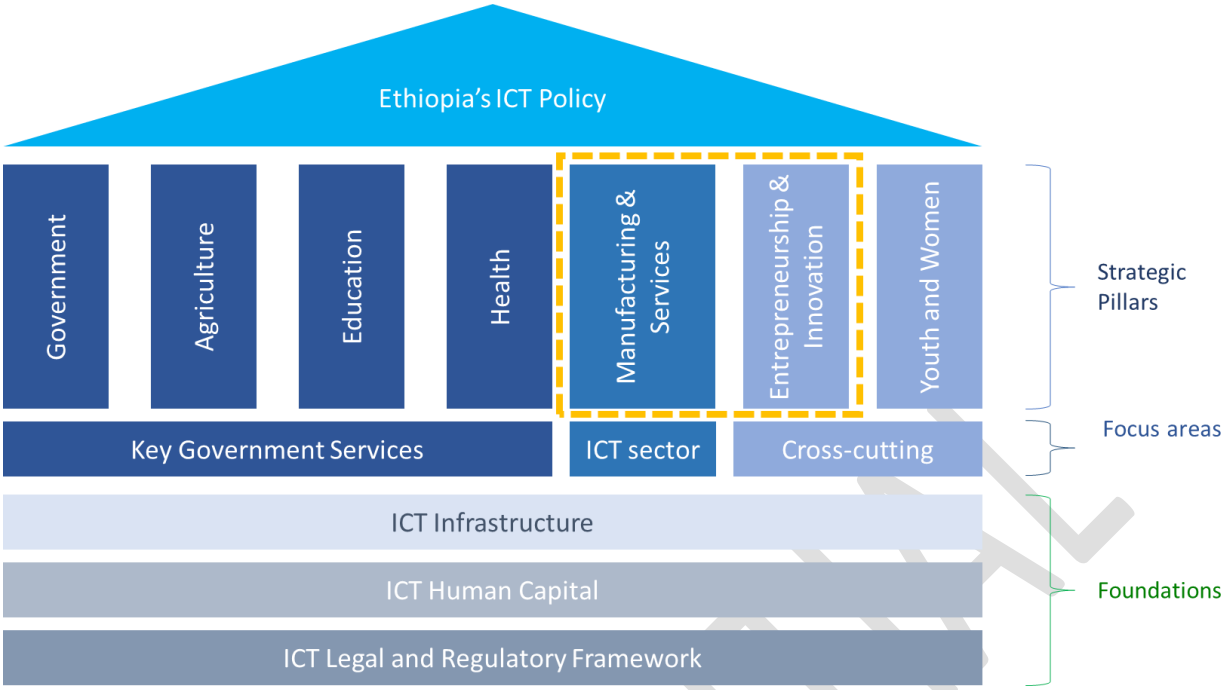


Figure 8 National ICT Policy and Strategy, 2016

An important departure of NICTPS-2016 from NICTPS-2009 in policy approach is its focus on the role of the private sector. NICTPS-2009 is based on the assumption that private sector participation in the ICT sector, especially in the production of goods and services, would occur spontaneously once the development of ICT infrastructure has taken place. In contrast, NICTPS-2016 adopts a more proactive approach, emphasizing the need for policy intervention to enhance the role of the private sector in ICT sector development.

The NICTPS-2016 also recognizes the potential of technology entrepreneurship and innovation making it a strategic pillar and laying out specific objectives aimed at availing an eco-system that helps nurture start-ups and social entrepreneurs. A major objective of the 2016 policy and strategy is to foster innovation and technology entrepreneurship in key economic sectors such as agriculture, health, education, and government services. Hence the emphasis on innovation and technology entrepreneurship as a strategic pillar of the current ICT policy. Even if innovation and entrepreneurship in traditional economic sectors need to be incentivized and encouraged, this approach may risk sending a wrong signal that innovation and entrepreneurship can be separately pursued from the policies that target the involvement and development of the ICT private sector. In fact, innovation and technology entrepreneurship does not take place independently of the policies aimed at the ICT manufacturing and services sector. Here, the specific role of investment in fostering innovation, enabling the transfer of technology and knowledge, and how links to global value chains can be leveraged to create opportunities for entrepreneurship for local businesses and individuals need also to be addressed in depth.

3.5 The ICT Park and the NICTPS-2016

Of the seven strategic pillars that the NICTPS-2016 identified as critical for the ICT sector, the two that are particularly important for the ICT park are innovation and technology entrepreneurship. The strategy highlights the importance of the ICT sector for the economy and stresses, in particular, the great potential for ICT manufacturing and IT-enabled services (ITes). NICTPS-2016 also gives greater attention – more than the previous strategy did – to the potential role of the ICT sector in job creation, technology transfer, export promotion, and the modernization of the economy. This understanding of the importance of the ICT sector is also mirrored in the current government policy reforms and the ten-year perspective plan, which have both identified the ICT sector as a priority area. The potential of the IT sector (manufacturing and IT-enabled services), is understood and several objectives and strategies are included in the document to realize this potential, with an understanding that additional action on the foundational areas (increasing ICT infrastructure, ICT human capital, and improving regulatory and legal framework) make the country an attractive investment destination.

The ICT Park: Expectations and Reality in the NICTPS-2016

The ICT Park is very relevant to the NICTPS-2016 in many ways. The above discussion alludes to the many roles that can be ascribed to the park as a physical space and as a special digital ecosystem with an improved business operating environment. It is relevant as a center for digital innovation, technology entrepreneurship development, incubation, and acceleration of start-ups, as a space where policy and operating environment are vastly improved, and where local and foreign investment can be channeled and incentivized. However, the NICTPS-2016 does not discuss the ICT Park, nor does it explore whether the park has all the required facilities, infrastructure, regulatory and legal framework, and human capital to play the many roles that it has been given in the policy and strategy paper.

3.6 The ICT park in the context of Digital Transformation Strategy

In June 2020, Ethiopia launched a Digital Transformation Strategy to accelerate the digitalization of the economy and transform Ethiopia into a leading digital hub in Africa. Ethiopia's digital economy is at an early stage of development and far behind most developing countries and even low-income economies in the East African region such as Rwanda, Tanzania, and Kenya. Digital transformation is the process of using digital technologies to create new or innovative digital products and services. The expansion of the digital economy creates many new economic opportunities. More importantly, digital innovation can be used for solving development-related problems and creating value that increases income and keeps enterprises and countries competitive at both national and international markets.

Ethiopia's digital transformation strategy takes into consideration the country's current economic drivers – agriculture, manufacturing, and services, especially tourism – and the national priority goals, particularly job creation, foreign exchange earnings, and inclusive prosperity as

starting points for charting enabling digital development pathways. The strategy identifies four pathways to be achieved through digital innovation and transformation. They are.

- Pathway 1: Unleashing value from agriculture;
- Pathway 2: The next version of global value chains in manufacturing;
- Pathway 3: Building IT-enabled services; and
- Pathway 4: Digital as a driver of tourism competitiveness.

Undoubtedly, the role of the ICT park will be directly relevant and critical for the implementation of the third pathway – "building IT-enabled services". Indeed, this study is about how to transform the ICT park into a dynamic technology park that operates as a digital innovation hub and creates an enabling environment for fostering IT-related services such as BPO. Given the low level of ICT sector development in Ethiopia and limited digital infrastructure and skills, the emergence of the ICT park as a pocket of digital ecosystem could provide the opportunity and enabling environment for the development of technology entrepreneurship and digital transformation.

4. The ICT Ecosystem in Ethiopia

Population size

In 2018, the population of Ethiopia was estimated to be 109,224,559. It is the second-most populous country in Africa. Forty-eight percent of the total population is considered to be the labor force and out of this, the unemployment rate is around 18%. GDP growth rate has been slowly declining from 12.5% in 2010 to 6.81% in 2018[10].

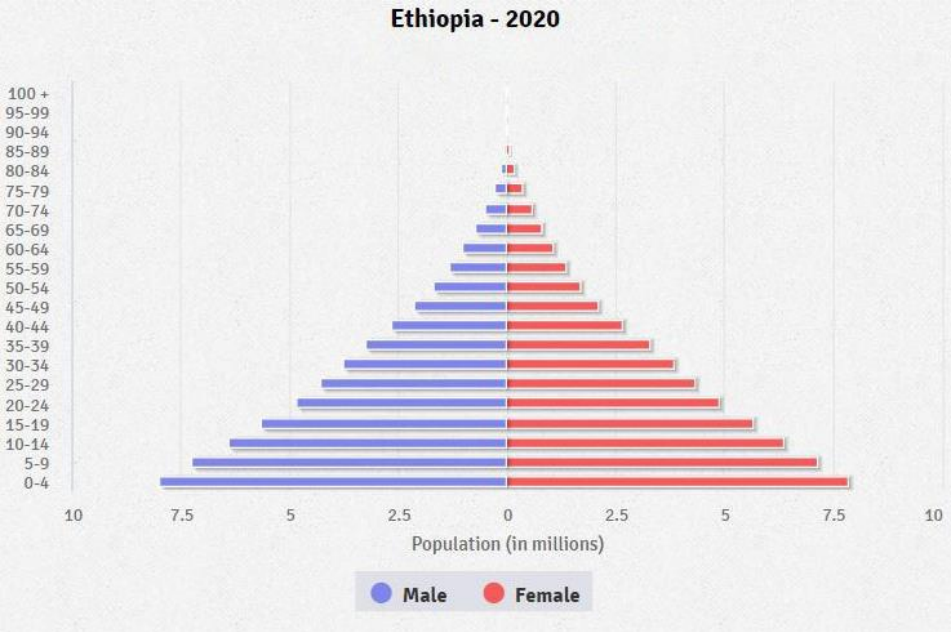


Figure 9 Ethiopia Population Pyramid, CIA Factbook, 2020

Education

Fifty-three percent of the country's population is between 15 and 64 years of age. This promises a large talent sourcing pool for the ICT Sector. From the total population, 30% are enrolled in formal education. The national education strategy followed 70:30 approaches to give more emphasis to science and technology graduate students from higher educations. Apart from this, almost all universities provide ICT-related courses. There are special departments designated for ICT engineering in Addis Ababa, Ambo, Hawassa, Arbaminch, Adama Science and Technology, Haromaya, Jimma, and Mekelle Universities. These universities enrolled nearly 10,000 undergraduate and post-graduate students, which serves as producing skilled manpower for ICT.[11] In all higher institutions, the medium of instruction is the English language; this has an ample opportunity for ICT business in getting potential workforce.

[10] World Bank Group (2018) https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2018&locations=ET&start=2008

[11] JICA, IPDP (2019) ICT Park Development Guideline

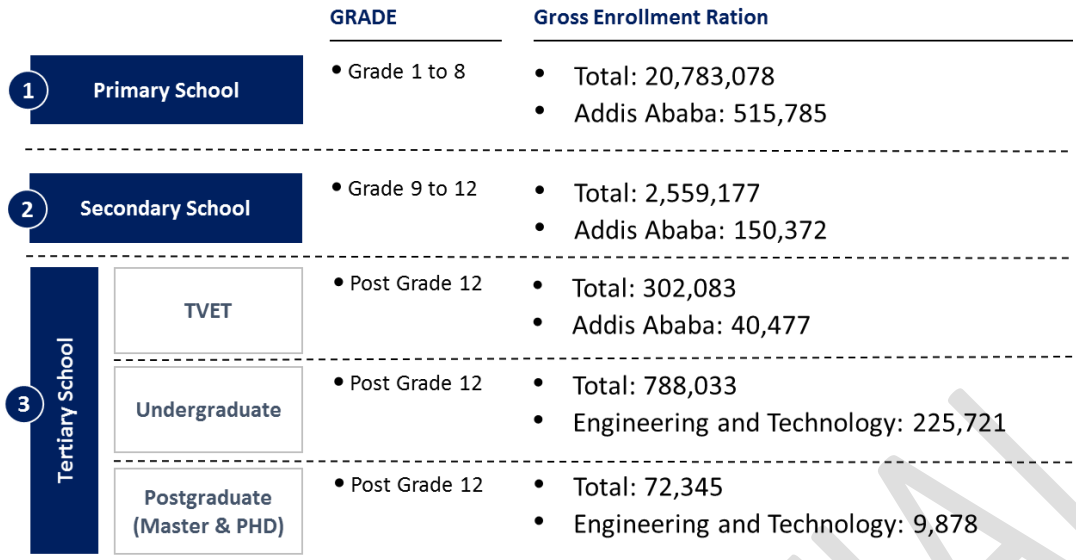


Figure 10 Gross Enrolment Ratio

The gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. There are 372 TVET institutions and 58 Polytechnic colleges offering ICT courses across the country.

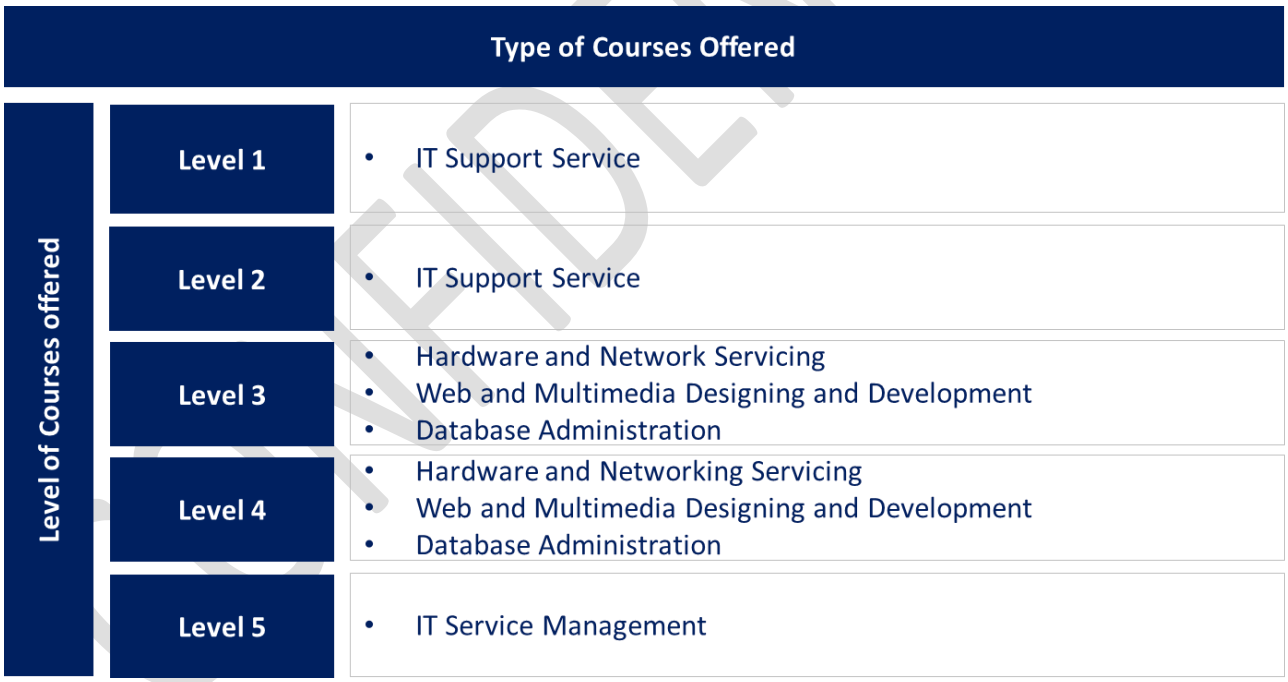


Figure 11 Courses Offered by TVETs

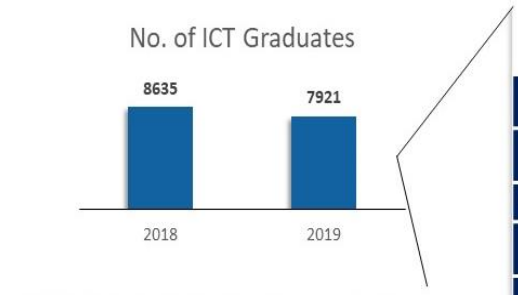
Across the different levels of the ICT, courses offered an average of 43% of the students graduate.

Number of ICT Graduates

The country produces a significant number of ICT graduates consistently who can be trained to be employed in the ICT Park. The diversity of the courses offered in all the universities and TVET institutions can attract different companies which are engaged in various sectors to the ICT Park.

In 2016/2017 universities, colleges, and TVET institutions supplied almost 250,000 engineering and ICT graduates to the industry while between 2018 and 2019, the number of ICT graduates reached more than 16,000.

Overall, Ethiopia has a competitive advantage in terms of skill availability in the sector when compared with major regional players such as Mauritius.



- This data indicates that the country has enough talent that could be trained to be enrolled in the ICT sector
- The number of ICT graduates is consistent each year
- The ICT courses offered at each university are diverse and will help in attracting ICT companies which are engaged in different ICT sectors to the park

	2018 Graduates*			2019 Graduates^		
	Regular	Extension	Total	Regular	Extension	Total
Information Technology	1529	604	2133	1502	404	1906
Software Engineering	293	4	297	317	0	317
Computer Science	2218	332	2550	2184	383	2567
Computer Engineering	303	16	319	76	19	95
Electrical and Computer Engineering	1976	158	2134	1984	52	2036
Information Systems	445	25	470	527	26	553
Computing Technology	166	61	227	0	0	0
Information Science	240	0	240	362	0	362
Electrical Communication Engineering	62	0	62	85	0	85
Information's	193	10	203	0	0	0
Total	7425	1210	8635	7037	884	7921

*The data is from 32 universities excluding Mekelle University
^The data is from 29 universities excluding Adigrat, Bahir Dar & Debre Brihan Universities
Source: Ministry of Science and Higher Education, October, 2019

Figure 12 Number of ICT Graduates for 2018 and 2019

Ease of Doing Business

The World Bank's "Ease of Doing Business" index, a measure of the relative ease for starting and running a business, for 2019, ranks Ethiopia as 159 out of 190[12].

The Legatum Prosperity Index is an index measuring Ethiopia's 2018 prosperity performance. In the sub-indices, Safety and Security and Governance, Ethiopia has not changed much in its performance over the last decade. Ranked 124 and 106 out of 149, respectively, the situation has worsened with a declared state of emergency following massive protests in several parts of the country. The safety and security ranking has dropped down by 22 places from 2017.

4.1 Features and Structure of ICT in Ethiopia

Ethio Telecom provides telecommunication services to Ethiopia. There is an open-wire, microwave radio relay, radio communication in the HF, VHF, and UHF frequencies. Two satellites provide the domestic national trunk service. There is a 12,000 km optic fiber cable infrastructure starting from central Ethiopia to all directions of the country and connected all cities with a capacity to transmit 40 Gbps along with the national backbone.[13]

[12] World Bank Group (2019). Doing Business https://www.doingbusiness.org/en/data/exploreeconomies/ethiopia
[13] GESCI (2017). Assessment of Knowledge Society Development in Ethiopia
https://gesci.org/fileadmin/user_upload/Assessment_of_Knowledge_Society_Development_in_Ethiopia.pdf

Ethio Telecom, a monopoly on all telecom services including fixed, mobile, internet and data communications. While some $3.1 billion has been invested in telecom infrastructure and service expansion projects over the last decade, the sector is heavily regulated and the government has complete control over networks, with virtually unlimited access to the call records of all phone users and to logs of internet traffic. A management contract with Orange Group was considered a first step towards privatization and the introduction of competition.[14] The government is now in the process of assessing the privatization options with the intention of selling minority shares of the company.[15]

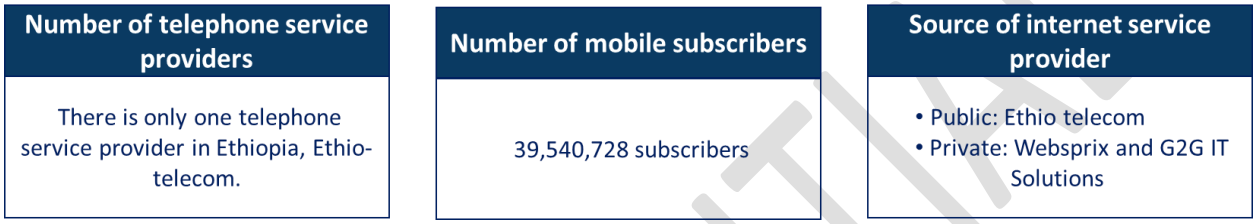


Figure 13 Telephone Service Providers and Subscribers

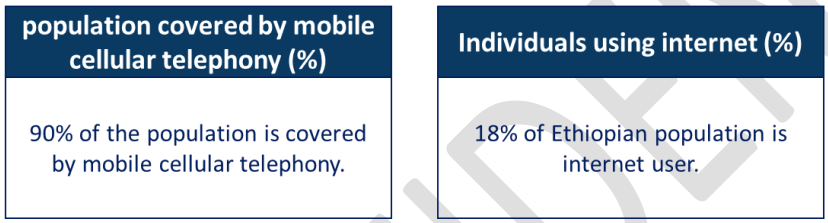


Figure 14 Cellular Coverage and Individuals Using Internet

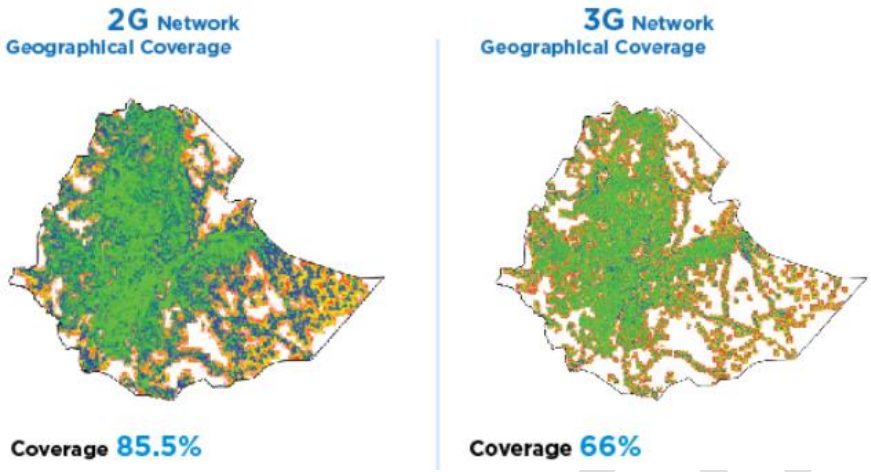
Ethiopia's mobile penetration remains among the lowest in the world, at 48.3%, but growth is strong and considerable growth potential remains. There are countries that have surpassed 100 in value which implies one person may have multiple cellular subscriptions. Ethiopia's low rank in this indicator could be the fact that the mobile network is still in its infancy, while the fact that there is only one Telecom company means people will not have more than one number.

The mobile coverage has reached 85% for 2G, 66% for 3G, and 332 sites in Addis Ababa for 4G.[16]

[14] GESCI (2017). Assessment of Knowledge Society Development in Ethiopia https://gesci.org/fileadmin/user_upload/Assessment_of_Knowledge_Society_Development_in_Ethiopia.pdf

[15] Ministry of Finance (2019) http://www.mofed.gov.et/-/completion-of-preparation-of-the-reform-process-of-ethio-telecom-and-sugar-factories-through-partial-privatization-and-opening-of-the-sector-for-compe

[16] Ethio-telecom (2019). https://www.ethiotelecom.et/teledensity-in-ethiopia/



Map 2 2G & 3G Network Geographical Coverage

According to the International Telecommunication Union (ITU), Ethiopia's ICT Development Index (IDI) score for 2017 was 1.65, placing it 170 out of 176 countries. This is up from 171 place and a score of 1.42 in 2016. So, while Ethiopia's score improved slightly, the pace of development lagged its competitors and Ethiopia is only ranked 32 in the region[17]. According to ITU 2017 report, fixed telephone, mobile cellular, fixed broadband and active mobile broadband subscribers per 100 inhabitants were 1.1, 50.5, 0.6, and 5.3 respectively. This indicates that there is a huge demand in these areas.

There is a 12,000 km optic fiber cable infrastructure starting from central Ethiopia to all directions of the country and connected all cities with a capacity to transmit 40 Gbps along with the national backbone.[18]

Ethiopia has experienced massive increases in international bandwidth, improvements in national fiber backbone infrastructure, and the growing availability of mobile broadband services via 3G and LTE networks, developing the broadband network. Prohibitive prices have meant that uptake of broadband services was low, but recently retail prices have been comparable to other more developed markets in the region. [19]

The telecom network and service expansion activities are a major component of the second Growth and Transformation Plan (GTP II). According to the plan, by 2020, mobile service subscriptions will reach 103.7 million, and that of internet and fixed-line will be 56 million, and 10 million, respectively. [20] However, by mid-2020, the figures for mobile voice service subscriptions is 44.5, while mobile internet and fixed internet subscription is 23.8M and 212.2 thousands only.

ICT initiatives in Ethiopia are primarily focused on e-Government and Public Key Infrastructure (PKI), e-Infrastructure, entrepreneurship, and e-Education. National initiatives

[17] International Telecommunications Union (2017). ICT Development Index http://www.itu.int/net4/ITU-D/idi/2017/index.html#idi2017rank-tab

[18] GESCI (2017). Assessment of Knowledge Society Development in Ethiopia https://gesci.org/fileadmin/user_upload/Assessment_of_Knowledge_Society_Development_in_Ethiopia.pdf

[19] GESCI (2017). Assessment of Knowledge Society Development in Ethiopia https://gesci.org/fileadmin/user_upload/Assessment_of_Knowledge_Society_Development_in_Ethiopia.pdf

[20] JICA, IPDC, EIPP (2019). ICT Park Development Guideline

focused on stimulating the use of ICT include the National Data Set, National Enterprise Service Bus (NESB), Public Key Infrastructure (PKI), Ethio ICT Village, WoredaNet, and Integrated Financial Management Information System.[21]

4.2 ICT Enabled Services

The World Bank in collaboration with McKinsey Co-developed a location readiness index to assess countries' based service development and potential. Based on this index, the World Bank conducted a study about the potential of Ethiopia in the sector and found that the country has "a relatively good level of competitiveness in terms of low risks and a stable environment."[22] However, the study indicated that Ethiopia lacks ICT infrastructure and capacity at all levels and that the country needs to improve in these areas in order to effectively utilize its potential.

The study has proposed possible intervention areas, which could take forward the country's ICT sector in general and ICT-based services in particular.

According to the report, first and foremost, the country should set a strategy to develop ICT-based services. In addition, it recommends the establishment of an industry association targeted at the IT sector and ICT-based services. This will be leveraged for enterprises in the ICT park.

The report also suggests Ethiopia to put "tax incentives, training subsidies, and other incentives that generate positive externalities."[23] In addition, it is also suggested that Ethiopia should put in place innovative practices for increasing access to finance for SMEs. SMEs may also be pushed towards the ICT park and the sectors that the park will specialize in by allocating enough finance to these enterprises. SMEs and other companies in the ICT park may be connected with international firms and create foreign venture capital firms.[24] This will help develop the skill and capacity of local entrepreneurs and work force while transferring know-how to the country.

Ethiopia also has a huge potential in enhancing public sector performance with ICT.[25]The country could do well in this sector if it addresses the big picture challenges in "ICT connectivity and e-government services delivery, ICT capacity gaps, at both demand and supply side levels, good governance mechanisms and citizen feedback to government entities."[26]

4.3 The ICT Manufacturing Industry

Overall, the electronics and ICT industries play a relatively modest role in the overall Ethiopian economy but are seen as having significant potential. Both sectors are widely viewed as being in their infancy, with a relatively limited presence of companies.

[21] JICA, IPDC, EIPP (2019). ICT Park Development Guideline
[22] Marc Lixi and Mariana Dahan (World Bank), ICT as an Enabler of Transformation in Ethiopia, 2014, p.VII
[23] Ibid
[24] Ibid
[25] Id. P.VIII
[26] Ibid

Ethiopia's Electronics industry is targeted at the local market rather than export. It is totally based on imported raw materials.[27] The local market presents itself as a potential profitable market supported by the country's large and growing population and a rapidly growing economy with a vibrant construction sector which has created a strong demand for cables, wires, switches, etc.[28]

However, the electronics manufacturing industry has little value addition since manufacturers highly import components and other supplies. Food manufacturing generates 50% of the total manufacturing value-added.[29]

Figure 15 Key Companies in the Electronics and ICT Industry in Ethiopia

When it comes to employment, the overall manufacturing sector in Ethiopia including the electronics sector, it employs few people.[30]

"The electronics and ICT sectors are heavily concentrated in Addis Ababa and surrounding regions, with Addis Ababa and Oromia accounting for more than half of the country's urban employment in the sector. Amhara and SNNPR also have some employment in the sector, with 14% of the country's total each. The dominance of Addis Ababa is further evident when analysing the relative specialization in electronics and ICT (by means of the location quotient), which has Addis Ababa ranked first with 1.4, ahead of Dire Dawa in second at 1.1 and Benishangul-Gumuz in third."[31]

[27] MinT data, September, 2019
[28] World Bank Group and IBM-Plant Location International, Assessing the Potential for the Electronics and ICT Manufacturing Industry in Ethiopia, Final Report, 2016, p.5
[29] Id. p.29
[30] Id. p.31
[31] Ibid

The country's local market is huge for local mobile assemblers. The industry has a size of 20 million devices per year.[32] However, it is dominated by contraband smartphones which makes entry into the market difficult for mobile assemblers who aim the local market. There are also several problems that are attached to the assembly sector. The government's new methodology to calculate value addition, as well as the percentage imposed, is among one of them.[33]

ICT Service Sector

The ICT service sector is in infancy with small companies which often employ between 5 – 20 people. Most foreign IT services are not physically present in the market except Huawei and ZTE.[34] Domestic business partners serve as a link to connect those foreign companies with the domestic market.

There are 242 ICT consultancy companies in the country.[35] Four hundred and eighty-eight companies have been registered as software development service providers while one company is registered to render data center service.[36] MinT has also registered a total of 731 companies as ICT-enabled service providers.[37]Seven hundred and sixty-nine companies are also currently providing ICT services under a different license.[38]

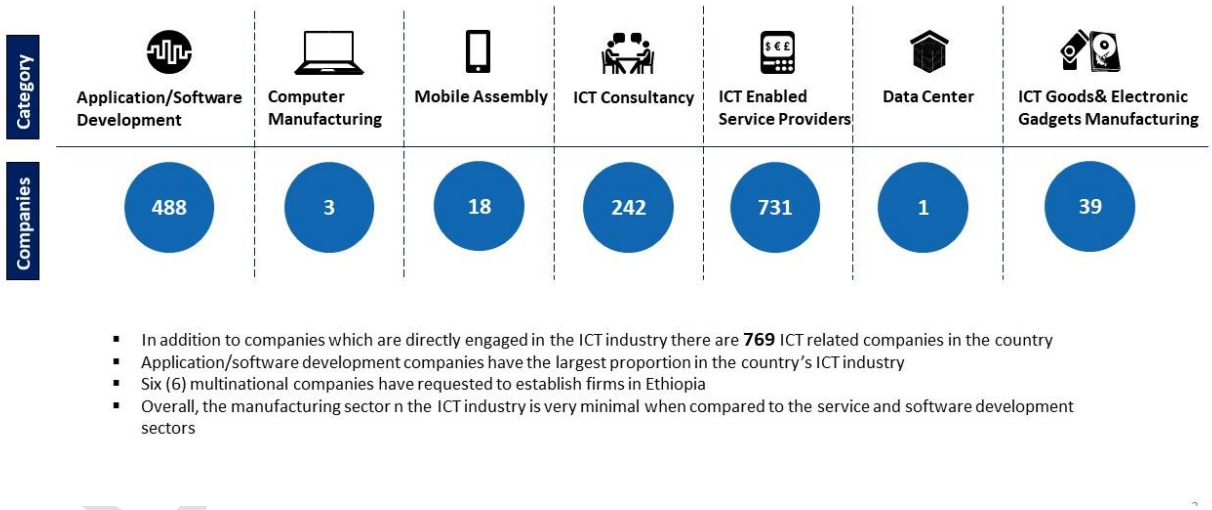


Figure 16 ICT Sector in Ethiopia

Ethiopia's ICT Development Indicators

Ethiopia has showed progress on all indicators except the Global Competitiveness Index.

[32] ICT-ET Hardware Group, Gap Analysis, Clarity and Understanding of ICT and Electronics Manufacturing
[33] Ibid
[34] World Bank Group and IBM-Plant Location International, Assessing the Potential for the Electronics and ICT Manufacturing Industry in Ethiopia, Final Report, 2016, p.29
[35] MinT Data, September, 2019
[36] Ibid
[37] Ibid
[38] Ibid

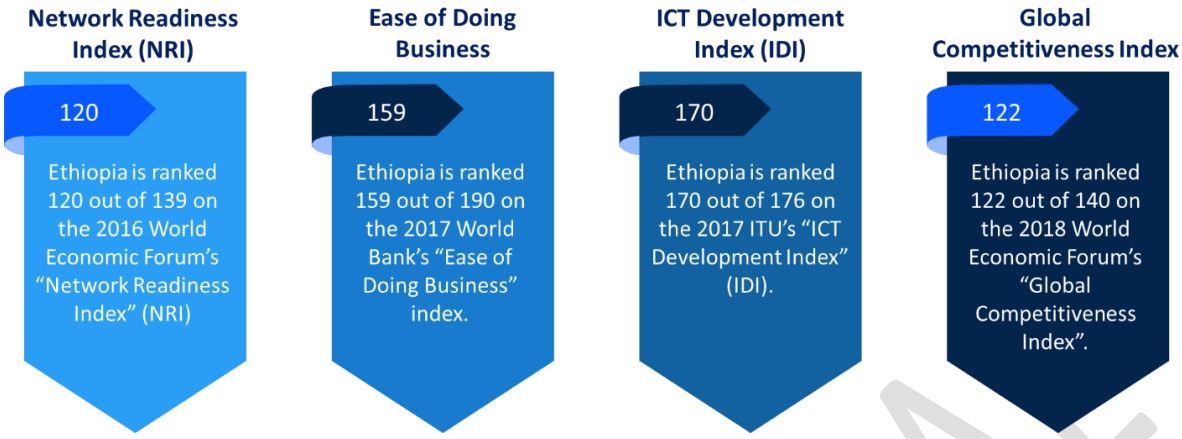


Figure 17 Ethiopia's Business and ICT Indicators

The World Economic Forum's Networked Readiness Index for 2016 ranked Ethiopia 120 out of 139 countries, moving up ten places, with a score of 3.1.[39] Ethiopia's ranking is led by the government sector, and the business sector is starting to catch up as executives feel innovation capacity in the country is increasing and businesses are starting to explore the use of the internet to interact with consumers. Setting up a new business seems to be getting tougher. In addition, Ethiopia has been edging forward on the skills dimension, although a large gap remains to be closed. Importantly, the figures suggest that there have been significant improvements in giving schoolchildren access to the internet.[40] Ethiopia's strongest pillars, as you can see from the

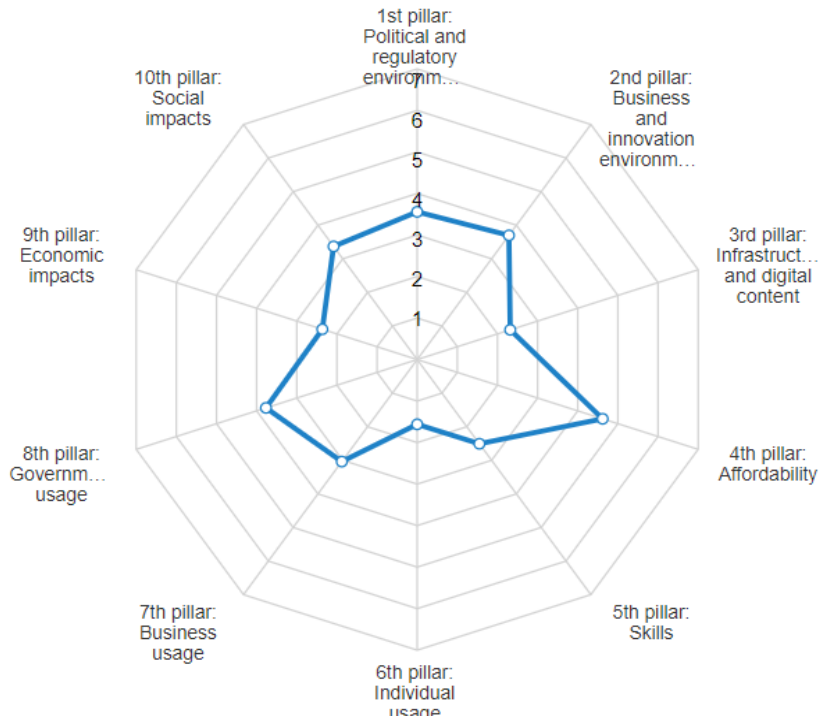


Figure 18 Ethiopia's Network Readiness Indicator 2016

[39] World Economic Forum (2016). Global Networked Readiness Index http://reports.weforum.org/global-information-technology-report-2016/economies/#economy=ETH

[40] GESCI (2017). Assessment of Knowledge Society Development in Ethiopia https://gesci.org/fileadmin/user_upload/Assessment_of_Knowledge_Society_Development_in_Ethiopia.pdf

below picture are the Affordability and Government Usage pillars and the individual usage remains the weakest pillar. The summary generally stipulates where actions need to be taken. Economic impact, infrastructure, and digital content, skills, and individual usage pillars remain below the average (3.5) value.

The Network Readiness Index - 2016

	Catagories/Countries	Ethiopia	Finland	United States	Netherlands	United Kingdom	Costa Rica	Mauritius	China	Seychelles	Morocco
1	**The Network Readiness Index**										
	Rank	120	2	5	6	8	44	49	59	74	78
	Value	3.1	6	5.8	5.8	5.7	4.5	4.4	4.2	4	3.9
	2015 Rank (Out of 143)	130	2	7	4	8	49	45	62	74	78
	Income Level	LI	HI-OECD	HI-OECD	HI-OECD	HI-OECD	UM	UM	UM	HI	LM
	Group	SSA	ADV	ADV	ADV	ADV	LATAM	SSA	EDA	SSA	MENAP
2	**Environment Subindex and Pillars**										
	Rank	106	5	13	8	3	69	34	83	76	77
	Value	3.6	5.6	5.3	5.5	5.6	4	4.7	3.9	3.9	3.9
	Political and Regulatory Environment										
	Rank	89	4	21	8	5	60	30	58	59	70
	Value	3.6	5.8	5.2	5.6	5.7	3.9	4.6	3.9	3.9	3.8
	Business and Innovation Environment										
	Rank	109	9	3	10	5	78	41	104	97	87
	Value	3.7	5.4	5.5	5.4	5.5	4.1	4.7	3.8	3.9	4.1
3	**Readiness Subindex and Pillars**										
	Rank	116	1	5	23	20	38	57	75	74	94
	Value	3.1	6.6	6.4	5.9	5.9	5.5	5	4.7	4.8	4.3
	Infrastructure										
	Rank	122	3	5	18	20	60	68	90	49	102
	Value	2.3	7	7	6.4	6.3	4.5	4.3	3.3	4.7	3
	Affordablility										
	Rank	93	13	17	83	53	21	65	63	98	20
	Value	4.6	6.4	6.4	5	5.7	6.3	5.5	5.5	4.5	6.3
	Skills										
	Rank	131	2	27	6	24	30	53	47	74	110
	Value	2.5	6.5	5.8	6.2	5.8	5.7	5.3	5.4	5	3.7
4	**Usage Subindex and Pillars**										
	Rank	123	7	8	3	11	46	55	51	70	60
	Value	2.8	5.8	5.8	5.9	5.7	4.3	41	4.1	3.9	4
	Individual Usage										
	Rank	136	6	17	8	5	55	66	75	62	67
	Value	1.6	6.6	6.2	6.6	6.6	4.8	4.3	3.9	4.3	42
	Business Usage										
	Rank	127	5	4	7	16	38	55	44	70	105
	Value	3	5.8	5.9	5.8	5.2	4	3.8	3.9	36	3.3
	Government Usage										
	Rank	71	21	12	14	10	56	48	40	79	41
	Value	3.8	5	5.4	5.4	5.4	4.1	4.3	4.6	3.7	4.6
5	**Impact Sunindex and Pillars**										
	Rank	119	4	5	2	7	42	67	39	82	80
	Value	2.9	5.8	5.8	6	5.6	4.1	3.7	4.2	3.5	3.5
	Economic Impacts										
	Rank	131	1	7	6	11	49	69	37	73	110
	Value	2.4	6.1	5.8	5.8	5.3	3.5	3.2	3.8	3.2	2.8
	Social Impacts										
	Rank	109	18	7	3	5	40	61	41	86	59
	Value	3.4	5.5	5.7	6.1	5.9	4.8	4.2	4.7	3.8	4.3

Figure 19 Network Readiness Indicator 2016 Comparison

Ethiopia moved up 10 spots to 120th place in the NRI, led by the government sector (71st for government usage). Yet the business sector is starting to catch up, moving up 8 spots to 127th. Executives felt innovation capacity in the country was increasing and businesses were starting to explore the use of the Internet to interact with consumers (123rd in 2016, up from 138th). It would be important that this momentum was not broken by a deteriorating business environment; in particular, setting up a new business seemed to be getting tougher, with the required number of days and procedures increasing.[41]

The private sector was also still constrained by a very small base of online consumers: only 31 percent of the population had had a mobile phone subscription in 2014. Yet, because prices

[41] World Economic Forum (2016). Global Networked Readiness Index http://reports.weforum.org/global-information-technology-report-2016/economies/#economy=ETH

were falling significantly, ICTs would become accessible to a larger part of the population (93rd rank on affordability in 2016, up from 113th).[42]

In addition, the country had been edging forward on the skills dimension, although a large gap remained to be closed. Importantly, the NRI figures suggested that there had been significant improvements in giving schoolchildren access to the internet (ranking 96th in 2016, up from 115th), an effort that would most certainly pay off in the coming years.[43]

Core ICT Indicators

No.	Indicators	Rank
1.	Fixed Telephone Lines per 100 inhabitants	161 out of 191
2.	Mobile cellular subscribers per 100 inhabitants	183 out of 195
3.	Individuals using internet	?
4.	Broadband Internet subscribers per 100 inhabitants:	150 out of 191
5.	International Internet bandwidth per inhabitant:	118 out of 139
6.	Percentage of population covered by mobile cellular telephony	116 out of 138
7.	Prepaid Mobile Cellular Tariffs, PPP $/Min	26 out of 138
8.	Fixed broadband internet tariffs, PPP $/month	67 out of 137
9.	Percentage of households with a computer	136 out of 139
10.	Percentage of households with Internet access	135 out of 139

Table 3 Ethiopia's Core ICT Indicators

Fixed telephone lines per 100 inhabitants	
1.13 out of 100 persons have telephone Connection	
Rank	169 out of 191

***Fixed telephone lines per 100 inhabitants*:** Fixed telephone lines refer to telephone lines connecting a customer's terminal equipment (e.g. telephone set, facsimile machine) to the public switched telephone network (PSTN) and which have a dedicated port on a telephone exchange.

Ethiopia ranks 161 out of 191 countries with a value of 1.13 according to 2018 statistics found on ITU

[42] World Economic Forum (2016). Global Networked Readiness Index http://reports.weforum.org/global-information-technology-report-2016/economies/#economy=ETH

[43] World Economic Forum (2016). Global Networked Readiness Index http://reports.weforum.org/global-information-technology-report-2016/economies/#economy=ETH

Report, which means 1.13 out of 100 persons have terminal equipment (telephone) connected to the Ethio-telecom's public switched telephone network (PSTN).

Ethiopia's low rank for the fixed telephone lines per 100 inhabitants could be described as part of the international phenomenon of fixed telephone subscriptions decreasing and mobile subscribers increasing. Ethiopia was a late bloomer to the telephone network connectivity.

According to the 2017 ITU report, 13% percent of the total world population is fixed telephone subscribers. Fixed telephone subscribers in the world had reached its highest in 2005 (19% of the total population). United states fixed telephone subscribers per 100 inhabitants reached its highest 68% at 2000 the plummeted to 36% in 2017. This decline in fixed telephone subscribers has been an international occurring trend. In 1960 United States had 26 fixed telephone subscribers per 100 inhabitants it was only 0.039 in Ethiopia. The decline was seen as a result of people diverting into Mobile cellular and IP Telephone.

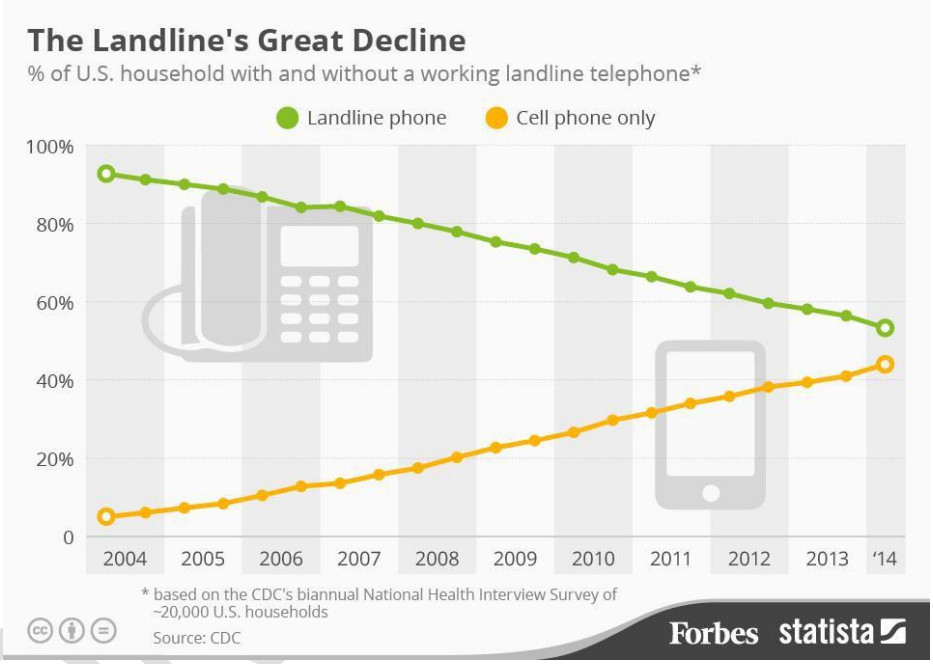


Figure 20 Percentage of U.S. Household with and without a Working Landline Telephone

Mobile subscribers per 100 inhabitants	
50 out of 100 persons are mobile cellular subscribers	
Rank	183 out of 195

***Mobile cellular subscribers per 100 inhabitants*:** Mobile cellular subscribers refer to users of portable telephones subscribing to an automatic public mobile telephone service using cellular technology, which provides access to the PSTN.

Ethiopia ranks 183 out of 195 countries with a value of 50.51 according to 2016 statistics found on ITU's Development Report and database, which means about 50 out of 100 persons are mobile cellular subscribers. There are nations that have surpassed 100 in value which implies one person may have multiple cellular subscriptions. Ethiopia's low rank in this indicator could be

the fact that the mobile network is still in its infancy. The mobile network coverage has reached 90% overall, 85% for 2G, 66% for 3G, and 332 sites in Addis Ababa for 4G according to the tele density report by Ethio-telecom.

Broadband internet subscribers per 100 inhabitants	
0.55 out of 100 persons are subscribers of broadband internet	
Rank	150 out of 191

***Broadband Internet subscribers per 100 inhabitants*:** *The number of broadband subscribers* refers to the number of active registered Internet accounts including all fixed network broadband access technologies: digital subscriber line services (DSL), cable modem services, satellite broadband Internet, fiber-to-the-home Internet access, Ethernet LANs, wireless local area network (WLAN) services, etc.

Ethiopia ranks 150 out of 191 countries with a value of 0.55 according to 2016 statistics found on ITU's Development Report and database, which means 0.55 out of 100 persons are subscribers of broadband internet.

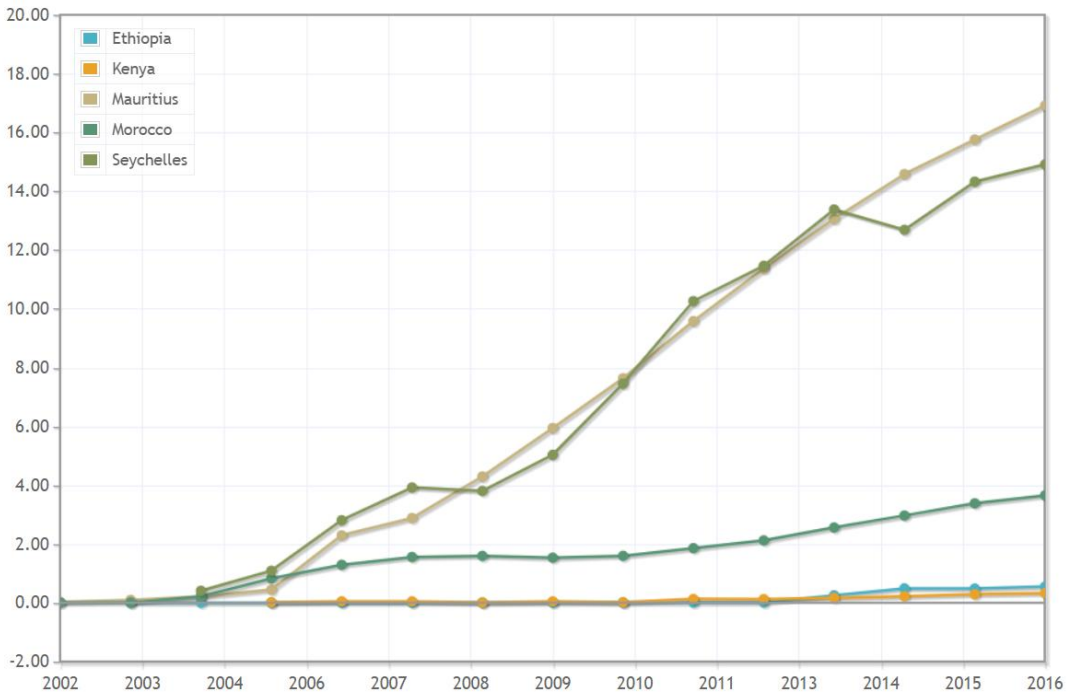


Figure 21 Broadband Internet Subscriptions Comparison

In this comparison Mauritius is leading with 16.90, Ethiopia and Kenya are at the bottom with 0.55 and 0.33 respectively.

The highest value for Broadband Internet subscribers per 100 inhabitants was 48% by Monaco according to the 2016 Global Information Technology Report. 0.55 persons out of 100 are broadband internet subscribers in Ethiopia. There is a huge gap regarding broadband internet subscribers. The fixed broadband internet subscriptions per month costs 33 dollars

(approximately 961 Ethiopian Birr), the cost is fairly competitive since Ethiopia is ranked 67 out of 137 countries. In addition, the percentage of households with computers in Ethiopia is 2.8% which is 3 times bigger than the broadband subscribers.

International Internet Bandwidth per inhabitant	
International internet bandwidth per Internet user is 2242.35 Bit/s	
Rank	118 out of 139

International Internet bandwidth per inhabitant: International Internet bandwidth refers to the capacity which backbone operators' provision to carry Internet traffic measured in bits per second. This indicator is intended to represent the quality of the experience of Internet users within a country.

Ethiopia ranks 118 out of 139 countries with a value of 5 according to the 2016 WEF Global information technology report, the world median value for this indicator is 35.

Percentage of population covered by mobile cellular telephone	
90% of the population is covered by mobile cellular telephony.	
Rank	116 out of 138

***Percentage of population covered by mobile cellular telephone*:** One of the most useful indicators of universal access is the percentage of the population covered by a mobile cellular network. Inhabitants who are covered by a mobile cellular signal have the potential to subscribe to the network, irrespective of whether or not they do so. Where there is a large gap between population coverage and penetration, it suggests that bottlenecks in access are more due to affordability than to infrastructure shortcomings.

Ethiopia ranks 116 out of 138 countries with a value of 90 according to the 2016 WEF Global information technology report, the world median value for this indicator is 100% coverage.

Prepaid Mobile Cellular Tariffs, PPP $/Min	
Mobile cellular tariff is 0.11 dollar per minute.	
Rank	26 out of 139

***Prepaid Mobile Cellular Tariffs, PPP $/Min*:** this indicator focuses on the Average per-minute cost of different types of mobile cellular calls.

Ethiopia ranks 26 out of 138 countries with a value of 0.11 according to the 2016 WEF Global information technology report, the world median value for this indicator is 0.25.

Fixed broadband internet tariffs, PPP $/month	
The tariff for broadband internet is 33.5 dollar per month.	
Rank	67 out of 139

***Fixed broadband internet tariffs, PPP $/month*:** this indicator focuses on monthly subscription charges for fixed (wired) broadband Internet service.

Ethiopia ranks 67 out of 137 countries with a value of 33.5 according to the 2016 WEF Global information technology report, the world median value for this indicator is 35. Ethiopia went up by 71 in rank for the Fixed broadband Internet tariffs, PPP $/month from 2012 to 2016.

Percentage of households with a computer	
2.8% percent of Ethiopia's population have access to computers with in their household.	
Rank	136 out of 139

Percentage of households with a computer: Ethiopia ranks 136 out of 139 countries with a value of 2.8% according to the 2016 WEF Global information technology report, the percentage of the world median value for this indicator is 50%.

Percentage of households with Internet access	
2.9% percent of Ethiopia's population have access to internet with in their household.	
Rank	135 out of 139

***Percentage of households with Internet access*:** Ethiopia ranks 136 out of 139 countries with a value of 2.8% according to the 2016 WEF Global information technology report, the value has moved from 2.8% in 2016 to 5% in 2018, the world median value for this indicator is 50%.

Ethiopia's rank on mobile subscribers is very low - 183 out of 195. Fifty out of 100 persons are mobile subscribers while the mobile cellular network coverage in Ethiopia is at around 90%. This shows that the small number of subscribers is due to the affordability of mobile devices rather than access or infrastructure.

The highest value for Broadband Internet subscribers per 100 inhabitants was Monaco – 48%, according to the 2016 Global Information Technology Report. In Ethiopia, the figure for broadband internet subscribers is 0.55 persons out of 100. There is a huge gap regarding broadband internet subscribers. The reason could be affordability or difficulties of access. The fixed broadband internet subscriptions per month costs 33 dollars (approximately 961 Ethiopian Birr). The cost is fairly competitive since Ethiopia is ranked 67 out of 137 countries, maybe the issues will have to do with access to infrastructure or computers. That said, however, the percentage of households with computers in Ethiopia is 2.8% which is 3 times bigger than the broadband subscribers.

In terms of percentage, the coverage of mobile networks in Ethiopia is 90%, which is impressive but the majority of it is 2G.

- 2G covers 85%
- 3G covers 66%
- 4G covers 332 sites within Addis Ababa

The current trend on mobile network is 4G and it is currently accessible only in Addis Ababa at 332 sites, however 5G is expected to accomplish a lot of things such as to facilitate the implementation and adoption of the Internet of Things (IoT) and provide mobile internet speeds of more than 10 gigabits per second (Gbps), approximately a hundred times faster than 4G.

5. Lessons from Successful Experiences in Technology Park Development

5.1 Learning by Example: Latecomer Advantages

Today, according to UNCTAD, there are more than 500 Science and Technology parks in operation worldwide, many of them in developing countries. In recent years, more and more African countries have opted to use this policy instrument as the main driver of technological entrepreneurship and entry into the new digital-driven global economic system. South Africa, Mauritius, Kenya, Rwanda, Egypt, Morocco, Tunisia to name but a few have opened the way for technology and ICT parks in Africa and some of these pioneers have seen their initiatives resulting in successes. They have been able to create several thousand new jobs and the role of new technologies in their economies has increased rapidly. Rwanda is a good example of a small Least Developed African country and a latecomer to digital transformation that has been able to make steady progress, demonstrating that with determination, coherent policies, and focused efforts, it is feasible to enhance the contributions of new technologies to the economy.

Viewed from this perspective, the decision of the Ethiopian Government to establish an ICT park as a driver of digital transformation and sources of investment and employment is understandable and sensible. However, the benefits from ICT parks are neither automatic nor straightforward, as often assumed by policymakers. They depend on several factors such as the rationale for establishing the park, the e-readiness of the country to host investment in ICT-related activities, availability of skills, energy, and other essential infrastructure, the policy environment, the linkage potential, and so on. These factors, to a large degree, determine the success and failure of technology parks as drivers of digital transformation. This section attempts to identify potential lessons for Ethiopia from countries that have succeeded in utilizing technology parks to attract investment in ICT-related activities and use them as locations to promote technology entrepreneurship, nurture start-up companies and create a digital innovation hub.

Applying lessons from the past experiences of other countries to inform current policies and strategies in a latecomer economy is not always easy. *What has worked in one country may not be relevant or work in others*. Similarly, what is regarded as international 'best practice' may not be the best option for all countries. It requires careful analysis of the lessons learned and considerable caution in identifying lessons that are 'best matches' for the needs and starting conditions of a specific country. Every country has its own unique characteristics deriving from geographical, political, historical, demographic, and social circumstances. Starting economic conditions also vary widely between countries, with potentially important implications for the appropriateness of particular policies or strategies.

This important caveat aside, however, drawing 'policy' lessons or identifying principles from successful cases or 'best practices' can be a useful exercise and worth considering. History is full of successful examples of countries learning from each other with positive outcomes. This

applies, particularly, to countries at an early stage of technological catch-up and development and where the skills and capacities for assimilating and mastering new digital technologies are either limited or non-existent. In these scenarios, governments that are considering investing in ICT parks could draw lessons, particularly on the "how" aspect of ICT Park development, from the vast evidence available on good practices in ICT park design, governance and operation.

With this in mind, Section V reviews the experiences of successful countries focusing mainly on two questions: first, what are the key factors that contributed to the success of ICT parks; and second, how relevant are these experiences and lessons to Ethiopia? We believe that identifying lessons from more successful countries could serve as a checklist when developing a strategy for the ICT park in Ethiopia. It is clear from the evidence available that ICT Parks can be successful, if – and only if – they fulfill certain essential conditions. This report will discuss the necessary requirements focusing mainly on those that are relevant for Ethiopia's current conditions and easy to implement. We believe that if applied carefully and factoring the specific conditions in Ethiopia, the lessons from other countries could serve as important building blocks for designing both a new strategy and implementation roadmap for the ICT park in Ethiopia.

5.2 Technology parks: identification of best practices

Governments began establishing technology (or science) parks in the early 1970s as part of a strategy to encourage innovation and research and development (R&D) activities. In general, there were two primary objectives driving the establishment of technology parks. In more advanced economies, they were used to create an enclave environment for R&D and technology diffusion in the domestic economy. This explains why many technology (or science) parks in the early days were established within or near major universities. In later years, however, technology parks acquired broader objectives. For example, when the newly industrializing economies in East and South East Asia were diversifying their technological capability, they relied on technology parks as seedbeds for technology development and "to play an incubator role, nurturing the development and growth of new, small, high-tech firms, stimulating the development of innovative products and processes."[44] Gradually, technology parks were also used as effective policy instruments for attracting foreign investment, creating employment, promoting linkages, facilitating the transition from a labor-intensive to a knowledge-based economy, and raising the level of technological sophistication of local enterprises. In some countries, technology parks have provided the ecosystem and the technical environment where small and medium-size technology firms could cluster and learn from each other. Indeed, the multiplier

[44] See, Felsenstein, D, (1994) "University-related Science Parks – 'Seedbeds' or enclaves of innovation?". Technovation, 14(2), 93-110.

effects resulting from these interactions are what makes technology parks an appropriate program for public investment and active involvement of the State in their establishment and operation.

However, there is less consensus on how technology parks should be managed, the ownership structure (public or private), and what services they should provide. These are important issues for newcomers to technology parks such as Ethiopia. It is hoped that reviewing the literature on technology parks and the experiences of other countries may shed light on how Ethiopia should approach the development of the ICT park. The question is, as a latecomer, are there lessons that Ethiopia can draw from the development of different technology parks around the world? What does it take for a technology park to evolve, grow and become an effective source of technological learning and, in the case of ICT parks, a driver of digital transformation?

The four stages of technology park development: where does the ICT park fit in?

In the literature discussing technology parks, there is no framework of an ideal model detailing the practical steps to be taken when establishing a technology park. However, the experiences of many countries show that there are commonly practiced steps that are taken when establishing a technology park (Phan et al., 2005; Koha et al., 2005; Silva Ruiz et al., 2017; & Guadix et al, 2016). These include the following:

1. **Identifying land in appropriate location** and developing basic infrastructure that a technology park needs to host technology firms and provide effective services. For example, availing critical infrastructure in the development of an ICT park such as internet connectivity along with availability of adequate power supply. Nowadays, it is impossible to attract technology firms into an ICT park without high-speed internet connectivity and power supply to meet the demands of IT-related businesses such as Data centers.

2. **Attracting anchor investors** that take the lead in supporting the formation of clusters and also contribute with investment in both infrastructure and knowledge. (Phan et al., 2005; Koh et al., 2005; Silva Ruiz et al., 2017; & Guadix et al, 2016). In low-income economies such as Ethiopia, anchor investors are often foreign enterprises with wider international networks and a leading role in the IT sector. As anchor companies invest in the ICT park, they are likely to attract other investors thereby strengthening the park as a technology/IT hub. (Koh et al. 2005).

3. **Developing and accelerating new businesses**. The most critical factor for a technology park's long-term sustainability is its ability to encourage the creation of new firms, in both existing as well as emerging technologies. This will enable the park to continually renew itself (Koh et al. 2005). Many technology parks have sought to improve their capabilities in this process with the establishment of incubators and a collection of venture capital firms to accelerate the entrepreneurial process (Guadix et al, 2016).

4. Finally, the **integration to markets** which has 3 different dimensions. First, the integration and sharing of knowledge within the tenants. A technology park should be able to assure knowledge transfer within the park (Guadix et al., 2016). Second, the integration and knowledge transfer between firms within the park and external actors. Third, the integration of the technology park into the technology or IT-ecosystem in the country and the alignment of park objectives with national development goals. (Koh et al., 2005; Guadix et al., 2016; Silva Ruiz et al., 2017).

These four stages are important steps that technology parks have to take to guarantee a firm foundation in their development. In addition, however, experiences from other countries show that the development and sustainability of technology parks depends on additional enabling factors that such parks need for smooth evolution (Silva Ruiz et al., 2017; Guadix et al, 2014). They include:

1. **Physical infrastructure**: buildings, social areas, common infrastructure, connectivity;

2. **Adequate supply of technical skills**, including managerial and organizational skills and competencies;

3. **Key partnerships** with universities or research institutes, authorities at different levels, business associations, and funding agencies. In addition, the park should be near locations where essential services could be obtained from outside the park.

4. **Mature financial sector:** Sources of funding, including through venture capital, is critical for both start-ups and established technology enterprises; and

5. **A business model (or a strategy) for the park and a clear policy and regulatory framework** (patents, copyright, and IT policies) are essential requirements for the smooth and sustainable operation of a technology park.

5.3 The ICT park's Challenges in light of Industry Best Practice

As already noted above, after nearly a decade of existence, the ICT park is still stuck at an early stage of its development. Very little progress has been made to attract anchor investors, diversify into new activities and integrate the park into the Ethiopian IT ecosystem. Similarly, progress in developing the key enabling factors has been limited. The Park still lacks an efficient and reliable internet connection and adequate energy supply. Interviews conducted with tenants currently operating within the ICT park reveal that the park faces several structural constraints. This section presents a summary of some of the structural and institutional challenges facing tenants in the ICT park. Some of the tenants have been residents in the park for a number of years and, therefore, their responses represent an insiders' view of experience in the ICT park.

Structural challenges[45]

- ***Poor National ICT infrastructure***[46]
  As already shown in Section three, Ethiopia's IT ecosystem is one of the weakest in Africa. The country has only one (state-owned) provider of internet services with limited capacity. Hence, the country registers one of the highest internet tariffs within East Africa. Moreover, internet shutdowns for up to one week or more are common, which invariably affects businesses in the IT sector. Similarly, various power outages during the day are also common.

- ***Lack of understanding of the sector among public authorities***
  According to the IT companies operating within and outside the park, there is a lack of understanding of the intangible nature of the sector by public authorities. Consequently, government officials treat the ICT sector with the same rules and regulations that are applied in other sectors and industries such as light manufacturing and services. The governance and management structures of the ICT park are also the same as those applied in other industrial parks that specialize in textile, leather, and agro-processing. This approach, according to IT companies interviews, is a clear indicator of a lack of appreciation of the dynamic and complex nature of new technologies and specific features.

- ***Excessive bureaucracy and lack of a regulatory framework hinders the development of the ICT industry***
  According to the ICT companies interviewed, up to 80% of the CEOs' time is spent dealing with the bureaucracy due to largely inconsistent and incoherent rules and procedures and regulatory misalignments. For example, some of the foreign IT companies complained about the excess of minimum capital requirements ($200, 000) to start a business in Ethiopia. They believe that this amount will impede the development of the IT sector where attracting talent and experience is more important than attracting capital.

- ***Lack of understanding of the sector in the local private capital*** *market*
  Many IT companies stated that local banks and venture capitalists do not wish to invest in local IT companies because of a lack of understanding of the industry and its potential. They prefer to invest in real estate which is the safest option.

[45] When asking about the challenges that the ICT park faces to operate, interviewees identified IT park's challenges and the general sector's challenges indistinctly. Hence, those issues were classified as structural, referring to the constraints for the development of the ICT industry, and organizational referring to the particular issues for IT park operations

[46] Telecommunications market in Ethiopia has a monopolistic structure and is controlled by the state company Ethio Telecom (Research ICT Africa, 2018). According to the Ministry of Innovation and Technology, the main challenge is the limited bandwidth capacity, and the lack of tools for monitoring the use of it (Appendix 8).

- ***Human talent***

  According to the IT companies, there is a good pool of "raw" talent in Ethiopia. However, many of them lack experience and exposure to new technologies. This problem is attributed to the misalignments between academia, government and industry, and the inability of schools and universities to create curriculums that respond to the economy's needs. As a result, the private sector is forced to incur additional costs and investment for re-training graduates.

Internal and organizational challenges

- ***Location***

  The ICT park is located in the outskirts of Addis Ababa with few options for transportation and food services for the residents. Hence, it is difficult for the companies to attract the human talent they need and, as a result, they will have to pay higher salaries than companies located in the center of the city.

- ***Operative tasks consuming time***

  IT companies that are tenants in the ICT park complained that most of their time is spent solving issues related to power outages, internet interruption, and other administrative issues. Although rent in the park is cheap, the cost of operating and transporting workers makes it less attractive than being located in the city.

- ***Lack of implementation tools***

  In designing and establishing the ICT park, most of the emphasis was on vision and master plan for the park rather than designing a manual on how the park should be managed run efficiently. The IT companies within the park complained that the management of the park has been left with a heavy responsibility without a clear strategy and implementation roadmap.

- ***Lack of clarity on investment promotion and how to attract investment***

  Although the ICT park – like other industrial parks – was established to attract FDI and encourage export-oriented activities, there was no strategy on how to attract investment or promote the ICT park. Indeed, since its establishment, a large number of investors have expressed interest to invest in the ICT park and some have presented detailed project proposals. However, responding to the expression of investment interest has been difficult because of the lack of clarity on how to facilitate investors and lack of decision on the cost of land within the park.

- ***Lack of appropriate managerial and organizational structure***

  Many of the tenants in the ICT park emphasized the need for a management structure that understands the complexity and special features of the technology and services that ICT parks are expected to attract. They believe that while the current management system is adequate for the present level of the development, as the park starts to attract

anchor investors and other enterprises, it is important that the management and governance structure of the park is reorganized to reflect the knowledge and technical requirements of the industry.

- ***Lack of incentives***
  According to tenants in the ICT park, the government promised incentives for companies established in the park. However, it would seem that companies already operating in the park have not received the incentives promised, except the low rent they pay for facilities.

- ***Companies are leaving the ICT park***
  Largely due to the constraints mentioned above and poor definition of business model, several companies which established their operations in the ICT park had to leave the park moving back to the city or in some cases shifting their operation to Nairobi, Kenya. For many companies, the promises and the hype created when the ICT park was established and the reality, once it became operational, was different.

The rest of this section identifies broad principles and lessons drawn from the experiences of other countries that have successfully established and implemented an ICT park program. This report believes that taking these principles and lessons into consideration would have enabled the Ethiopian government to establish a successful ICT park. Moreover, given the fact that – as noted above - the park is still in its first stage of its development, these principles and lessons are still relevant for reviving and upgrading the ICT park.

Do your homework and learn to walk before you leapfrog?

Before spending scarce resources developing an ICT park, first, establish whether or not the essential conditions required to attract investment into the ICT sector exist in the country. Such advanced evaluation of the precursory conditions (or what we refer to in this report as the ICT ecosystem) enables policymakers to better understand the potential as well as the constraints to investing in ICT parks. Prior evaluation of the ICT ecosystem will also help to identify the gaps in infrastructure and the skills-base. It is a mistake to assume that somehow the necessary conditions will be fulfilled once the park is built.

In fact, in some successful countries, even the management team for the ICT park was assembled well before the park was constructed. At least, serious thinking was placed in advance on whether the county has sufficient personnel - with all the necessary skills - needed to manage a technology park. Managing an ICT park involves multiple tasks such as coordination and communications among various stakeholders, including dealing with tenants within the park, handling issues related to funding, infrastructure, inter-firm relationship, and other technology and management-related activities. To fulfill such management tasks, the team needs to have expertise not only in ICTs but also in business, marketing, legal matters, negotiation and communication skills. Furthermore, the management team must be able to

implement a strategy and adjust it as necessary in line with ever-changing national and international environments. This, in effect, means assembling a management team that understands the complexity of fast changing technology and that has the mix of skills required to run an ICT park as a cost-effective business venture and monitor performance and ensure that the park continues to grow and attract investment

Provide a clear pathway for the development of the ICT park

Define clearly the short- and long-term goals of the ICT park and prepare a roadmap laying down the projected growth path (or expected outcomes) over five, ten and fifteen years. This form of planning is commonly practiced among successful countries and gives targets and clear guideline to managers of the park and policymakers alike. It also means that policymakers are clear from the start why they wish to establish an ICT park, what the short- and long-term objectives are, which industries should be targeted, who should own the park, how it should be managed, how to select tenants, what incentives to offer, how it should be funded, how to attract quality investment, why establishing a park is the better option as a policy instrument for building technological capability, and so on. In other words, in best practice countries, an ICT Park is considered as a policy instrument and a means to an end, rather than an end in itself.

Design a strategy and implementation roadmap

In successful countries, the establishment of an ICT Park is often accompanied by a strategy that provides a detailed guideline on the 'strategic direction' that the park should follow. This basically involves determining in advance the types of investors and ICT activities that will be allowed in the park and shape the pattern of development of the park. This, in effect, means that the search for investors is not left to chances or handled randomly on first come first serve bases, but animated carefully with clarity of purpose and well-defined development pathway.

The initial investors in the ICT park are the 'value drivers' that will influence how the park evolves over time and its specialization and market direction. For example, in some countries, the 'value drivers' have been domestic enterprises servicing domestic consumers and gradually upgrading to export level. In other countries, the strategy was focused on attracting foreign investors through targeted investment promotion and encouraging them to invest in targeted ICT activities. In other cases, the focus has been to mobilize an 'anchor investor' that will serve as a magnet attracting other foreign investors or domestic enterprises into the park. The approach may differ between countries, but the most important lesson from these observations is that the establishment of an ICT park must be accompanied by a strategy indicating the types of investment the park should attract and what types of activities it should encourage.

Management and governance structure matter for success

Among other things, the ICT park strategy should spell out how the park will be managed and how the ownership structure will evolve over time. As will be shown in this report, the types of management and ownership models used could have significant impact on the performance and success of the park. Unfortunately, Ethiopia did not follow such a well-developed strategy when establishing the ICT park in Addis Ababa. Although various studies were conducted, they did not result in the development of a strategy that charts clearly a 'strategic direction' and the 'value drivers' that will kick-start investment in the ICT park. Such a strategy is still lacking in Ethiopia creating confusion as to what to do when potential investors express interest in the ICT park.

Align the ICT Park objectives with national development goals and vision

Maintaining policy coherence and policy consistency between the country's national development vision and the investment activities in the ICT park is critical. This way, the government will ensure that the investment activities in the park are compatible with the sectoral priorities, social objectives (for example, creating employment) and the overall national development agenda of the country. Misalignment between the investment patterns in the ICT park and national development goals will reduce the impact of the ICT park and the parks relevance to the country's development vision and priorities lost.

Knowing the sector and its distinctive features is critical

ICT parks have been more successful in countries where policymakers have made efforts to understand sector and have made informed decisions - from the start – on the types of activities that the ICT park should promote. Early verdict on the investment activities to be promoted is important because such decisions influence the types of parks to be built and their required features. They determine, for example, where the park should be located, the nature of infrastructure and skills required and the types of services offered. For instance, electronic hardware producers have very different requirements than IT-enabled service providers or a software developer.

From the ICT sector scan that the IFC developed in Ethiopia and used in this report, it is evident that the generic term "Information and communications Technology" covers a wider range of rather diverse products and services. Therefore, before establishing an ICT park and when designing a strategy, it is important to determine which of the ICT-related activities will the park host and what types of investment promotion strategies are needed. As noted above, such decisions should be based on national development objectives and development plans and the ability of the country – in terms of skills and infrastructure – to support investment in the targeted areas. Experiences from other countries show that many of the ICT parks that have succeeded are those that targeted products and services in which the country already had developed some capabilities or where demand for such products and services is high or is likely

to grow. Clearly, such a focus on existing domestic industries means that an ICT Park can build on an existing knowledge base and on tested and tried value chain. This important lesson has relevance for the strategy that this report intends to develop.

Intensive 'efforts' and 'learning' in implementing a strategy

Formulating a strategy is only the beginning of a long process of transforming an ICT park into a dynamic and successful project. In fact, this is the easier part. Successful implementation depends on "intensity of efforts" by the government and the institutions that are directly responsible for the management and operation of the ICT park. Experiences from successful countries, particularly those in East and South East Asia, show that a sense of urgency was often attached to implementation of important projects such as ICT parks and their progress was monitored regularly and the challenges faced by park managers and the tenants solved without delay.

Thus the 'intensity of efforts' refers to the amount of resources, energy and attention expended by the government and the responsible institutions in developing the precursory conditions necessary for ICT development, in attracting foreign investment, encouraging local enterprises to benefit from the opportunities created by the ICT park and ensuring that the objectives of the park remain aligned with national development objectives. Such efforts could create 'intensive learning' and they are important preconditions for the success of the ICT park and for accelerating the process of local technological learning.

6. The ICT park as a driver of Digital Transformation: *Mapping a New Strategic Direction*

Summary of key issues addressed in Section VI:

(1) The report argues that in its current status, the ICT park will contribute very little to the country's digital transformation agenda. The only way it could become an effective driver of digital transformation is if the park functions as a 'Digital Innovation Hub' providing an ecosystem in which technology entrepreneurship could develop and a range of IT-enabled services, such as IT application development and BPO could operate in. The emergence of the ICT park as a pocket of digital innovation hub containing the foundational digital infrastructure and skills needed to promote digital transformation will compensate for the lack of digital infrastructure and e-readiness at the national level.

(2) The establishment of the ICT park was based on erroneous policy assumptions and a business model that equated the functions and objectives of the ICT park, and its operations, with those of industrial parks in the manufacturing sector. Consequently, some of the essential precursory conditions necessary to establish an ICT or technology park were not considered. As a result, the ICT park lacks appropriate vision and a strategic direction to guide its mode of operation. This study identifies – based on best practice experiences – the most essential preconditions that governments should consider when establishing a technology park.

(3) An essential requirement for developing a well-defined strategic direction for an ICT park is to understand the expectations or 'Value Drivers' of the key stakeholders in digital transformation. These include international companies, local digital companies, incubators, start-up companies, the government, employees, managers of digital hubs, etc. This study identified the 'value drivers' of key stakeholders based on information obtained through interviews and best practice experiences.

(4) Finally, there are many successful examples of Digital Innovation Hubs that Ethiopia can learn from and adopt to meet its own current needs. The key message emerging from these experiences is that an effective way in which the Ethiopian ICT park can spur innovation, promote tech entrepreneurship, support the development of IT-enabled services, such as BPO, and contribute towards the country's digital transformation agenda is by functioning as a digital innovation hub or an ecosystem that enables digital enterprises to manage their digital transformation. Obviously, digital innovation hubs take many forms and come in different sizes and their creation may proceed at varying speed. For Ethiopia, the more realistic option for the ICT park – given the country's current level of development - is to function as a innovation hub rather than a traditional

park that hosts export-oriented FDI detached from the digital transformation process in the rest of the country.

6.1 Introduction

The objective of Section VI is to examine the role that the ICT park can play in Ethiopia's digital transformation agenda. In June 2020, Ethiopia's Council of Ministers approved the country's new Digital Transformation Strategy - *Digital Ethiopia 2025*. The strategy identifies four pathways as priority areas and singles out the ICT park as the main driver of pathway 3, "Building IT-enabled Services". This report will argue that – in its current state – the ICT park is incapable of contributing to the successful implementation of the digital transformation strategy. It requires a new strategic direction that reverses the flawed business model envisaged when the ICT park was established a decade ago and transform the park into a *Digital Innovation Hub* to create an ecosystem that will enable digital enterprises to undergo through digital transformation process.

Innovation and upgrading of digital technologies are the main driving forces of digital transformation. It is through continuous innovation and effective application of digital technologies that digitalization makes businesses, communities, societies, agriculture, the manufacturing and service sectors, and the environment efficient and generate economic value. However, achieving these goals poses at least two challenges. The first is how to acquire the digital infrastructure and diverse skills that are essential for kick-starting a process of digital transformation and building a viable digital economy; and second, how to achieve a rising share of value added in economic activities by harnessing and applying new technologies. This report examines what role the ICT park can play in addressing these challenges and how it can contribute towards the goal of *Digital Ethiopia* 2025.

Ethiopia is a latecomer to the application of ICT/technology parks to promote technological learning and digital transformation. However, many other countries have already used ICT/technology parks – some of them successfully - as effective industrial policy tools to foster innovation and advance their digital transformation. Therefore, there are potential lessons that Ethiopia can draw from the experiences of other countries. Before that, however, it is important to ask why Ethiopia decided to establish an ICT park and whether the country possesses all the precursory conditions required to establish and transform an ICT park into an effective instrument of digital transformation. What will it take to make an ICT park an effective industrial policy instrument? Did Ethiopia fulfil the necessary preconditions? Consideration of the value drivers of stakeholders – for example, international and domestic IT-enterprises, start-up companies and entrepreneurs, employees', the management of the park, the government, etc – is critical in establishing a strategic direction for an ICT park. To what extent were these essential preconditions considered when the ICT park was established? Does the ICT park currently have a well-defined strategic direction or a business model to guide its mode of operation and priorities? If not, are there technology park operational models in other countries that Ethiopia can draw from and adopt and assimilate to its needs and prevailing conditions? These are some of the questions that will be addressed in Section VI.

The overall conclusion of this report is that when the ICT park was established nearly ten years ago, it lacked vision, priority, focus, a strategic direction and the operational or business model that an ICT park needs to contribute towards the development of a digital economy. Indeed, to a large extent, the park's low-level of performance and current inactive state is very much a reflection of its flawed origin. Thus, in its current status and mode of operation, it is highly unlikely that the ICT park will play a meaningful role towards digital transformation. The park needs a new strategic direction and a radical transformation from its current dormant status and role as a real estate manager - waiting for export-oriented investors to come and rent land and office spaces - into a *Digital Innovation Hub* that attracts and hosts digital enterprises of all sizes and different ownership structure – foreign and domestic – and that offers mentoring and a learning environment for start-ups and fosters collaboration, tech entrepreneurship and innovation. Transforming the ICT park into a dynamic ecosystem and a driver of digital innovation and digital transformation requires revisiting and changing its current approach to investment and priorities, which are based on operational models of traditional industrial parks rather than technology parks.

6.2 The precursory conditions necessary for establishing an effective ICT Park: the best-practice business model

It is evident from the experiences of successful countries that ICT parks can be effective policy instruments for building a digital economy and promoting digital transformation. This has been established from the role played by Digital Innovation Hubs in China, Thailand, South Korea and many other countries. Even in the African continent, digital hubs are beginning to foster digital transformation, modernize the financial system and drive economic growth[47]. However, the lessons from successful countries show that before ICT parks are established, there are certain conditions that need to be considered and fulfilled to ensure that the parks serve as effective engines of digital transformation. It is not clear whether the decision that led to the establishment of the ICT park in Ethiopia involved consideration of the precursory conditions. In short, two of the essential preconditions necessary for creating an effective ICT park include the following:

First, a decision to establish an ICT park should be assessed in a broader national development context and its relevance to national policy goals and priorities. This is an essential requirement that Ethiopia seems to have failed to take into consideration when establishing an ICT park.[48] It is important to note that establishing an ICT park is not an end in itself; it is a means to an end. In Ethiopia, there were only three broad outcomes or goals expected from the ICT park. Attracting efficiency-seeking (or export-oriented) Foreign Direct Investment (FDI), creating 300,000 new IT-related jobs, and the vision of transforming Ethiopia into "a premier IT Hub

[47] See, for example, Kelly, T & Firestone, R (2016) "Digital Dividends: How Tech Hubs are helping to drive economic growth in Africa", Background paper for World Bank, World Development Report 2016.

[48] Ethiopia's national IT policy and national development objectives and vision are discussed in detail in Section III.

in Africa". While these objectives are essential and will no doubt contribute towards national development objectives, there was no clarity or a business model on how they were to be achieved. For example, important questions such as what types of ICT-activities should the park promote; what is the strategy for attracting FDI into the ICT park; why should the park focus on attracting export-oriented FDI only; what is the basis for allocating land; why would digital technology enterprises locate their operations in a site where social amenities are not available; why 300,000 new jobs and on what basis were these job numbers estimated, and so on, remain unanswered.

Second, before an ICT park is developed, it is essential to establish whether the precursory conditions necessary to turn the park into a dynamic Digital Innovation Hub are in place. These precursor conditions include, among others:

I. The presence of an anchor tenant – preferably a globally recognized digital technology corporation. The presence of such a key tenant in the park and the expression of commitment to stay will encourage other key plays in digital technology to locate in the ICT park and create the momentum for clustering and inter-firm interaction and learning. In other Industrial parks in Ethiopia, the presence of an anchor investor has served as a magnet pulling other enterprises in related areas of production activities to locate in the same industrial park. The presence of PVH, the second largest apparel corporation in the world, in the Hawassa park and its impact in attracting to Hawassa fourteen other global suppliers of PVH is a good example.

II. The availability of a management team with all the skills and expertise necessary for managing a technology park and knowledgeable about the dynamic and fast-changing feature of digital technology. The management of a technology park is often expected to supervise and administer multiple tasks, including coordination and communication among various stakeholders. To be able to fulfil such responsibilities, the management team needs to have expertise in diverse aspects – ranging from the intricacies of the latest digital technologies, the complexity of digital business, marketing, negotiation and communication skills. Furthermore, the management team must be able to adjust its strategy to a constantly and rapidly evolving environment. Such a requirement makes assembling the right types of management skills difficult for countries at an earlier stage of development. One possibility is to acquire - on a contractual arrangement – an international management company with specific experience in the ICT sector and proven record of managing ICT parks. In its initial stages of development, for example, China relied on Singaporean expertise and management experience to operate its technology parks.

III. The presence of a strong national ICT ecosystem and digital technology base. In other words, e-readiness and a solid foundational base on communication technology and digital infrastructure. For example, two key precursory conditions that may make or break an ICT park are access to a reliable internet connection with appropriate redundancy capacity and a dependable and affordable energy supply.

IV. The most critical precursory condition is the availability – both in terms of quantity and quality – of digital skills. As explained below, availability of digital skills is an

important component of digital infrastructure and often a key factor in determining the degree to which innovation and digital transformation takes place.

V. Availability of an entrepreneurial culture in the country or the city where the ICT park is to be located. This factor is particularly important if the key objective of an ICT park is to foster start-ups and digital entrepreneurs. While a large ICT park may not be normally the best place for start-up or the development of digital entrepreneurship, as discussed below, if the ICT park is operated as a Digital Innovation Hub, it can help start-ups or digital entrepreneurs to identity technology solutions.

VI. Access to finance, especially seed money and venture capital, is critical for making an ICT parks promote innovation and digital entrepreneurship. This is particularly important if the key objective of an ICT park is to foster innovation by local start-ups and digital entrepreneurs. Innovation is risky and uncertain and entrepreneurs, particularly start-ups, that cannot secure funding may see the knowledge competencies they have assembled dissipate quickly. Unfortunately, the uncertainty of innovation outcomes is a disincentive for traditional financial institutions seeking investment opportunities. As a result, innovative firms in low-income economies experience high costs of capital that are only partly alleviated by personal savings or family support in the absence of venture capital. Venture capital itself depends on the existence of a well-functioning equity market in which it can divest its venture when it matures, and this is not often available in least developed economies such as Ethiopia. Therefore, financing of the activities of park tenants, particularly local start-up companies, may need to rely on public investment vehicles or funding developed through public–private partnerships. At current stage of development, the government of Ethiopia has no choice but to play a key role as a source of finance for start-ups since the culture of private venture capital is still be underdeveloped. For example, one of the constraints identified by start-up companies in Ethiopia during interviews was the difficulty of access to finance and the absence of venture capital system and culture in the country.

VII. The choice of the right location is critical for an ICT park or a Digital Innovation Hub and needs careful consideration as it is likely to affect the success or failure of the park as a promoter of digital innovation and digital entrepreneurship. To attract FDI and encourage start-ups, the site where the ICT park is located should be attractive to talented entrepreneurs and young people. Ease of access to the park, transport system and housing facilities for professionals need to be taken into consideration. These factors, which are often beyond the control of the park management, have huge impacts on whether an ICT park can attract the required investment and talent.

The available evidence suggests that many of these precursory conditions were not taken into consideration when the Ethiopian government established the Addis Ababa ICT park nearly a decade ago. Ideally, in a low-income and digitally less developed economy such as Ethiopia, the establishment of an ICT park should offer an ecosystem or a digital infrastructure, which, combined with the right policy environment, are better than the conditions that investors – both foreign and local - find outside the ICT Park. This has not been the case. In fact, as shown

below, in some respects, digital entrepreneurs find the ecosystem outside the ICT park more conducive and attractive than what the ICT park offers.

6.3 Transforming the ICT park into a special ecosystem of digital infrastructure and skills

The decision to establish the ICT park was taken at a time when Ethiopia begun to construct government-sponsored industrial parks to attract FDI and promote export-led industrialization anchored in the manufacturing sector. Since 2008 a total of nineteen industrial parks have been established – both private and public - in different parts of the country to manufacture textile, leather and agro-based products for export. A specialized industrial park was established in Kilinto to attract FDI and produce pharmaceutical goods and medical supplies for export. The establishment of the ICT park was viewed in the same light and was intended to attract FDI to produce IT-related products and services for export. Thus, the broad business model applied in the ICT park was not different from the model envisaged for the manufacturing-based industrial parks that the government established as part of its export-led industrialization strategy. It revolved around attracting 'efficiency-seeking' FDI to promote export-oriented activities.

However, the characteristics, dynamism and foundational infrastructure requirements of the new digital technologies are distinctly different from other industrial parks that are specifically designed to create employment for a semi-skilled labour-force and produce standardized light manufacturing products such as apparel, shoes, handbags and processed food for export. ICT, according to technical definition, incorporates diverse products and services ranging from electronic hardware to software, networks and technologies used for collection, storage, transmission and information delivery system (voice, data, text, images).

In fact, the new technologies can be both a core industry and an enabling system. As a core industry, ICT offers electronic products and IT-enabled services that improve people's lives through the use of digital technology. As an enabling industry, ICT provides technology solutions to other sectors of an economy, allowing them to operate more efficiently and improve their services. This diversity partly explains why parks that host IT-related companies are often referred to by different names in different countries – such as, digital technology parks, digital innovation hubs, science and technology parks, innovation Parks, business innovation centres, techno-city, techno-pole, techno-polis, smart city, etc.

Furthermore, the range of digital infrastructure and skills that countries require to build a viable digital economy and promote digital transformation are complex and still underdeveloped in many low-income economies such as Ethiopia. Developing such infrastructure and skills nation-wide can take time and can also be costly. A possible option available for latecomer countries such as Ethiopia is to develop the digital infrastructure and skills needed to kick-start digital information in pockets of ecosystems such as ICT parks or Digital Hubs. Bringing together digital capabilities, digitally talented individuals and start-up companies, including well-established foreign IT companies into pockets of ecosystems, creates an environment conducive for interactive learning, innovation and digital transformation. As noted above,

Ethiopia's ICT park currently does not contain the digital infrastructure and skills needed to support the country's digital transformation agenda.

Generally, the digital infrastructure needed to kick-start a process of digital transformation can be grouped into five broad interrelated components.

I. Digital networks, i.e. ICT and broadband connectivity. These are the principal tools for collecting and transmitting information flows. In fact, it is practically impossible to expect successful digital transformation and catch-up with more developed economies without acquiring a reliable broadband connectivity.

II. Software that can be used in combination with broadband connectivity and cloud computing infrastructure to provide computing services remotely. This component includes storage, means for processing, networking, and services, as well as operating software and platforms for building custom applications, and remote provision and management of the whole range of computing needs up to fully functional applications and data-based processes.

III. The third and arguably most important and foundational digital infrastructure is data which fuel digital technologies and are intrinsic to digitized commercial transactions, and that represent the value of intangible assets that underpin value and income generation in the digital economy.

IV. Adequate supply of energy, preferably renewable energy is another important component of digital infrastructure and source of competitiveness. The processing of digital data and the storage devices and cooling system on which it depends, consumes vast amounts of energy. This has often raised concerns about electricity supply and consumption, particularly in developing countries where the lack of reliable and affordable access to electricity is a major constraint and a hindrance to growth. Clearly, energy consumption by IT-related enterprises depends on the types of activities performed but, all studies point to growing levels of energy used by digital infrastructures, both in absolute terms and as a share of global electricity use. In fact, availability of adequate, reliable and cheap electricity supply has become the main determinant of competitiveness for attracting investment in data centres. The vast opportunities that Ethiopia has in renewable energy generation—particularly when the Grand Ethiopian Renaissance Dam is completed and becomes operational —could create a comparative advantage in cheap energy and turn the country into an attractive site for digital infrastructure.

V. Availability of diverse digital skills is another important component of digital infrastructure. In fact, ultimately, the effective use of digital infrastructure depends on the range of digital skills available in the economy, including: (a) basic digital skills related to the effective use of technology including web research,

online communications, use of online platform, digital financial services, etc.; (b) soft skills necessary to ensure collaborative work among professionals; (c) intermediate digital skills, such as digital graphic design and marketing, desktop publishing and social media management both for job and entrepreneurship opportunities; (d) advanced digital skills related to technology development such as coding, software, and app development, cybersecurity and network management as well as 4th Industrial revolution digital skills like machine learning, big data analysis, Internet of Things and blockchain technology, etc.; and (f) digital entrepreneurship which includes digital skills required by entrepreneurs for strategic planning, market research, business analysis, etc.[49] While building basic digital skills requires economy-wide efforts - such as digital education in schools and universities - ICT parks or Digital Hubs may well prove useful instruments for addressing the immediate skill needs through learning-by-doing and learning by interaction with digital professionals. Moreover, Digital Hubs could provide learning opportunities by pooling together the country's digital knowledge base, such as research institutes, digital-oriented universities and institutions. Such a collection of digital competencies could facilitate digital cooperation platforms, business–education forums, and social networks, and thus be conducive to the creation and dissemination of tacit digital knowledge that requires face-to-face interaction, spatial proximity, and experience. More importantly, ICT parks as pockets of digital infrastructure could make big data accessible for digitally skilled workers. This has the advantage of enabling talented your people to: (i) learn how to build the algorithms that extract systematic information and create value from big data and (ii) enhance their own learning through the use of artificial intelligence.

In short, in the initial stage of digital transformation, it is more manageable and realistic for developing countries such as Ethiopia to develop the digital infrastructure, skills and the innovation environment needed for digital transformation in pockets of specialized ecosystems such as a Digital Innovation Hubs than to build economic-wide energy grid, broadband connectivity and digital skills. Hence the proposal to transform the ICT park into a Digital Innovation Hub that attracts not only export-oriented FDI – as currently intended – but also local digital enterprises, start-ups, incubation centres, private digital hubs, etc., to create a 'cluster' or 'agglomeration' digital entrepreneurship and innovative digital environment.

Identifying the value drivers of key stakeholders: ingredients for mapping a new strategic direction

All major stakeholders in the digital transformation process have their own 'value drivers' that determine and make what they produce and offer in the market valuable and competitive. For companies, value drivers are anything that can be added to a product or service that will

[49] For further details on digital skills, see ILO-ITU (2017), "Digital Skills for Decent Jobs for Youth Campaign to train 5 million Youth with Job-ready Digital Skills", Geneva: ILO-ITU.

increase its value to consumers. These differentiate a product or service from those of a competitor and make them more appealing to consumers. Thus, the greatest benefit of a value driver is that it provides a competitive advantage to a business, giving that business an upper hand in its industry. Therefore, in developing the strategic direction and a business model for an ICT park or a Digital Innovation Hub, it is first important to identify the value drivers of the key players in the digital transformation process. For purposes of this study, key stakeholders that have direct or indirect affiliation with the ICT park were interviewed to determine their value drivers or what they are regard be important to add value. In addition, the value drivers of competitors to the ICT park – both within the country and outside the country – were considered.

6.4 The value drivers of actual and potential ICT park users

International companies' value drivers

According to actual and potential foreign investors interviewed, the following variables are key determinants of the choice of investment in ICT park or a Digital Innovation Hub.

- **Market size and the level of development of the digital economy:** international investors tend to give greater importance to domestic market size, market growth and e-commerce development.

- **Human talent:** Greater emphasis is given to language proficiency, IT specialist availability, quality of education.

- **Infrastructure:** particularly broadband Internet connectivity with redundancy and power supply are given priority.

- **Sector dynamism:** the number and size of companies in the park, the ICT sector growth and the level of sophistication of local digital enterprises, including start-ups, are important factors for foreign investors.

- **Business environment:** ease of doing business, bureaucracy and the ease in which earnings are repatriated.

- **Financial attractiveness:** incentives, the ability to acquire emerging start-up companies with less legal hassle and the level of development of the financial market.

- **Regulatory environment:** particularly intellectual property rights and business regulation, including minimum capital requirements for foreign investors.

Domestic Companies' value drivers

Value drivers related to real estate:

- **Price:** due to the nascent stage of the IT sector development in Ethiopia and the challenges of doing business for domestic enterprises, particularly small businesses, and the difficulty of accessing finance, the cost of renting suitable offices with utilities is a major value driver for domestic digital enterprises. Indeed, for some of the tenants in the ICT park, the main reason for locating in the park is the low cost of office space, despite the distance of the park from the center of the city.

- **Availability and quality of facilities:** companies expect high quality and stability from the vital services provided for their operation, starting with power and internet but also facilities for their employees including toilets, common areas and access to cafeterias and restaurants.

- **Strategic location:** companies attach higher value to the location of the park when it creates an enabler environment for enhancing and doing business, as well as how easy it is for clients and potential partners to visit them and how connected it is to other clusters of digital enterprises.

- **Accessibility:** apart from the location, companies evaluate the distance and the transport options for employees and clients to access to their offices.

Value drivers related to business and advisory services

- **Recognition and inclusion:** There is a consensus among local ICT companies that the Ethiopian government and the private sector in general, particularly the financial sector, do not yet understand the value and nature of their business. They hope that the introduction of the Digital Transformation strategy will change perceptions in government circles. The transformation of the ICT park into a digital innovation Hub and a self-contained ecosystem with digital infrastructure and facilities should encourage domestic IT-service providers to locate in the park and be part of a cluster of digital technology enterprises.

- **Networking and linkages opportunities:** ICT companies highly value the space and opportunities that allow them to meet and keep in contact with key actors within the industry. This creates a fertile environment for knowledge and investment linkages and joint-innovation activities and learning from interaction and imitation. The transformation of the ICT park into an innovation hub will intensify this process even further.

- **Business facilitation:** most domestic IT companies are still small and do not have marketing capability. Therefore, access to marketing and promotion tools, business facilitation and incentives that digital innovation hubs provide are key value drivers for them.

- **Cost and times reduction:** any process or services that allow companies to minimize costs and make more efficient and productive use of their time is regarded as important value driver. According to some of the tenants in the ICT park, currently, about 80% of a CEO's time is spent on bureaucratic and operative issues, leaving less time for the strategic considerations.

- **Access to finance:** due to the lack of financing services tailored to the needs of ICT companies, access to finance is a priority value driver for domestic IT-enabled service providers.

- **Trust:** many companies stressed the importance of trust in the relationship with their clients and suppliers as an important value driver. Hence, the and an important which ideally for them would be built on following up processes and implementation accomplishment.

1. **Additional value drivers for Start-ups**

In many ways, start-up enterprises share the same value drivers as established companies. However, as newcomers to business, start-ups have additional value drivers related to learning and the possibility of improving products and services through close interaction with customers and other firms:

- **Learning opportunities:** start-ups highly value the opportunities to interact with and learn from bigger companies and experts as well as receiving specialized training in key aspects as business development, funding and marketing. Operating within Digital Innovation Hub ecosystem provides these opportunities.

- **Feedback on products and services:** start-ups value the opportunity to test and receive feedback on their products and services.

2. **Current and potential employees' value drivers**

- **Stable and sufficient income with job satisfaction:** interviews with employees in digital enterprises reveal that due to their specialized skills and generally low employment opportunities and the high level of informality in the digital economy, they highly value a well-paying and stable job. However, unlike other industrial sectors, skilled employees in the digital economy attach greater value to job satisfaction and the opportunities for learning.

- **Work environment:** employees in the digital economy attach greater importance to a work environment that provides opportunities for interaction with others in the field.

- **Access to work place:** employees specializing in digital technologies tend to prefer to work in cities and in close proximity to social amenities, which explains the reluctance of many digital entrepreneurs to locate in the ICT park despite the subsidized rental for office space and cost of electricity.

6.5 Operating the ICT park as a Digital Innovation Hub

A more specific way in which the ICT park can promote digital transformation at enterprise and national levels is by operating as a Digital Innovation Hub, broadly defined as an ecosystem that stimulates digital innovation and supports digital enterprises to manage their digital transformation. In other words, the ICT park should reframe its current operational modality and become a place where local and foreign digital enterprises cluster, digital technology entrepreneurship is developed and all sizes of digital enterprises gather and innovate. The value and effectiveness of the Digital Innovation Hub emanates from its unique position as an ecosystem that hosts foreign as well as domestic investors, large as well as small digital enterprises, start-up companies and incubators to assist tenants with innovation, marketing and business facilitation.

Digital Innovation Hubs come in different forms and their creation may proceed at varying speed. They are found in advanced economies as well as newly industrialized economies and low-income African countries. For example, in some developed economies, Digital Innovation Hubs operate as one-stop-shops which help companies to digitalize their products, processes, and services through the use of digital solutions and digital technologies.[50] At their core are R&D institutes and university labs, which collaborate with tech entrepreneurs, incubators, relevant public institutions, etc. to provide small and medium-sized firms with specialized services.

Low-income developing countries such as Ethiopia, by contrast, cannot afford to spend vast amounts of money on Digital Innovation Hubs. Consequently, such Hubs have to be established at different scales and different forms than those found in advanced economies. Fortunately, however, there are successful examples from countries at different stages of development that can provide useful lessons for Ethiopia. A good example is the transformation of the city of Shenzhen in China from a small fishing village to a leading Digital Innovation Hub in less than forty years. The twenty-first century Shenzhen – a large city hosting leading global digital corporations and competing with Silicon Valley – is completely different from the Shenzhen of 1980 when an ICT park was established to encourage digital entrepreneurship and attract foreign firms to assemble electronic products and engage in digital innovation. Shenzhen's transition from a small economic zone aimed at promoting digital enterprises into city-wide

[50] https://ec.europa.eu/digital-single-market/en/pillars-digitising-european-industry-initiative

Digital Innovation Hub is inspirational and has important and relevant lessons to Ethiopia, especially if Ethiopia wishes to transform the ICT park into a Digital Innovation Hub.[51]

A key element in Shenzhen's initial stages of development and an important driver of its growth and contributions to digital transformation has been the support given to digital start-ups along with attracting foreign investors. Leading digital companies from US, Europe and Japan and other foreign start-up companies were encouraged to move to Shenzhen and operate alongside Chinese start-up companies. Financial support to local start-up companies was provided by the government along with financial support to incubation facilities established within Shenzhen to assist the start-ups.

Thus, unlike the ICT park in Ethiopia where the focus has been primarily to attract foreign investors, in Shenzhen the business model has been to create a cluster or agglomeration of digital enterprises – of all sizes and origin - and create an innovative environment where progress is made through exchanging of ideas, inter-firm interactions and learning and innovation. This created an open and collaborative innovation environment where anyone can have an idea prototyped, tested, and marketed at an affordable price. The lesson from the Shenzhen experience is clear – Ethiopia can transform the ICT park into a Digital Innovation Hub without compromising its current goal of attracting foreign investment into the park. The requires, however, treating the ICT park as an open innovation ecosystem that promotes collaboration among digital entrepreneurs.

[51] See, for example, O'Donnell, A, Wong, W and Bach, J (2017) (eds) "Learning from Shenzhen: China's Post-Mao Experiment from Special Zone to Model City". Chicago: University of Chicago Press.

7. Recommendations and Implementation Roadmap

The main rationale behind the development of industrial parks, is to create a conducive space for investment to come in and to commence production activity. It is a common conviction that this approach has been instrumental in the improved performance of the country to attract amounts of FDI relatively commensurate with the size of its population and economy (Figure 22). This trend is recorded in the increase of investment to the country since the first private and public industrial parks became operational around 2012. A defining feature of industrial parks is that they have all the necessary infrastructure to enable their tenants to quickly transition from establishment to operation. The availability of plug and play production spaces, buttressed with the right mix of policy and regulatory framework, is expected to lead to increased investments from abroad as well as from domestic investors.

Yet, as has been documented in the earlier sections, the ICT Park cannot be said to have the necessary infrastructure in place, nor the right policy and regulatory framework to unlock investment bottlenecks. In addition, the expected benefits from investments in the form of transfer of knowledge and technology and linkages to local industry, and in the fostering of innovation cannot be realized under these conditions. As has been indicated in previous sections, the Park is run in the same manner as any of the country's industrial parks, with no sufficient consideration given to the unique requirements of the sector. It lacks an independent management and a business plan that can help foster innovation and continuous upgrading of vital park infrastructure.

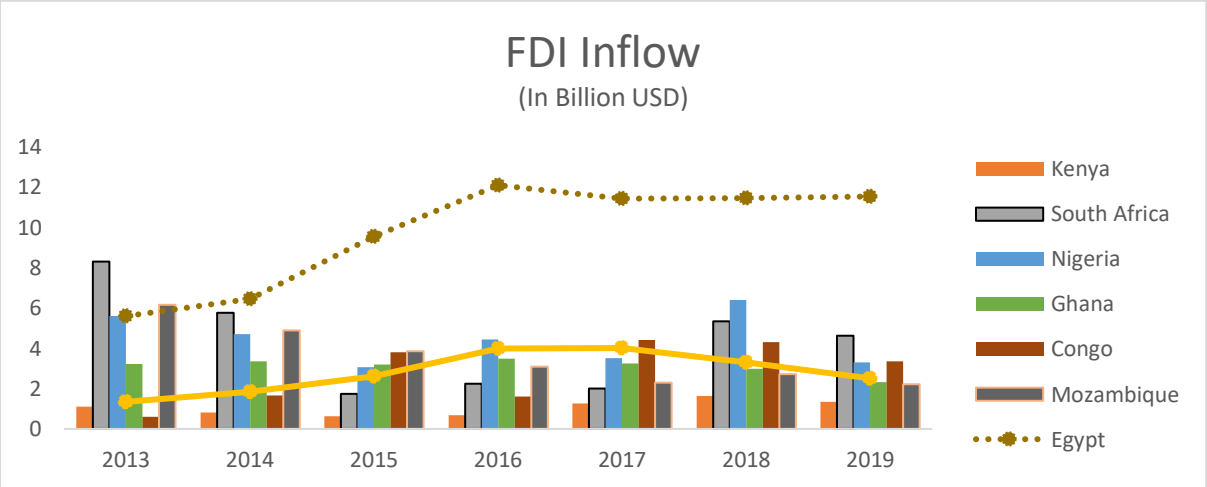


Figure 22 FDI Flow, Africa (2013-2019), UNCTAD

7.1 ICT Park Strategic Views

ICT Park Vision, Mission and Values

Vision

'To establish Ethiopia as the premier IT hub of Africa'

Mission

- "To provide impetus for the development of ICT sector in the country by offering a world class business environment along with a conducive policy and regulatory regime, state-of-the-art infrastructure and a value proposition geared towards positioning Ethiopia as the preferred IT hub of Africa".
- "To create a destination for overseas investment and on-going generation of foreign earnings".
- "To create employment and career opportunities for Ethiopian citizens".
- "To create a system that could contribute on building knowledge economy".

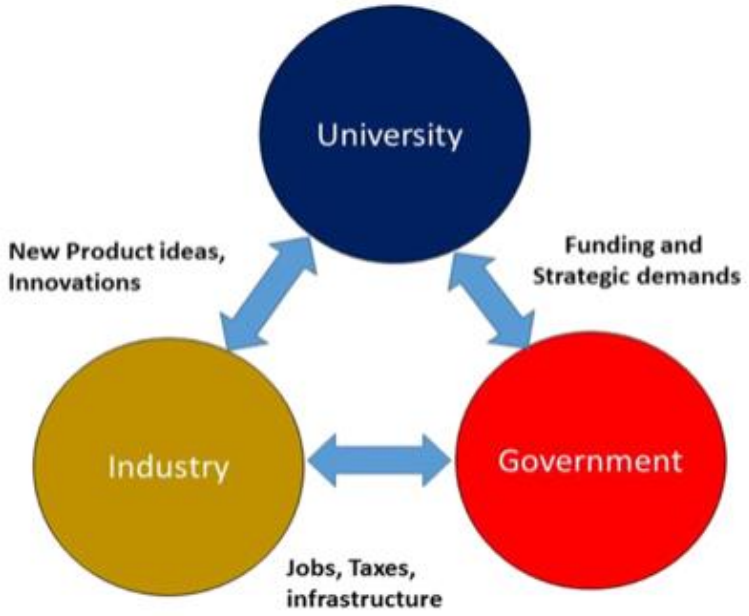
Values

- Innovativeness
- Business mindset
- Quality service

ICT Park frame work

It has been proven through many studies that local sustainable economic development is promoted through various initiatives that link universities, government and industries (UGI) (Etzkowitz and Leydesdorff, 1995; 2000) leading to the creation of technology parks (Afonso et al., 2010). Countries which have not advanced in linking the three (UGI) have yet to realize that although scientific research can be powerful, it is not the only organized human activity that produces sustainable innovation ecosystems relevant to the development of viable economic policies that meets societal needs (Gibbons et al., 1994; Carayannis and Campbell 2006). It is an almost common consensus that development arises as a result of cooperating and strategically consulting specialized productive units that are complementary.

The triple helix innovation model based on strategic interactions of UGI has played both integrated and overlapping roles for the benefit and sustainability of economic development in many countries. Analysis showed that economies where the triple helix has been operational had knowledge-based development and have created industries that are innovation-driven.



The ICT park having an intention of "digital innovation hub"; highly require the integration of these non-interchangeable parties. The success stories behind technology parks only further shows the collaboration of the three parties is undeniable.

The network of university-industry-government relations continuously restructures the opportunity matrix of a complex system which itself is the result of the reconstruction from different angles by each of the participating instances. All agencies are embedded in discourses at different levels, that is, within their respective institutions, at the specific interfaces between the helices, and at generalized levels where third actors may come into play.

The Academia would generally serve with the production of quality human capital which is the engine of any park whatsoever, this continuous production of equipped human capital would assure the sustainability of technology park. The impact of having the academia in this framework is not only limited to the production of technical force but also to enhance the innovative capacity of the environment.

The Government is going to be responsible for most of the administrative and regulatory matters in this model. In this case the government is responsible for placing the necessary infrastructures, incentives, policy, funding, operational matters etc.

The Private sector is where the expectation lays to bring the experience of embedding the soft values to a practical form of execution. It would be responsible to create jobs, knowledge transfer, taxes, new products or services.

Indicators

- Job creation
- Attracting FDI (Import substitution and export)
- Knowledge transfer

Focus Sub-Sectors

- **ICT manufacturing**

The ICT manufacturing basically involve the production electronics like telephone handsets, telecom network equipment, PC assembling units etc. but the target behind integrating this specific sub-sector to as part of the park was to bring the incorporation of software to the hardware.

One of the key objectives in making investments towards this vertical is to "strengthen the R&D efforts in Ethiopia, and provide an impetus to build world-class manufacturing capabilities in the Telecom and IT Hardware Equipment Space not to mention the job creation it brings.

- **IT enabled services ITeS**

IT Services a set of related components that support one or more business processes. That shifts the perspective from managing IT to managing IT as a service. Companies that outsource IT functions save between 12% and 17% of the cost of doing the work in-house.

The term ITES defines outsourcing of enterprise wide processes which can be enabled with information technology and cover diverse business lines such as finance, HR (human resource), administration, healthcare, telecommunication, manufacturing etc. These services are usually delivered to remote areas through the telecom and Internet medium and imply transfer of ownership and management of the process from the customer to the service provider. The concept of ITES started with the drive from global companies to become cost efficient. In an attempt to stay competitive, the corporate players restructured their businesses in such a way that they could concentrate on their competencies and outsource processes which were not core to their business.

According to ITeS sector scan some of the IT enabled services that show promising potential to our country include the following:

- **BPO/KPO**
- **Application development**
- **Applications maintenance**
- **Data center Infrastructure management**
- **Systems integration and consulting**
- **E- Commerce**
- **Fin-tech**

- **Digital technology entrepreneurship (Start-up Incubation)**

Technology entrepreneurship is the birth of new enterprises that create value through an innovative technology idea. More specifically, technology entrepreneurship is the process of transforming a technology idea into an enterprise. The experiences of many successful economies show that for digital transformation to take place digital knowledge should be accumulated; In order for the park to be digital innovation hub focusing on technology entrepreneurship is inevitable; thus, tasks that involve supporting start-up would assure the digital innovation we look forward to.

ICT Park Pillars

The ICT park's vision to started out with the vision of becoming a "premier hub for ICT in Africa". At its current state, it is difficult to say that it is even a full-fledged ICT park that could serve as a base for foreign and local investment in the ICT sector. Much of the interest in the park is in the expectation that things will change for the better. However, for that to happen, the work of bringing the ICT park to a state that is a "viable' destination for investment in the IT sector, has to start with strengthening the strategic pillars and planks of the park. These strategic pillars represent the areas of intervention that are crucial to sustain and develop the vision behind the ICT park to fruition. This strategic pillars and planks are Infrastructure, Business, Innovation, and Governance & Management; while collaboration is recognized as a cross-cutting issue that cuts and links not only these pillars but also one of the main reason investors locate in such compounds is the possible network of collaboration in place. Without these pillars collectively linked and strengthened with a collaborative working relationship, the pillars cannot reinforce each other, and will fail to uphold the vision of an IT park and to convert it to action.

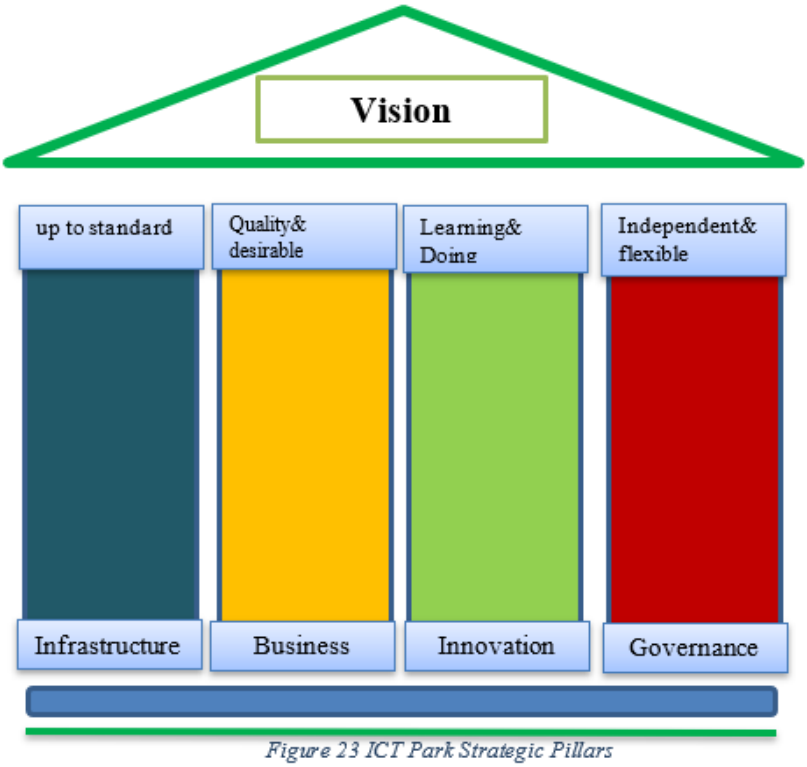


Figure 23 ICT Park Strategic Pillars

Figure 23 ICT Park Strategic Pillars.

Over the course of the study, it has become clear that without immediate and robust intervention on these strategic pillars the park will continue to exist in its current state sub-optimal state, while the little installed capacity of the park will only degenerate under the forces of rapid pace of innovation that makes the already existing physical IT infrastructure obsolete. The park as a whole will also not be able to generate the jobs that were planned to be created for the sector and will remain ineffective as an investment promotion tool that can attract quality investment that creates innovative and dynamic industry in the ICT sector.

More important to outline is the need of collaboration of public and private stakeholders across all pillars, and the central and indispensable role that this has to the future of the park. Collaboration is a running theme in solving the current problems of the park, and is a strategic plank, in whose absence the recommendations outlined below will not be effective. The need for active involvement of crucial stakeholders and collaboration amongst is further highlighted in the recommendation of the Governance and Management Pillars, and the institutional adjustments required to sustain the plank of collaboration.

To promote collaboration among the players within and beyond technology park, ICT and digital solutions to connecting parks internally and externally should be explored. Furthermore, collaboration should be looked at beyond the parks. A few good examples of this are available. The Hong Kong Science Park indicates that its international collaboration and business development team "aims to build up and foster the international community at Hong Kong Technology Park, by reaching out to connect, building relationships for collaboration, and realizing results to catalyse values". In Thailand, Tokyo Tech was invited to open its office in the Thailand Science Park to support the development of specific areas of science and technology personnel in the country. To deepen the collaboration, experts or managers from other countries may be invited to join the board or management team of Tech parks. The rationale is that these experts or managers may bring new ideas and management expertise.

A. Infrastructure

Although, there are a number of sector-wide issues that account for the lacklustre performance of the park, the considerable deficit of vital infrastructure to the park plays a major role. It is also an issue that has been expressed by park management, park tenants and also prospective tenants to the ICT park. Amongst, the challenges that have come from the IT sector companies that have chosen not to move into the park is the lack of power supply and a truly redundant internet connectivity stand out. Other infrastructural challenges relate to the lack of amenities such as transportation to the park, the lack of restaurants and cafeterias near or in the park, underdeveloped services and the limited bandwidth capacity at the park and independent utilities like its own bore hole, commercial sewerage, class A buildings, E-waste management etc. system are major deficits that have a direct impact on the desirability of the park as a place of work and business, let alone a space for innovation and dynamism.

Flag ship activities

i. Alleviating the connectivity issues

Infrastructure as a major foundational element in developing ICT Parks will have to be addressed with the highest priority and with much urgency as possible. As such, different plans to build to highest quality is detailed in the planning section of this report. Nonetheless, in light of recent development in regulations, policies, strategic directions of the government and mainly the COVID-19 pandemic worldwide, these flag ship activities are added as a priority matters to be delt with swiftly along with the detailed plans. As a result, both soft and hard infrastructures assessed as mandatory to address the issues along with recommendations are listed below.

Short-term (6 to 12 months)

- Conduct a swift operation to provide unlimited and redundant connectivity to internet
    - ✓ Conduct a quick survey of the existing connectivity infrastructure enough for design decision making
    - ✓ Perform need survey analyses enough for current as well as resisted new tenants in the park
    - ✓ Collaborate and sign an SLA (service level agreement) with Ethio-Telecom to provide the highest connectivity speed available.
    - ✓ Renovate current buildings to Class A or highest quality as possible
    - ✓ Provide moderate amenities such as Cafeteria, ATM services, green areas, bus services and others as needed.

ii. Addressing Necessary requirements for playing a leading a role in digital 2025 agenda

As the world is entering a new era at all ends, the Ethiopian government seems to understand the only way to cope with the pace in which the globe moves are to adapt to changes in all fronts and take swift actions as needed. Based on this assumption among the immense actions being taken by the government is the adaption of new policies and strategics in across arenas of different sectors. Amongst, Digital agenda 2025 is the major of it. In this strategy, the government is planning to transform different economic sectors using ICT and technology. With technology being at its centre of this plan the government devised four path ways as a basis for progress.

- Pathway 1: Unleashing value from agriculture;
- Pathway 2: The next version of global value chains in manufacturing;
- Pathway 3: Building IT-enabled services; and
- Pathway 4: Digital as a driver of tourism competitiveness.

In addition, the plan entails and considers Digital ID, Digital payment, Cyber security as enablers. Although the document suggests a considerable number of duties the ICT Park should play in the overall scheme of the plan, it is this study's strong recommendation that the park must place its self at the front of the battle to achieve this agenda. The ICT Park ought to play a major role and be the breeding ground for most of the activities suggested in the document by providing necessary conditions needed. By making Pathway3 as a major focus the following activity suggestion are made.

Short-term (6 to 12 months)

- Providing necessary conditions for the achievement of the digital agenda 2025
    - ✓ Conduct an overall survey of the basic needs behind the digital agenda
    - ✓ Prepare specific lands for Data Centers to be built specifically assigned to the need of the digital agenda
    - ✓ Collaborate with ministry of peace and MINT to build/provide exclusive data centers to be used for digital ID, e-government and other government activities
    - ✓ Collaborate with MOFED to establish a platform and infrastructure to be used for e-commerce inside the park
    - ✓ By making e-government, e-commerce, digital id a priority dedicate an exclusive infrastructure for this service.
    - ✓ Collaborate with national bank of Ethiopia to establish a center that can help improve digital payment systems by providing datacenters and such
    - ✓ Develop standard IT manuals, Data center regulations, world class cyber security firewalls and instructions by collaborating with relevant ministry offices with the like of INSA

B. Business

A Technology Park has to succeed in a competitive business environment even though some of its goals are different from those of simple commercial schemes. It has to be responsive to fast changing technologies and businesses working in these technologies. To provide this these sites need to have a flexible culture with the capability of making quick decisions and following them through in a business-like manner.

The business strategic pillar aims at the prioritization of target subsectors for promotion, the identification of investment bottlenecks and the processing of investment vetting, regulatory matters that would even place the park as a policy sandbox, financing approaches and last but not least revenue generation.

Regulatory framework

The success of digital technology hubs depends on how effectively they create an environment conducive to business development. State policies and regulations can significantly contribute in this direction by:

- Simplifying the regulatory system to facilitate the registration costs and time for starting a business;
- Encouraging the creation of flexible funding mechanisms, including venture capital funds, loan-guarantee schemes, etc;
- Providing tax incentives for corporate and co-operative research and venture creation;
- Strengthen the legal system to protect business rights and intellectual property.

Financing

The existence of well-developed facilities and strong technological talent is one of the conditions for the success of technology parks. Another is availability of financing. There are basically four models to structure the financing of a technology park/incubator (Lalkaka, 1996).

One is for the state to cover the initial investment and then let the park/incubator meet all operating cost on a fee-for-service basis. The other is to cover both the capital and continuing operations as a social investment. The third is to structure the park as a private, for-profit, real-estate based undertaking. The fourth model is for a public-private partnership, whereby the state meets capital and initial (3 to 5 years) operations, on the premise of inviting the private investors to play defined roles in the park.

In Ethiopia's ICT park case the last couple of development years shown the government was the sole investor; moving forward the suitable approach of developing the park is indicated to be the PPP approach where the government's role on the investment would be minimal.

Investment promotion

For an effective Investment promotion, it is recommended that ICT manufacturing and ICT services are approached as two distinct strategic sectors due to the distinct nature of the two sectors. ICT manufacturing and services have different value propositions, different sector growth drivers and location decision factors, distinct audiences, and varying industry challenges. Thus, proper segmentation, sector prioritization and targeting play a key role to successfully promote the sectors. Also, different sub-segments of both the manufacturing and services industry have their specific opportunities and challenges. For instance, in the manufacturing segment investment short- term potential lies in developing computer & computer equipment, communication equipment while in services with the aspired reforms investment potential lies in IT applications development, non-voice Business Processes and e-commerce.

To become a regional or global player, the desirability of the sector to Ethiopia and the attractiveness of Ethiopia as a preferred destination to investors should be assessed. On a sector-scan conducted on the sector (specifically focused on services), the sector is desirable to Ethiopia as it is completely aligned with the developmental goals of the country, its capacity to create quality jobs, the sectors enabling factor, export potential and in nurturing local entrepreneurship and value. However, looking into the attractiveness aspect, limited

infrastructure (telecom, power, and limited services in ICT park), legal and regulatory barriers, and talent gaps are major challenges. The assessment indicated that all the sub-sectors of the ITeS industry are of high potential for investment promotion but that the attractiveness to the investor is not sufficient to position the industry as "promotion-ready'' yet.

Investment promotion of the IT sector should start by segmenting the sector and having a clear value proposition in each sector and in the sub-segments. The first phase of the promotion strategy should focus on advocacy and pro-active aftercare program and creating effective partnership and stakeholder alignment. The next phase will focus on an active outreach program. It is important to note that the required infrastructural and legal and regulatory reforms are realized to make the sectors investment promotion ready – thus the short-term recommendations are aimed at addressing such obstacles and require collaborative efforts.

Investment Selection and Vetting Process

The quality of an investment and the type of activity an investment engages in will be critical in the overall transformation of the industry as well as success of the ICT Park. Based on the IT industry segments identified as a priority for the Park, all investments that seek to operate within the compounds of the park must therefore be engaged in activities listed within those industry segments. It is envisioned that there will be two pools of investor types that will have an interest to operate at the Park; targeted investors identified by the Park, and non-targeted investors, which have similar calibre and quality as those targeted. In either scenario, it is important that the investment selection process is thorough, transparent, and in line with the overall objectives of the ICT Park specially aligning every investment to innovation and R&D wing would have to be mandatory if creating knowledge economy is the target.

In order to have a streamlined process and an efficient means of processing requests from investors, there is a need to have a company selection guideline. The guideline will need to be very specific in describing each aspect of the selection process. The initial vetting process will start at the sub-industry level and whether activities fall within the prescribed industry segment. Following industry segment qualification will be the quality of the investment as proposed in the business plan and whether it supports the objectives of the Park, and lastly will be a firm level due diligence to assess the investors profile and experience. It is highly recommended that as part of the selection process, each of the investments considered be evaluated based on a standard scoring test. The criteria will consist of key questions that will allow decision makers the ability to rank each investment without bias, and more importantly, whether it fits with the scope of the Park's vision to attract sought after investment types.

Generating revenue

The sustainability of a digital technology hub depends mostly on its tenants. This is the (often underestimated) key to a successful park. Tenants are the most important source of revenues from the use or sale of physical infrastructure (rent, use of telecommunication facilities, purchase of land or offices) and from access to technical (congress hall, training rooms) and technological facilities (testing, experimentation, and research). Tenants are also the most important marketers of the park's strategic approach and services. The types of indirect marketing provided by tenants include word-of-mouth with their suppliers, clients, and partners, feedback and references provided to potential entrants in the park, and their guests' perceptions of the park's infrastructures and services.

Technology park management should have mechanisms to facilitate revenue collection. The management should be able to set up differential pricing policies for start-ups or relatively small enterprises (lower charges, delayed payment terms, grants) and to design specific service packages to attract large multinationals (ease of access to facilities, testing, and intellectual property). The inability to meet sustainability targets can lead to financial difficulties and to a reduction in services to tenants. In this context, the Park should have a proper feasibility study completed with financial modelling to understand projection of funding needed, including project capital and operational expenditures, revenue streams and Return on Investment (ROI). In addition, the financial model should contain an analysis of available sources of capital and of the project's proposed financial structuring model, as well as the financial sustainability and financial stakeholder risk-sharing mechanism.

Flag ship activities

i. Creating conducive business environment and model

To ensure the success of the ICT Park understanding the nature of the business and creating the environment where by the business activities can flourish is essential. Though, a detailed plan on how do it is covered both in the recommendation and planning section of this study, major issues that needs swift measures are selected to guarantee its success.

Short-term (6 to 12 months)

- ✓ Develop and state precise land pricing schemes to investors
- ✓ Target specific ICT industries that align and help with the digital agenda
- ✓ Approach aggressively local e-commerce companies to join the park
- ✓ Design and allocate logistic spaces specifically to be used by e-commerce tenants
- ✓ Invite existing service giving and shared economy local companies to the park

C. The Innovation Pillar

As shown in this study, the ICT park currently operates as a traditional industrial park rather than a technology park with innovation at the centre of enterprise development and inter-firm interaction within the park. The main operational functions of the park at present are leasing land and renting offices to investors, particularly foreign companies, that wish to initiate IT-related activities in the country. Thus, in its current status, the ICT park resembles a real estate manager than an IT park with the potential to promote the country's newly instituted digital transformation strategy. As already noted in this study, the two important driving forces of digital transformation are innovation and upgrading of digital technologies. It is through continuous innovation and effective application of digital technologies that digitalization makes businesses, communities, societies, agriculture, the manufacturing and service sectors, and the environment efficient and generate economic value. This makes innovation a critical requirement for digital transformation and an important pillar of the ICT park, especially if the park is to contribute towards the digital transformation strategy.

Following this logic, it is evident that the only way the ICT park can contribute towards digital transformation is if it operates as a 'Digital Innovation Hub' and functions as a self-contained ecosystem encompassing all the essential digital infrastructure and skills needed to promote digital innovation and develop an inclusive digital economy. The experiences of many successful economies show that for digital transformation to take place, many players in digital technology – for example, local digital enterprises, start-ups, multinational digital corporations, private incubators, etc - have to come together and work within proximity to make digital innovation possible through inter-firm cooperation, learning by interaction, exchanging ideas, providing IT-related services and working in a digital environment that stimulates and supports innovation. The ICT park should be able to provide such innovative environment.

D. Governance and management

As highlighted in this study, the experiences of other countries show that the governance and management of ICT parks (or technology parks) often require more diverse skills and competencies than often required for managing industrial parks in manufacturing sector. Addis Ababa ICT park is overseen by MINT and administered by IPDC, managed by the same management and administrative principles as the other publicly owned industrial parks in the country. Digital technologies are fast-changing, complex and multi-dimensional and understanding their multifaceted aspects requires remaining up-to-date on frontier digital technologies.

Countries have implemented alternative science park ownership and management modalities to nurture ICT services and fast-track investments in addition, governing and managing an ICT park or DIH requires the ability to adjust a strategy to constantly and rapidly evolving technological environment, and capacity to provide effective services. This necessitates assertive and flexible governance system responsible for setting strategic direction and a dynamic management skill to leading park operation. Such a requirement makes assembling the right types of governance structure and management skills difficult for countries at an earlier stage of development.

It is indicated in studies including the one WIPRO/ CISCO done for this ICT park that, one possibility is to acquire - on a contractual arrangement – an international management company with specific experience in the ICT sector and proven record of managing ICT parks reporting to an apex structure that can be comprised of public and private stakeholder to lead strategic and policy direction.

Though private sector operating the park is one way of managing the park , experiences show that there are also successful parks that are led by government; if that is the case, it is imperative that the ICT Park is managed with a large degree of independence that allows its management to address not only the park's own peculiar infrastructural and managerial needs.

Management/ operation

The ICT Park will have a significant role to play in the development and transformation of the IT industry as well as economic and skills development of the country. The Park requires significant amount of financial resources to fully develop its infrastructure to make the Park an attractive home for IT related operating companies.

Industrial park projects can be financed through direct or indirect public sector investment, including through direct allocation of national budget or indirect investment through public enterprises, commercial debt financing or equity. Although the primary project off-take or revenue stream is derived from plot and facilities rental (or land lease) income collected from the users, various other industrial park "value added services" can also prove interesting as supplementary revenue streams.[52] As it is currently structured, the Park is designed to have a cost recovery system by renting or leasing space and land at its facilities. The IT Park is treated as a cost centre. Revenues generated from the Park should be credited to the Park. This structure eliminates the long-term financial sustainability for the Park and disincentives it from engaging in innovative means to generate additional revenue. Thus, it is highly desirable if the Park has autonomy in the management of the Park as well as decision making abilities in utilization of financial resources. In order for this to take place, the IT Park will have to be managed and operated independently to make swift decision and have its own financial resources, albeit with IPDC having supervisory role.

The management of science and technology parks is much more like that of business than of a university. It is strongly recommended that a management model is based on the principles of managing a business. A good example is land pricing; almost in all the rest of industry parks pricing is/was cost-recovery model, which determine land and rental prices. This, in the past, has proven to be a model that is not viable, as some industry parks had to revise and restructure the rental pricing to the disappointment of investors. Pricing adjustment had to be made because the development cost of the parks and the initial pricing structure did not allow for a full cost recovery. Since there a significant amount of infrastructure cost is anticipated for the IT Park, it validates the case to develop a financial feasibility study to determine pricing both for land as well as space leasing. Thus, it is essential to develop a pricing structure based on market and service provision that will enable the Park to recover its costs as well as generate additional revenues to make it financially sustainable.

[52] UNIDO – International Guidelines for Industrial Parks.

7.2 Implementation Roadmap

The subsequent sections will elaborate and list action lines for the short (1 to 2 years), medium (2 to 3 years), and long term (4 to 5 years), and the lead agencies.

Infrastructure

INFRASTUCTURE					
s/n	**Sectors**	**Short Term**	**Medium Term**	**Long Term**	**Responsible Body**
1	Energy	-Commissioning the ongoing 10 MW dedicated line -Tap on the new two substations under-construction for supply and redundancy -Equipping every building with redundant generator -Develop a business plan to increase the financial sustainability of the park, as a provider of reliable and safe power supply -Map infrastructure deficits relating to power across the park -Identify blind spots within the park that	-Study source of energy (preferably renewable) -Explore PPP approaches to meet future power needs, especially if the park is to focus on hosting large data centres, -Ensure the financial sustainability of the park, by reviewing the commitment of supplying power against the future price of power by power suppliers	-Sustainable energy supply -Develop the park as an energy efficient park, by increasing energy efficient and energy saving technologies	**IPDC/ICT PARK**

		require additional park-level infrastructure			
2	Telecom	-Allocating VSAT -Put in place a plan to increase VSAT internet bandwidth capacity -Assuring redundancy through the upcoming service providers	-Sustaining alternative connectivity -Expansion of telecom infrastructure -Exploring business opportunities in the telecom industry	-Explore avenues of reducing the cost of redundant internet supply in the long run through introduction of newer and innovative sources of connectivity -Install the necessary infrastructure to become a virtual internet supplier	**IPDC/ICT PARK**
3	Water	-Adopting extensive rain water harvesting system -Study ground water potential	-dig a borehole that would serve the anticipated population	- sustainable water system	**IPDC/ICT PARK**
4	Roads & Transportation	-Finalize the ongoing and extension projects -Study on next projects -Identify stakeholders that can help improve the transportation link of the park to the city	-Avail internal transportation system -Proceed with further constructions -Advocate for the construction of the ICT Park & Bole International Airport Road link by integrating it with the policy focus on the ICT sector and its immense potential for job creation	-Interconnected sustainable road over the developed section of the park	**IPDC/ICT PARK**

5	Waste management	-Drafting e-waste protocol -Studies on overall waste estimation and plans to handle it.	-Laing separate lines for sewage and sullage	Establish e-waste treatment unit	**IPDC/ICT PARK**
6	Building plans	- Study the next building business models (should the government build?) - Setting building standards - building fence - land scaping and zoning Establishing the existing social infrastructures	-Availing class A buildings as plug and play spaces -Building utility infrastructures based on the studies	-Establishing social and commercial infrastructures (schools, hospitals, day-care, etc.)	**IPDC/ICT PARK**
7	Disaster management	-Reinforcing fire station in Bole Lemi Park -Establishing health units		-	

Business

BUSINESS					
s/n	**Sectors**	**Short Term**	**Medium Term**	**Long Term**	**Responsible Body**
1	Investment Promotion	- Design and launch an advocacy program, rebranding the park - Identify and create alignment of stakeholder (government, academia and private sector) - Develop a proactive aftercare program -Establish a One Stop Service Shop at the ICT Park	- Create partnerships and country branding - Establish an outreach and partnership office to enable the efficient recruitment and skilling of IT park personnel	- Consolidate and integrate on park aftercare services into the park's services - Incorporating investment promotion of the park in sector leading institutions as core business - Attract high profile and well-known individuals in the sector (preferably Ethiopians) from all over the world; the market would follow	**EIC, IPDC, ICT park**
2	Investment selection and vetting	-Develop an investment selection guideline -Develop a firm level evaluation scorecard - Review of existing pipeline companies and communication to affirm interests -Categorizing companies in a desirable / non-desirable bucket with	-Evolve the selection process to digital and online based to have efficiency and to eliminate the need to have a manual processing - create a system where investment is not only handled when it comes but is haunted	-Balanced environment among involving parties (Anchor companies, local companies, start-ups, academic sections of the park)	**IPDC/ICT park**

		respect to the existing resource			
3	Regulations and policy packages	-Develop protocol for operation tasks (space pricing, service manuals like colocation, cloud service, VSAT and other connectivity services) -Working on some telecom regulations -Intellectual property right is one of the major investment attraction factors in such parks; working on putting such safety nets are mandatory. -Identify policy and regulatory challenges that act us bottlenecks for operation of IT businesses - Setting attractive and talent driven incentives	-Set up innovation-driven carrier development program around existing key ICT industries, strategic emerging industries, and future industries inside ICT parks. -Designing targeted polices such as technology financing policies, intellectual property mediation services, carrier development sponsorships, can intensify the innovation-driven development in a high-tech zone. -Putting in place subsidy schemes for selected hi-tech innovation activist that will have significant spill-over effect in the local ICT industry and for export Reducing the minimum investment threshold (20,000USD) adapted to the dynamism of IT start-ups.	-Dynamic regulatory environment that would catchup with the sector - Sub-sectors that are new to the country (e-commerce, fintech, data protection, cybersecurity etc.) needs to be treated as soon as they surface themselves	**MINT, EIC, IPDC, ICT park**
4	Financing	- Study possible business model and choosing appropriate financing approaches for every sub-sector	- Execution of the possible business ideas that were set in the short-term plan needs to start here in the midterm; this is where the base for		**IPDC, ICT park**

		- Knowing possible investment expenses, breakeven points, return of investments - at the end of the day the park is corporation so studying possible revenue generation schemes is necessary	sustainable business could be tested - Assess and design Private Equity / Venture Capital -Training-related incentives to compensate training costs		

Innovation

INNOVATION					
s/n	Sectors	Short Term	Medium Term	Long Term	Responsible Body
1	Talent pool	- Identification and targeting of innovation activities - Business development advisory service - Create an environment that would be suitable for incubators and accelerators	-Establishing excellency centre that creates the necessary human capital for the industry - Mobilize resources from the government and private sources to finance the incubation programme.	-Consolidate the operation of the ICT park as a Digital Innovation Hub	**ICT park**
2	Integrated innovation	-Set protocols that oblige every investor to have innovation/ R&D wing in their business	-Put incentive packages for R&D tasks with in companies and for R&D firms	-Consolidate the operation of the ICT park as a Digital Innovation Hub	**ICT park**

Governance/Management

GOVERNANCE					
s/n	Sectors	Short Term	Medium Term	Long Term	Responsible Body
1	Governance	-Assess applicable DIH management alternatives, consult international technology park managers including firms and MNC with the appropriate experience and technical prowess, and endorse the feasible park management way-forward. -Identify applicable management and ownership structure considering Ethiopia's PPP proclamation, and the park actual and potential profit generation capability. -Establish a joint committee that would help with the administrative roles of the park (government, private sector and academia)	-Identify balance between financial and wider economic development objectives and targets considering sector focuses - Negotiate and attract firms and individual experts to park administration and management opportunity, develop an agreement with the special Governing Board having detail milestone and endorse implementation with the selected technology park operator.	- Establish the IT Park as a reputable destination of investment and a as the country's premier Digital Innovation Hub	**IPDC**

2	Management	-Set up a dedicated line of communication with park operation and maintenance service providers and external stakeholders -Ensure system of maintenance and upkeep has a higher quality grading that is approved by park tenants -Set up a customer service centre at the park, and a dedicated hot line -Review and analysis of current management structure, particularly in financial management and decision-making process.	-Establish a park tenant and park management joint committee to oversee and monitor the quality of services at amenities in the park -Introduce higher quality standards for solution providers in collabo-ration with park tenants and other solution providers -Encourage private sector solutions providers to upscale and provide quality service by introducing subsidised rent, and other incentives, along with the inputs from park tenants and park stakeholders		**IPDC, ICT park**

Stakeholders and responsible bodies

Agency	Responsibility	Jurisdiction
EEP	Generation, transmission & distribution & collection of tariffs of electricity and other regulatory controls	Up to sub-station of user
EEU		
AAWSA – Water Supply Division	Plan, design, fund, execute, maintain water supply networks and supply of water & collection of tariffs	Up to sump within the user premises
AAWSA – Sewerage Division	Plan, design, fund, execute, maintain sewerage networks and conveyance of sewage & collection of tariffs	Up to park boundary
ethiotelecom	Plan, design, fund, execute, maintain the telecom network and collection of tariffs	
Addis Ababa City administration	Collection, transportation, treatment & disposal of Municipal Solid Waste	Up to park boundary

IPDC
Industrial Parks Development Corporation
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INDUSTRIAL PARK ORIENTED ENTERTAINMENT CENTER

BUSINESS PLAN

JICA EIPP

Prepared by:
Japan International Corporation Agency
Ethiopian Industrial Park Promotion Team

October, 2020
Addis Ababa, Ethiopia

BUSINESS PLAN

for

"Addisu Gebeya "High-density Mixed-Use Building Project

Business Promoter: Industry Parks Development Corporation /IPDC/

October, 2020

Addis Abeba

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Acromyms

BoD	Board of Directors
BOO	Build-Own-Operate
BOOT	Build-Operate-Transfer
BTO	Build-Transfer-Operate
CEO	Chief Executive Officers
CSA	Central Statistics Agency
DBFO	Design-Build-Finance-Operate
DBOT	Design-Build-Operate-Transfer
DCMT	Design-Construct-Manage-Transfer
EIC	Ethiopian Investment Commission
EIPP	Ethiopian Industrial Promotion Project
ETB	Ethiopian Birr
FIRR	Financial Internal Rate of Return
GE	Government of Ethiopia
HPR	House of Peoples Representative
IP	Industrial Park
IPDC	Industrial Park Development Corporation
IPRB	Industrial Parks Related Business
JICA	Japan International Cooperation Agency
MoA	Ministry of Agriculture
MoUDC	ministry of Urban Development and construction
MSEs	Micro and Small-Scale Enterprises
NPV	Net Present Value
PLC	Private Limited Company

PMO	Prime Minister Office
PPP	Public-Private-Partnership
USD	United States Dollar

EXECUTIVE SUMMARY

The demand for building spaces is influenced by different variables. This variable may incorporate relative value, proximity to city centers, availability of infrastructure and market-related variables. The interest from building space comes mainly from residential and non-residential uses. A large part of the demand from non-residential building spaces comes from shopping complexes, retail outlets, business offices, and from entertainment centers.

The most important factor in the demand for building space is the location of the site. The site of the building project, "Addisu Gebeya", is among the best in the city. The area is active and well connected with the city center and the surrounding spaces are vibrant commercial spaces. It has been found out that the location is proposed for high-density mixed-use development.

The analysis made on the demand and supply of building space indicated that the appropriate market segment for the proposed building is high-density mixed-use. The "Visitors Attraction center" of the non-residential part of the mix dominant space is business-entertainment space. The development is designed to appeal to three market segments: the young mobile domestic market, tourists staying in four- and five-star hotels in neighboring Areas and all national tourists.

The complex is expected to bring together several elements, notably a family entertainment center, apartment, artisan center, traditional restaurants and bars, retail outlets etc. The assumption is that 75% of the plot will be developed. On average, the building will have 13 floors with a total floor area of 94,440M^2 of which 73,663 M^2 is allocated for the business –entertainment complex.

For the realization of the project the Pre-construction stage works such as conducting a feasibility study, bid document preparation, floating and awarding, partnership contract etc. should be performed by IPDC. While the Construction work needs to be performed by Private developers. Concerning the management of the commercial- entertainment complex, it is suggested that IPDC should outsource the business to the developer or professional property Management Company.

Part One: Introduction

1.1 BACKGROUND

1.1.1 The Promoter: Industry Park Development Corporation/IPDC

The Industrial Park Development Corporation /IPDC/ is a public enterprise, which established for the realization of the national vision to reach the middle-income country and make a leading manufacturing hub in Africa by 2025. IPDC was established in 2014 by virtue of Council of Ministers Regulation No. 326/2014. The corporation has a mandate to administer the overall process of the industrial parks with the objective of: regulating the designation, development and operation of Industrial Park; contributing towards the development of the country's technological and industrial infrastructure; encouraging private sector participation manufacturing industries and related investments; enhancing the competitiveness of the country's economic development; and creating ample job opportunities, and achieve sustainable economic development.

In order to materialize its establishment purpose of becoming an engine of rapid industrialization that nurtures manufacturing industries; to accelerate economic transformation; promote and attract both domestic and foreign investors; and establish and regulate the eco-industrial zone, the Corporation has sound organizational structure and well experienced and skilled human capital.

Apart from this, the Corporation has been providing different services in collaboration with the Ethiopian Investment Commission and Ethiopian Revenue and Customs Authority and other relevant institutions using a one-stop-shop approach for investors creating a conducive investment environment.

So far IPDC has been performing different activities such as: activate both pre and post-investment servicing, avails serviced industrial land, pre-built sheds equipped with all-encompassing utilities and infrastructural facilities that fit international standards, with no compromise on workers' security and environmental safety.

A. Vision

> *To be an innovative and leading eco-industrial park developer and operator in Africa by 2025.*

B. Mission

> *"To boost industrial parks development through the highest standards of professionalism; to drive industrialization, promote exports, create employment opportunities thereby the country's development goal will achieve the middle-income status."*

1.1.2 The Business Plan Objective

The major objective of this study is to assess the condition of the rental business in Addis Abeba, Especially in Addisu Gebeya Area and determine whether there is a market for the proposed building. The study is also expected to suggest marketing strategies for the building if it is found to have a viable market.

The project area is proposed for the construction of the "Visitors Attraction center ". Therefore, this preliminary study will have the following specific objectives:

- ✓ *To explore appropriate land use function to optimize revenue for IPDC;*
- ✓ *To identify appropriate/viable project/ business activity that optimize both the private investors and IPDC's interest*
- ✓ *To explore and identify appropriate project development and implementation business model*
- ✓ *To suggest a lifestyle-based attraction that will be consciously designed to attract the local population.*

For the realization of this development plan, a preliminary study is very crucial. JICA EIPP team conducts this preliminary study with the major objective of identifying best-suited partnership modality for the realization of this project as well as the viability of the project.

The development is designed to appeal to three market segments:

- The young, mobile domestic market
- Tourists staying in four- and five-star hotels in neighboring Areas
- All national tourists in the country

The complex is expected to bring together several elements, notably:

- A family entertainment center
- Apartment
- A hands-on science center's/Discovery center

- Artisan center
- Traditional restaurants and bars
- Retail outlets
- Temporary Exhibition Space
- Department Stores

1.1.3 IPDC Values and Culture

- ➔ Highest level of integrity and professionalism;
- ➔ Learning organization;
- ➔ Concern to the environment;
- ➔ Effective and efficiency
- ➔ Customer satisfaction.

1.1.4 Organizational Structure

Taking the 2018 regulation that stipulates the powers and duties of executive organs, the corporation is supervised by Ethiopian Investment Commission/EIC/ and the EIC is accountable to the Prime Minister. This indicates that IPDC is one of the vital public enterprises.

Institutionally, the corporation is governed by the Board of Directors/BoD/ under this there is Chief Executive Officers /CEO/. Under the CEO there are three deputy CEOs: Corporate Services, IP Development and Operation and Management. Under each Deputy CEOs, there are directorates and currently, the Corporation has more than 30 staff at the main office, which equipped with the basic Industrial Park related development, operation and management, knowledge and skills. The detail organogram of IPDC is presented below.

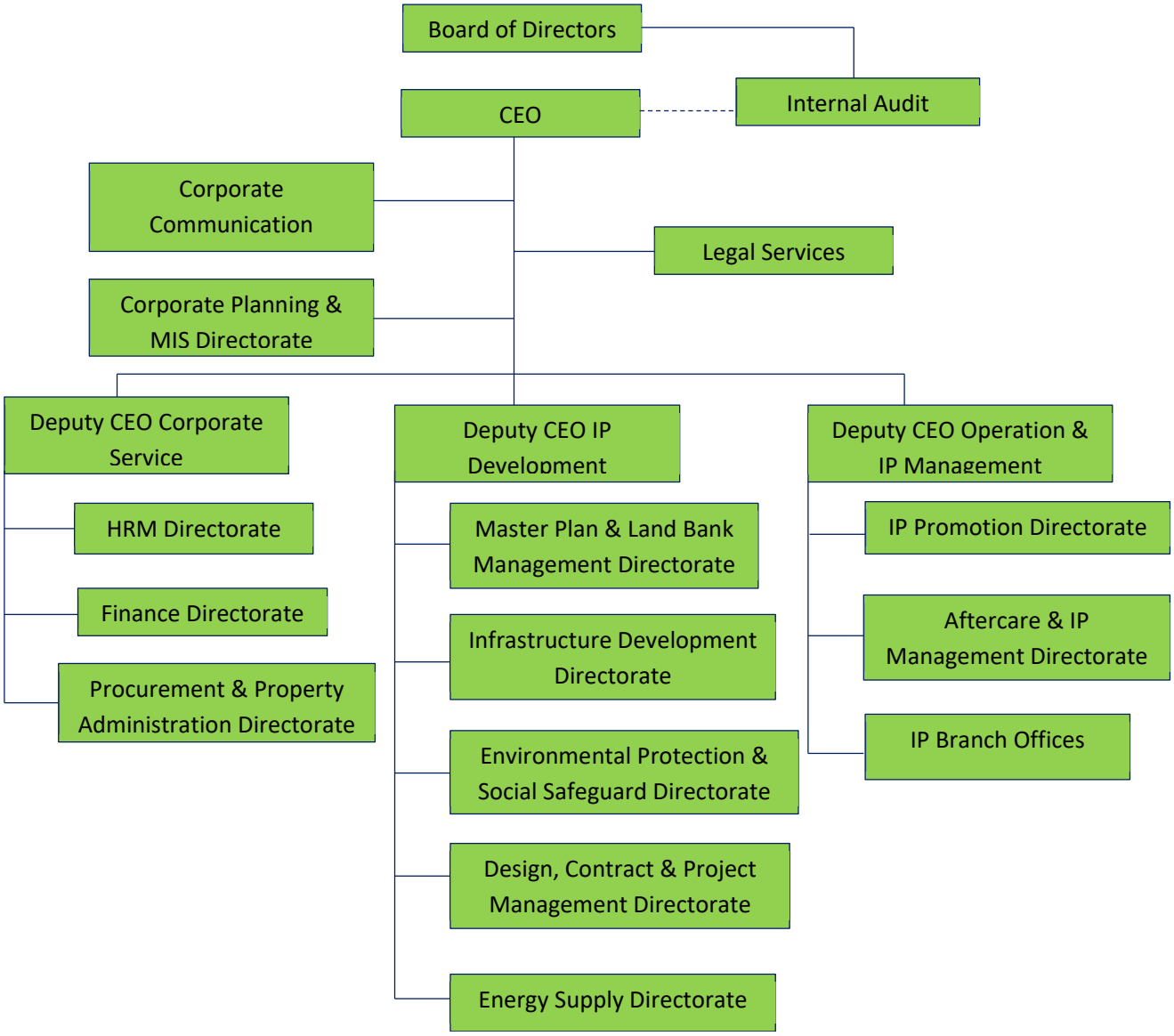

Figure 1 IPDC's Organogram

1.2 Methodology

This situational and preliminary analysis employed descriptive and explanatory methodology using qualitative and quantitative methods. In line with site visits, key informant interviews and document reviews were used as basic methods. These methods help the JICA-EIPP team to collect primary information using checklists and question guides through ***KoBoToolbox***; and secondary data from different statistical reports, policy documents, the city Master plan and the study area

local development plan etc. JICA-EIPP team also examined a few organizations experiences which have direct nexus to the project.

1.3 Description of the Area

The project area is a public property located in Addis Ababa, Gulele-Sub-City, Woreda 08. Gulele sub-city is one of the 10 sub-cities of Addis Ababa. The total area of Woreda -08 is 312ha.
The project area has a total area of nearly one hectare (9444m^2). Currently, the area is owned by IPDC, it has a plan to develop the area in partnership with the private sector.

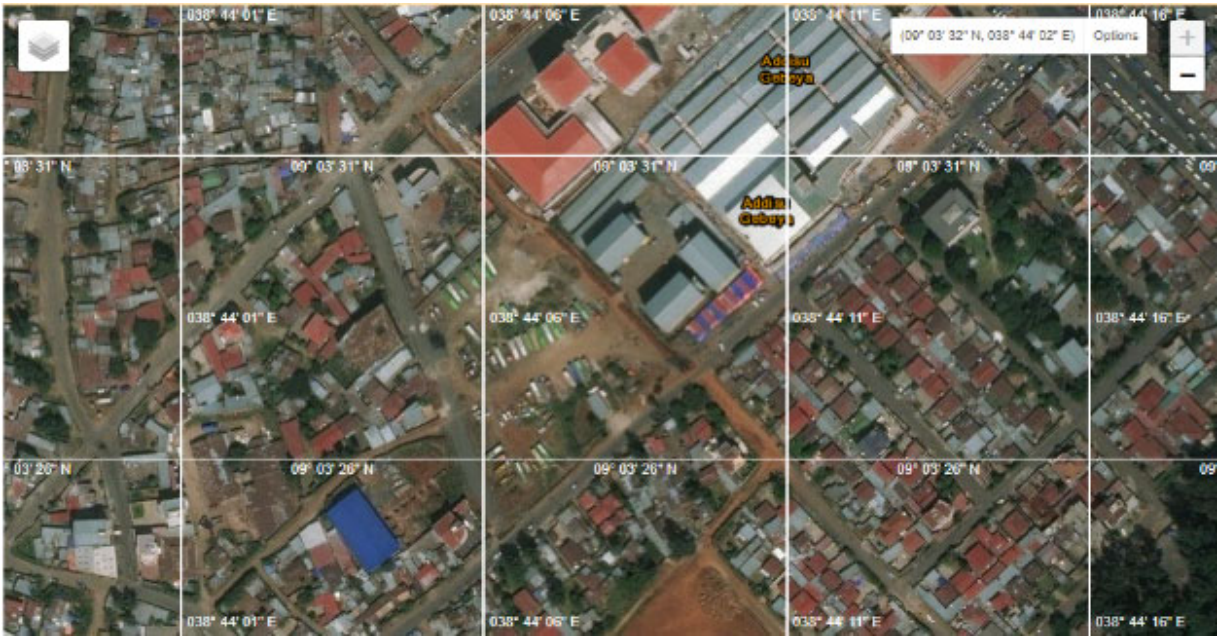

Figure 2. Google earth image of the area

1.3.1 Location

Absolute Location

The project area is located between 9^0 3’ 28’’ North latitude and 38^0 44’ 6.9’’ East longitude.

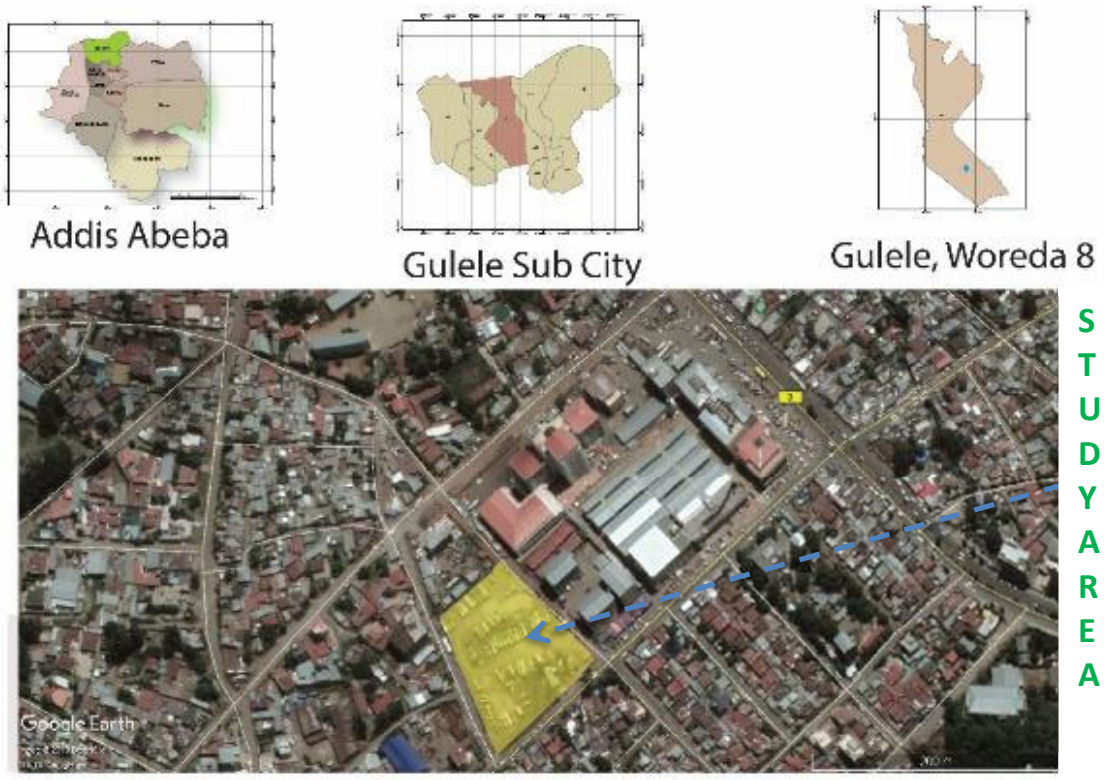

Figure 3. Absolute Location of the Study area

Relative

Relatively, the project area is bordered: in the north with "Kifiya Lehulum" PLC, in the northwest and South by privately owned residential areas, and in the east MSEs and commercial areas.

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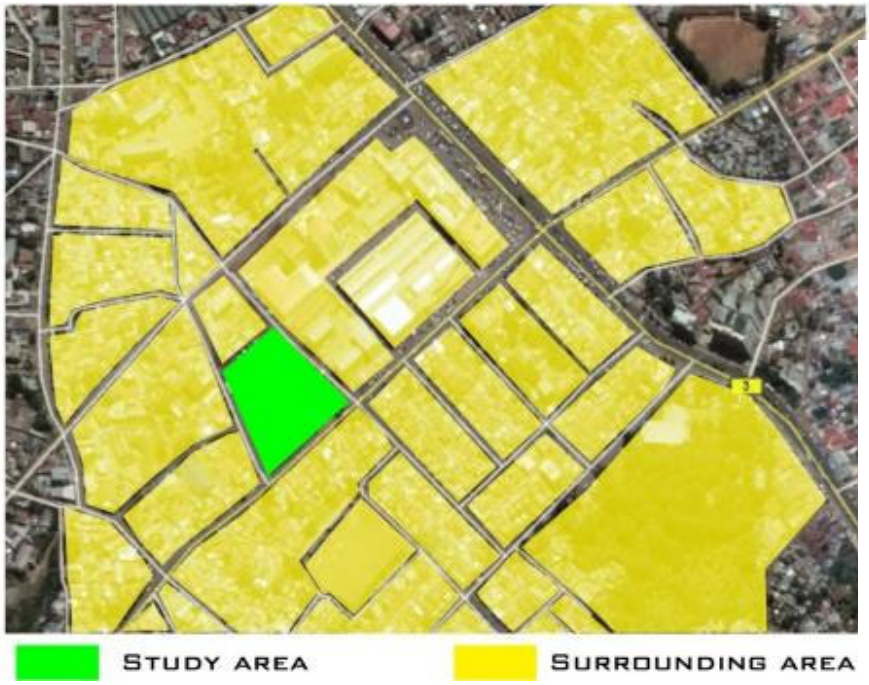
Figure 4. Relative Location of the Project Area

The project area is also accessible to the major nodes of the city such as: 2.5 km far from Addis Ababa City Administration, 3.4 km from Merkato and 4.5 km from the House of Peoples Representative /HPR/ or Prime Minister Office/PMO/, as well as 10 km from Bole International Airport.



Shape

As the map indicates the project area is broader to the southern direction and diminishing its size to the northern direction.

All in all, the shape of the area is nearly trapezium.

Figure 5. Study area and its surrounding

Part Two: Basic Analysis

2.1 Land Use Analysis

On the field visit, JICA-EIPP team identified that the project area is currently used as a temporary parking site for cross-regional busses. In the north and north-western part of the project area, the land is owned by the government and used for administration purposes. The eastern part is used for commercial and business activities. The southern and western part of the land mainly used for residential purpose.

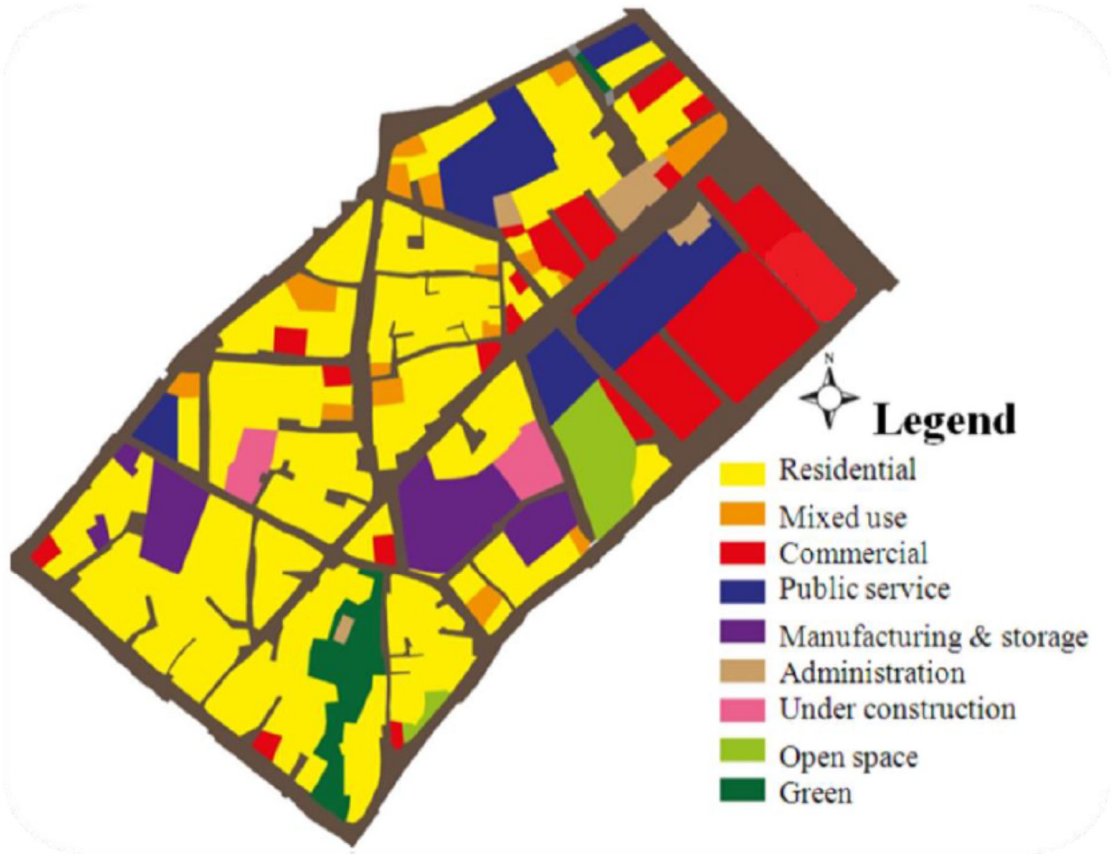


Figure 6. Existing Land Use Map

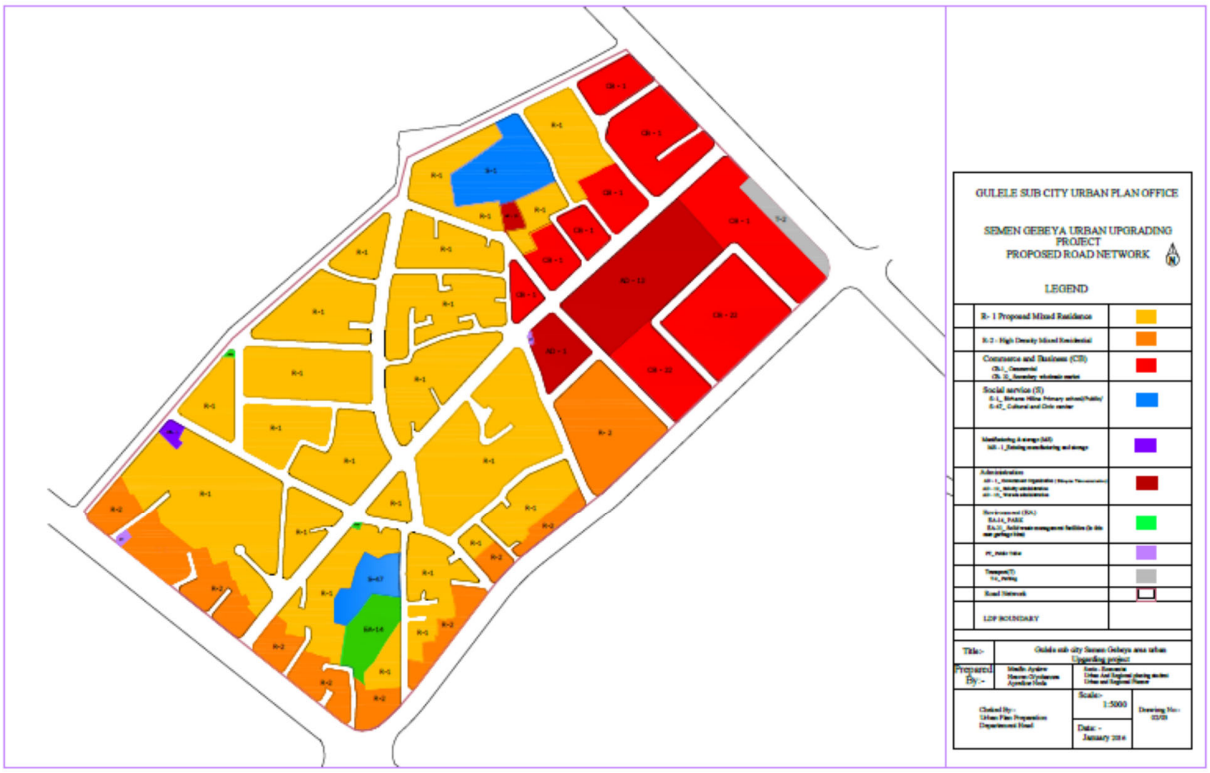


Figure 7. Proposed Land Use Map

If we evaluate the vicinity of the study area, the eastern and northeastern part, particularly along the major road is used for commercial purpose. In this area: hotels, retails, education center, banks and insurances exist. Different kinds of services providing government offices also exist in this area. To mention some: Kifiya Lehulu that served as bill payment center; the Addis Abeba Transport Licensing and Regulatory Authority, Gulele branch office; Gulele Sub-city Administration, Land Registration and Administration Agency, Gulele Sub-city branch office; Kenema public pharmacy and Addisu Gebeya health center.

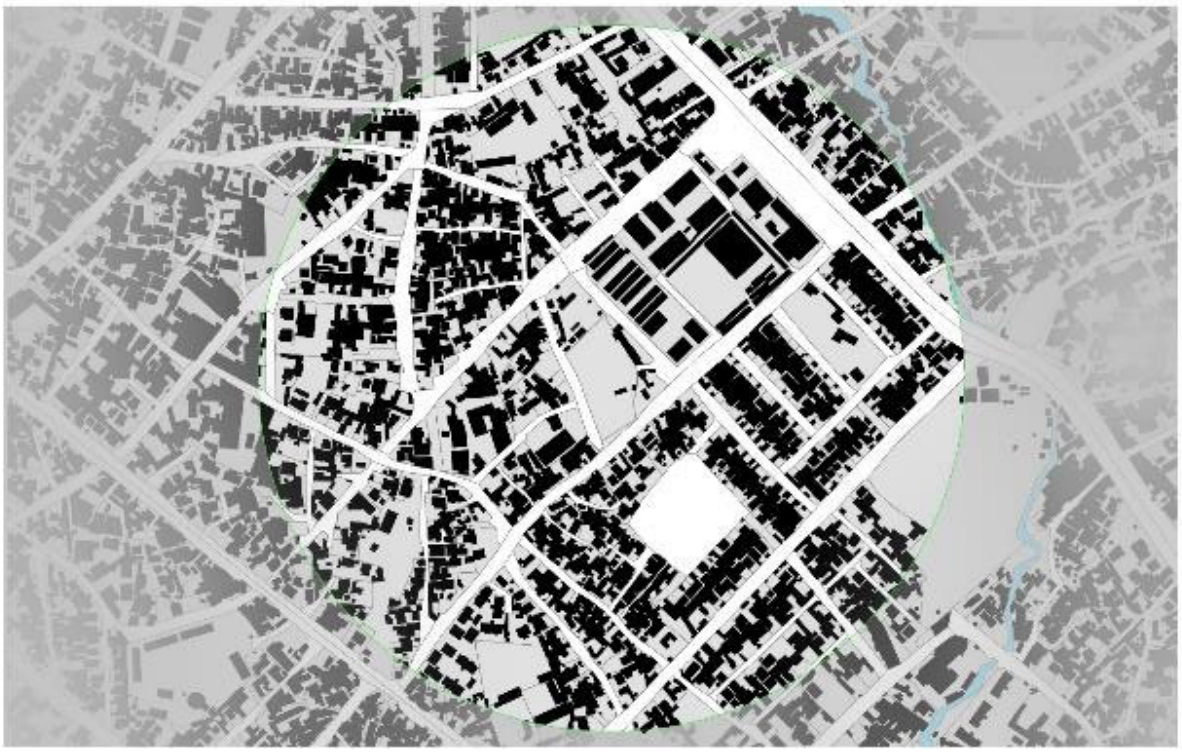


Figure 8. Noli Map of the Area.

ID	Land Use	Owner	Building Type	Building Function			
A	Mixed	Private	G+10	Residential	Bank/Insurance		
B	Mixed	Private	G+6	Residential	Bank/Insurance	Business	
C	Commercial	Cooperatives	G+5	Shop	Bar/Restaurant	Bank/Insurance	Business
D	Service	Public	G+5	Social service (Health Center)			
E	Commercial	Private	G+6	Shop	Bank/Insurance	Business	
F	Commercial	Private	G+7	Shop	Bar/Restaurant	Bank/Insurance	Business
G	Commercial	Private	G+4	Bank/Insurance	Social service	Business	
H	Service	Public	G+0	Social service(Kenema)			
I	Commercial	Private	G+4	Hotel			
J	Commercial	Private	G+4	Shop	Bank/Insurance	Social Service	Business
K	Commercial	Private	G+3	Shop	Bar/Restaurant	Business	
L	Service	Public	G+2	Administration			
M	Service	Public	G+9	Administration			
N	Service	Public	G+1	Administration			
O	Service	Public	G+2	Social Service			
P	Open Space	Public	-	Project Area			

Figure 9.Land Use and Building Function around the Project area

If we examine the vicinity of the study area within 200m, 400m, and 800m radius; municipal service exists in the northern direction, the commercial area exists in the eastern direction and

residential areas mostly exist in the south and waste direction of the project area within 200m and 400m radius.

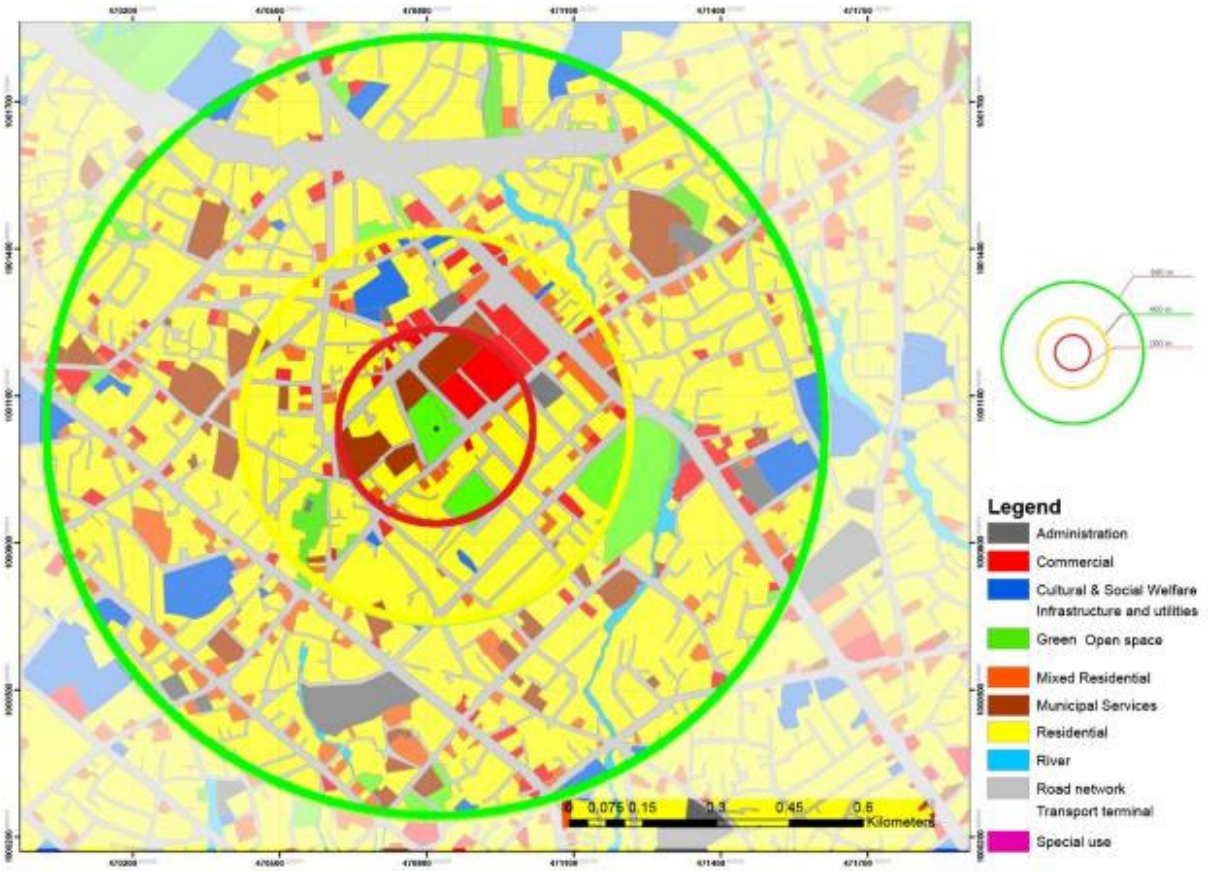


Figure 10.Existing Land Use within 200m, 400m and 800m Radius

2.2 Street Network

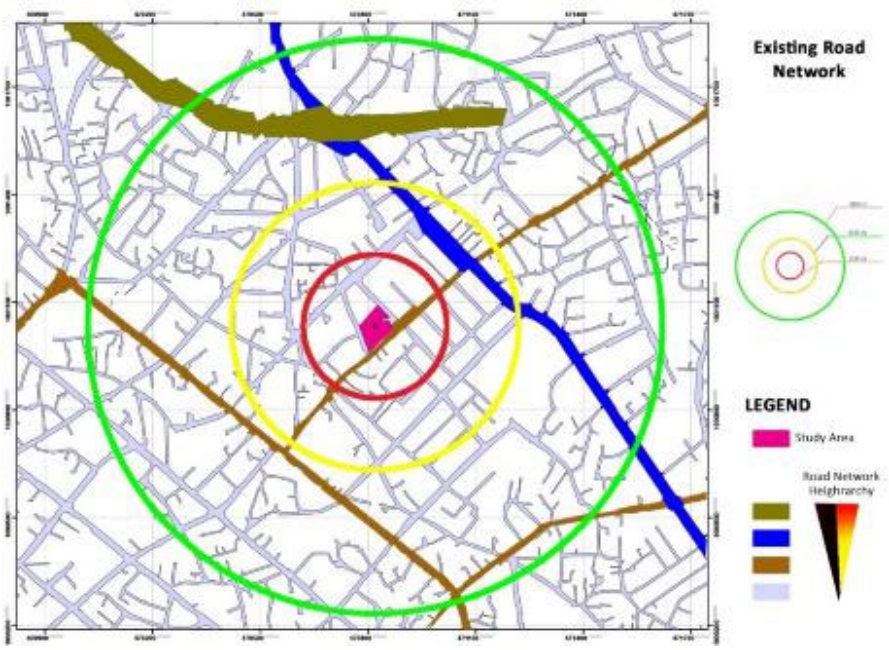


Figure 11.Existing Road Network

The existing road network depicts that the study area is surounded with roads in all directions. The major road that run from Piassa to the north direction is located in the eastern direction of the project area within 400m radius. This indicates that the study area is accessible in avery direction from any point.

2.3 Accessibility/Connectivity

If we examine the accessibility and traffic flow of the study area, it has more than two options to reach the different nodes/landmarks of the city. The project area is accessible to Bole International Airport and Bole Lemi Smart Industrial City with moderate traffic flow.

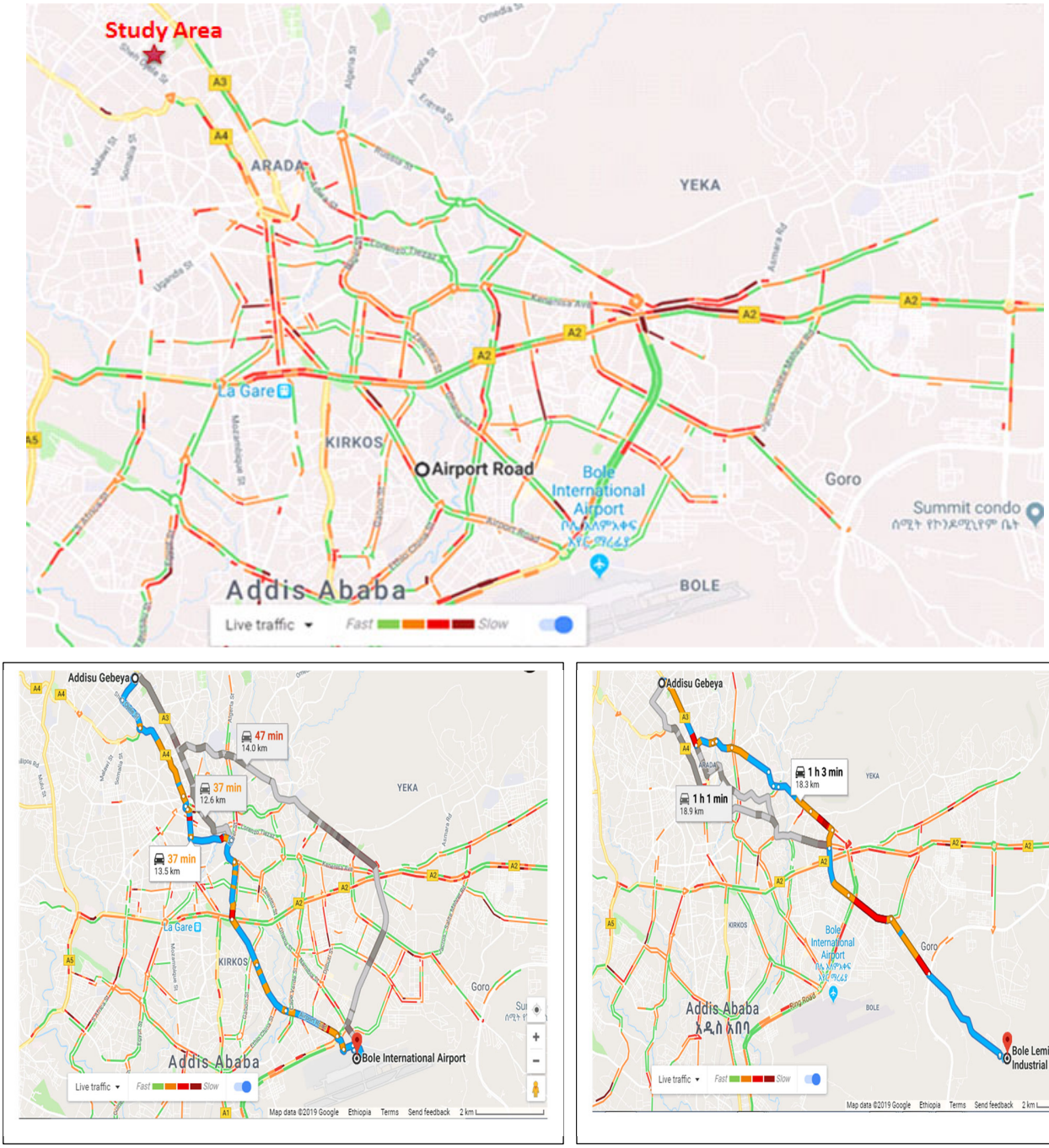


Figure 12. The Traffic Flow of Addis Abeba

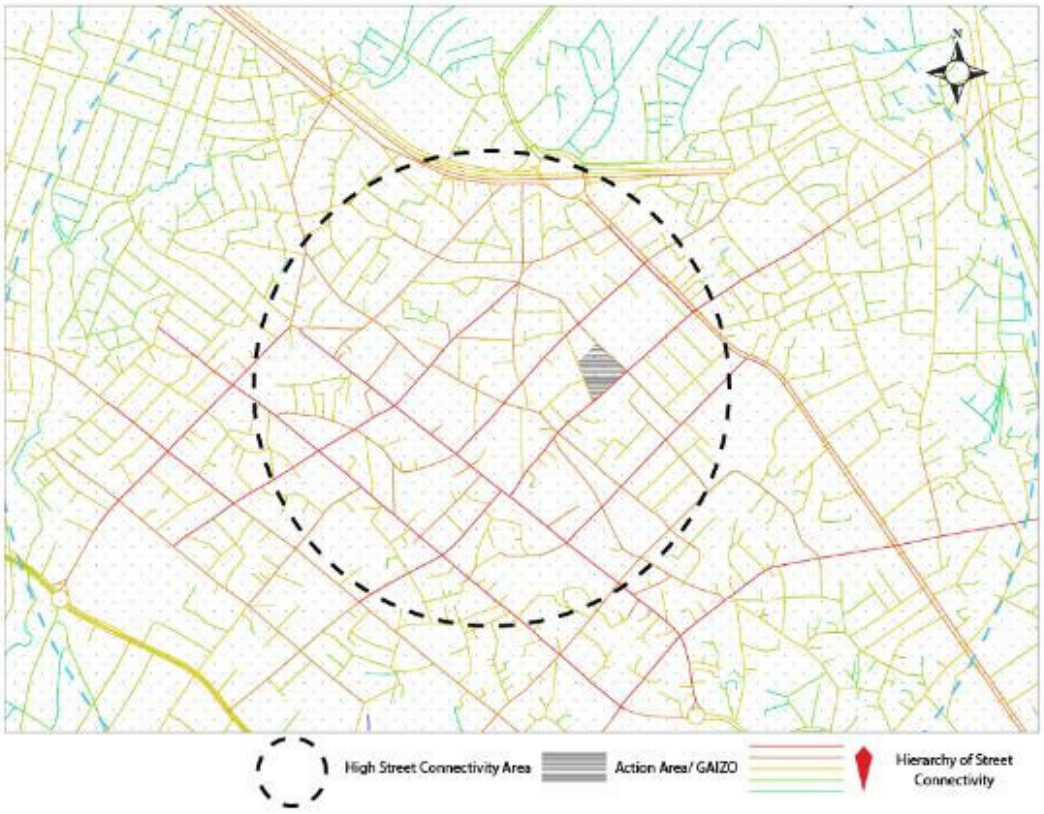


Figure 13. Street connectivity and Activity

2.4 Socio-Economic Analysis

2.4.1 Demography

According to the CSA report, the 2007 census result indicates that Gulele had a population of 267,381 which accounts for 9.76 % of the total population of Addis Ababa. The 2016 population projection depicts that, Addis Ababa reached 3,243,514; of this Gulele accounts 276,887 or 8.54%. From this one can realize that the growth rate of Gulele Sub-City is around 0.4 within the nine-year period.

Table 1. Number of Population and Growth rate in Gulele Sub-City

City/Sub-City	2007		2016		Growth Rate	Population Projection (2030)
	Population	%	Population	%		
Addis Abeba	2,738,248		3,243,514		2.05	4,309,212
Gulele	267,381	9.76	276,887	8.54	0.4	292,802

Source: CSA, 2007 & 2016

2.4.2 Market Analysis

A. Land Lease Price

As the map indicated the project area is located in the northern part of Addis Abeba. According to the Municipality recent lease auction price, which was held in 2016, the maximum price was 20,000 per M^2. Based on this the total land value of the project area will be ETB **188,880,000.00 or $ 5,124,253.93**. On the other hand the Addis Ababa City Administration meanimum trashold lease price indicates that, the area lies in the transition zone with in the range of level 1 to 5. Accordingly the average land lease price is ETB 825.1/m^2 or USD 22.39. Therefore, the total lease price of the project area will be **7,792,244.4** or USD **211,401.10.**

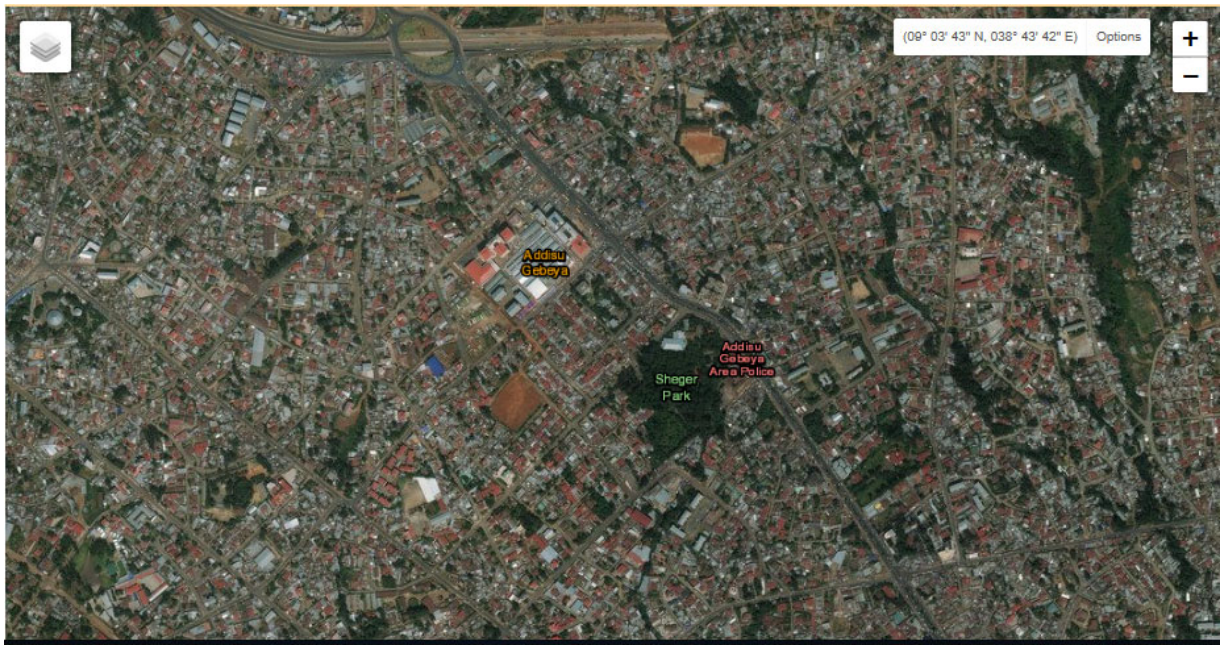


Figure 14.Google earth image of the area

Table 2. The Addis Ababa City Administration Land Lease Price Threshold

Price	Zone													
	Central Market District					Transitional zone					Expansion zone			
	Level					Level					Level			
	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th
Price/M^2 (ETB)	1,794.90	1,634.32	1,408.42	1,155.26	951.83	1,101.93	995.57	861.35	729.23	590.81	378.10	318.47	230.99	203.43
Price/M^2 (USD)	48.70	44.34	38.21	38.56	25.82	29.90	27.01	23.37	19.78	16.03	10.26	8.64	6.27	5.52
Average Price /M^2/ (ETB)	1,338.91					825.1					272.64			
Average Price /M^2/ (USD)	36.32					22.39					7.40			

B. Floor Area Rent Price

On the field visit, the JICA-EIPP team identified that the rental price for different business activities ranges from ETB 256.00 - 512.00 / M^2 per Month. Based on this, the average rental price for floor area is ETB 384.00 or USD 10.42/ M^2 per month. Thus, the crude estimation of revenue with a 75% built-up area and 85% occupancy rate for 10 story building will be ETB 603,055,000.00 or USD 16,333,559.00 per month. This indicates that IPDC has been losing around ETB 222.4 million or USD 6 million per annum.

C. Hotel Related Service Business Activity

In the study area, there are a number of hotel-related business activities along the major road that runs from "Piassa" to "Dill Ber". The minimum and maximum price for bedroom service is 11.25 and 170.45 **USD** respectively. Almost all the hotels have bars and restaurants, internet services and meeting halls. As an example, Yerosa Guesthouse and Apartment provide well-furnished rooms with a rental price of 40 USD per night. According to the hotel managers, most of their customers are foreigners and they stay for more than a month. (See the Map and Table below) This indicates that the area is suitable for hotel-related service providing business.

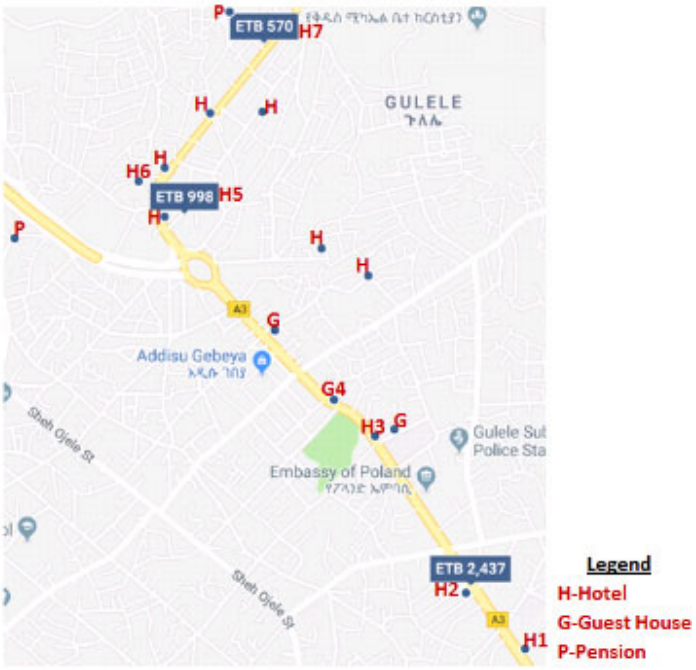


Figure 15. Hotel related Service Providers around the Study Area

Table 3. Hotel related Service Providers around the Study Area

NO.	Name	Star	Build. Type	Rooms	Aver. Price (USD)	Function
H1	Yadam Zewd Hotel	**** (Planned)	G+7	72	71.00	Bar, Restaurant (modern & Tradition) & Multi-purpose hall (200p-250p)
H2	Sarem International Hotel	****	G+9	83	78.75	Bar, Restaurant (modern & Tradition), Coffee shop, Sauna & steam bath, Gymnasium, Multi-purpose hall(450p), Meeting room(150p), & massage
H3	SGS Hotel	**	G+4	44	14.71	Bar& Restaurant (modern)
G4	Yerossa Guest House & Apartment		G+6	12	40.00	Well Furnished & Cafeteria
H5	Brooklyn Hotel and Apartment	***	G+4	25	156.67	Bar, Restaurant (modern & Tradition), Coffee shop, & Meeting room(20p)
H6	Tsion Hotel	No	G+3	58	10.34	Bar, restaurant(modern), coffee shop, multi-purpose meeting hall(1000p), meeting room (400p)
H7	Fasil International Hotel	*	G+3	45	21.91	Bar, restaurant(modern) & Assembly hall

Part Three: Development, Operation and Management Concept

3.1 General

To use the area for a different function, the JICA- EIPP team, first conducts need assessment, sight analysis and review the municipal local development plan. Accordingly, the study area is proposed for High density mixed residences with a maximum building height of 35m.

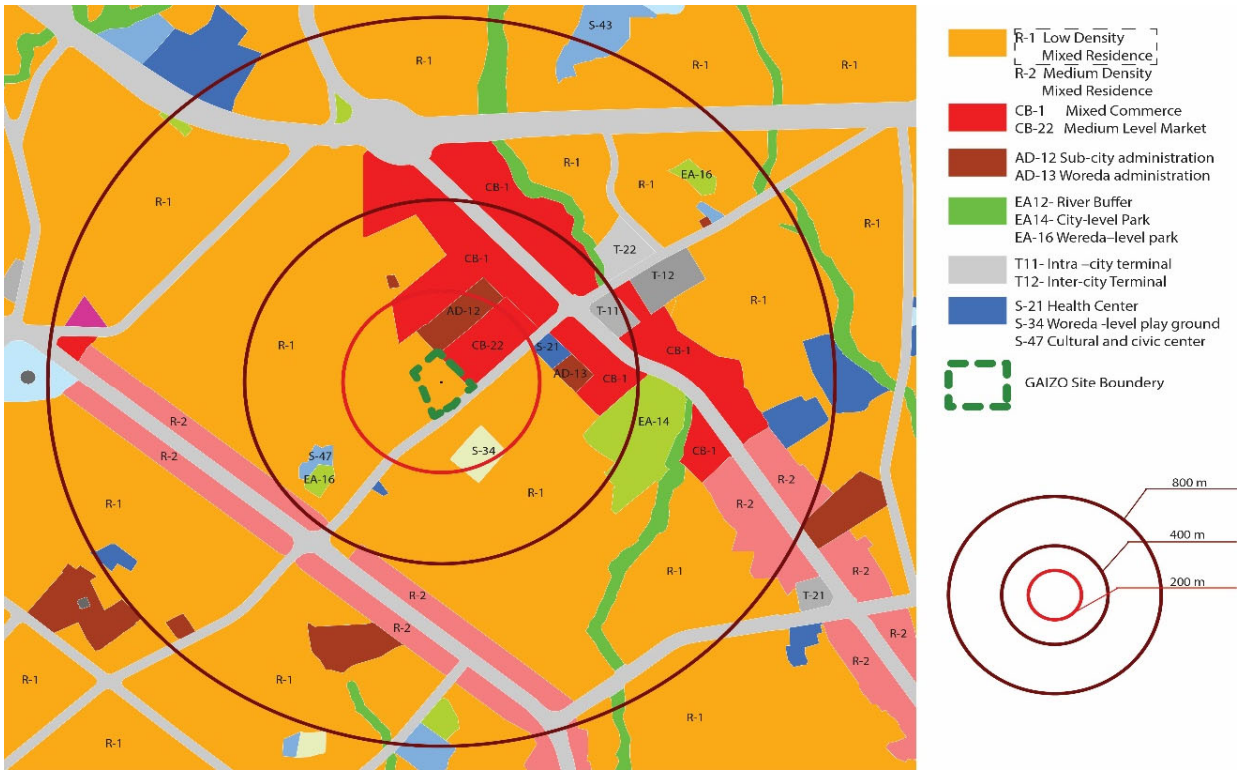


Figure 16.Land Use

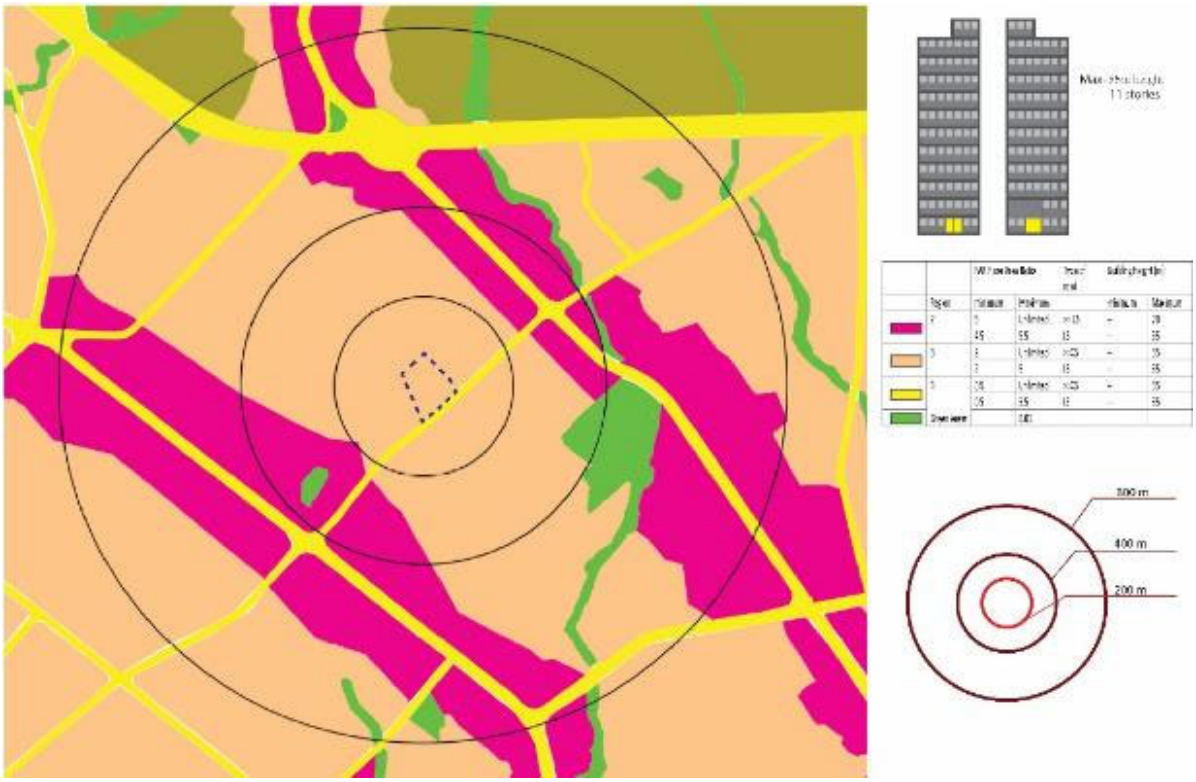


Figure 17.Building Height

By considering the existing and proposed conditions, the team developed a concept to use the 9,444m^2 area for a high-density mixed-use project. The project is envisioned to be a "**Visitors attraction center**". Accordingly, the area is expected to serve for:

a) **An apartment**: which will serve around 55 families.
b) **Entertainment & Business Complex:** Office space, conference hall, Family Entertainment center, Shopping center, A hands-on science center's/Discovery center, Artisan center, Traditional restaurants and bars, Retail outlets, Temporary Exhibition Space etc.

Then the team rates these functions from profitability and IPDC's mandate/purpose point of view. After this, the team makes a balance by giving more weight for profitability. Thus, it is recommended to all these activities in the project area; because, the City as a destination of turiests and primate international diplomatic hub, it needs hotel or guesthouse accommodations and meeting rooms and the business parts need service demanding people investors and other service users. (See Table 5)

3.2 Development Concept

There are two approaches to develop the area: the **Separate** and **Merged** Approach.

a. ***Separated approach:*** in this approach, the two broad categories will have separate plots. Accordingly, the residential area will have a 1,417m^2 plot area. The business and entertainment center will have a 5,666 m^2 area. The remaining 2,361 is for outdoor recreational activities. (See Table 5)

Table 4.Plot Area Allotted for Different Functions

Area Allotted For	Function	Area (M2)
Residence	Apartment or Guest house	1,417
Business and Entertainment Center	Office space, conference hall, Family Entertainment center, Shopping center, A hands-on science center's/Discovery center, Artisan center, Traditional restaurants and bars, retail outlets, Temporary Exhibition Space,	5,666
Open Space	Outdoor recreational space	2,361
Total		**9,444**

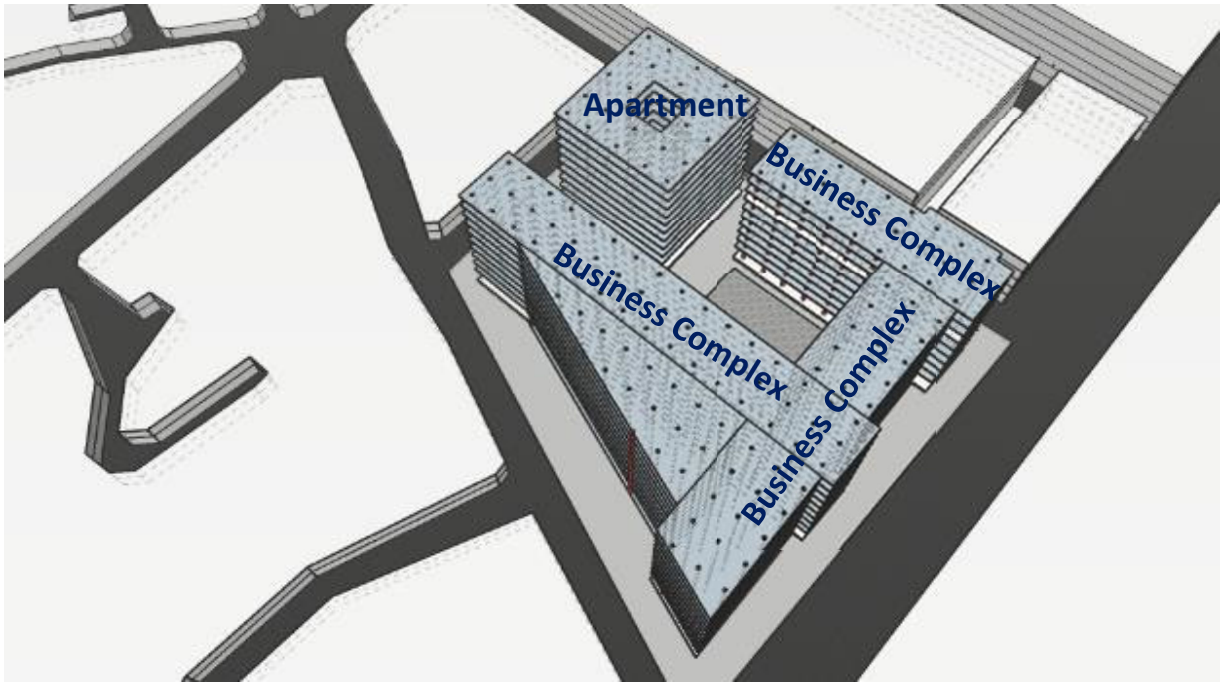


Figure 18. Project area Allotted for two major Buildings

b. Merged Approach: in this approach, there is no separation of the plot for the two broad functions instated they will distribute in one or two buildings in accordance with the floor area each function demands and interaction with each other.

The realization of the project in the development area will cause **16,871** additional people to leave and/or work in the area. As a result, the area will become more attractive business hub and knowledge center for the northern part of Addis Abeba.

Table 5. Expected Population in the Project Area

Location	Area Allotted For	Function	Area (M2)	Population	Remarks
Gulele Sub-City, Woreda 08	Residence	Apartment/Guest house/	1,417	430	(1,417m^2x75%x10floors) / 124m^2/family=86Family = 430 People
	Entertainment & Business Complex	Office space, conference hall, Family Entertainment center, Shopping center, A hands-on science center's/Discovery center, Artisan center, Traditional restaurants and bars, Retail outlets, Temporary Exhibition Space,	5,666	16,271	(5,666m^2x75%x10floors) / 7m^2/Worker=6,071.14
					(5,666m^2x75%x60%x10floors)/ 2.5m^2/Visitor= 10,199.52
	Open Space	Outdoor recreational space	2,361	170	(2,361M2*60%*60%)5M2/Visitor =169.99
	Total		**9444**	**16,871**	

3.3 Operation and Management Concept

For the realization of this project, it will pass three stages: pre-construction, construction and post-construction.

i. **Pre-construction:** this is the initial stage, as a result, all the preparation, procurement business model, implementation and partner selection and other related activities will be performed by IPDC

ii. **Construction Phase:** at this stage, the different activities will be controlled and administer by private developers. Here the role of IPDC will be overall supervision about the progress of the project.

iii. **Operation & Maintenance:** after construction, IPRA will be administered by IPDC, and the other IPRB will be administered by Private investors using an administration contract.

Table 6. Operation and Management of the Project Area

Activities	Proposed Function	Main Operators		
		Pre-Construction	Construction	Post-Construction
Residential	Apartments	IPDC	Development Partner /Investor	IPDC
Entertainment & Business Center	Office space, conference hall, Family Entertainment center, Shopping center, A hands-on science center's/Discovery center, Artisan center, Traditional restaurants and bars, Retail outlets, Temporary Exhibition Space,		Private Developer /Investor	Investor
Open Space	Outdoor recreational space	IPDC	Private Developer /Investor	Investor

Part Four: Normative and Regulatory Framework

4.1 Definition and Nature of PPP

The concept of ***public-private-partnership*** (PPP) has been defined differently in different contexts, and there is no universal consensus on what constitutes PPP. Generally, it refers to a collaborative arrangement between the government or the public sector, and a private entity for better provision of public infrastructure and services. The classical definition of PPP describes it as a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. It is a voluntary and collaborative relationship between various parties, both state and non-state, in which all participants agree to work together to achieve a common purpose or specific task, and share risks and responsibilities, resources, and benefits for a time span of medium to long term (Hodge & Greve, 2011).

Recently, Ethiopia promulgate PPP law. The law defined PPP as:

> *'a long-term agreement between a Contracting Authority and a Private Party under which a Private Party undertakes to perform a Public Service Activity that would otherwise be carried out by the Contracting Authority.'* (Art. 2/12 of Proc. No. 1076/2017)

This definition enshrined all the elements that constituents PPP, like contractual agreement, contracting parties, undertake public service and time duration.

It is well known that outsourcing a project/s because the public sector has a shortfall of resources to perform/deliver a public service/s will highly likely create problems. Thus, parties in the partnership must have a clear agreement on shared objectives. This implies that a conspicuous legal and institutional framework for PPP must be in place in order for each partner to gain what s/he/it wants from the partnership.

4.2 Models of PPP

The development and operation of different activities by the private sectors in collaboration with the government has been growing as a preferred model in both developed and developing countries. In general, the two parties contribute different things to the realization of the intended project objectives.

Table 7. Potential Contributions of the Two Parties

Public contribution	Private contribution
▪ Leasable land ▪ Credit for construction ▪ Investment incentives ▪ Utility supply ▪ Sound regulation (license, permits, etc.)	▪ Finance (partially or fully cover the land development & construction cost) ▪ Utility provision ▪ Management ▪ Investment promotion & marketing ▪ Maintenance

The public-private partnership can take various models. One model is that the private sector participates with 100% of its own capital to develop the infrastructure and/or facilities and the government grants concessions to the private-sector partner. The other very popular model is a joint partnership between public and private partners in which the public-sector usually takes responsibility of off-site development while the private partner implements on-site development. There are verities of PPP models. The most known are: Build-Own-Operate (BOO), Build-Operate-Transfer (BOOT), Build-Transfer-Operate (BTO), Design-Build-Finance-Operate (DBFO), Design-Construct-Manage-Transfer (DCMT), and Design-Build-Operate-Transfer (DBOT).

Table 8. The Evaluation Criteria PPP Models

Evaluation criteria	PPP Models						
	Concession	**Joint Venture**	**BOOT**	**DCMT**	**DBFO**	**DBOT**	**BTO**
Principal of construction	Private	Privet	Private	Private	Private	Private	Private
Principal of operation	Private	Both	Private	Private	Private	Private	Private
Ownership	Public	Both	Privet→public	Private→Public	Private→Public	Private→Public	Public/user
Level of government involvement	Less	Equal	No	No	No	No	No
Liability	Both	Both	Private	Private	Private	Private	Private
Period of contract	Limited	Unlimited	Limited	Limited	Limited	Limited	Limited

4.3 PPP Practice in Ethiopia

In Ethiopia, there is a great demand to use PPP model for the sustainable provision of infrastructure and services. The Ethiopian government has shown a political commitment to use PPP for development projects. To make the legal and regulatory framework conducive for PPP the government developed policy and promulgate proclamation. Prior to this policy/legal framework, there were projects executed jointly with private developers using the time existed legal framework. These development projects were executed in different sectors such as: hospitality, industry, business, service, and agriculture. Some of the examples are presented in the following table. (Table 9)

Table 9: Sample Development Projects Executed by Government and Privet Developers

Sector	Name of Business or Project	Modality	Partners
Hospitality	Hilton Hotel	Service Contract	Government of Ethiopia/GE/ & Hotel Worldwide
Hospitality	Ethiopian Skylight Hotel	Loan Based Service Contract	Ethiopian Airlines & Chines company
Industry	Matador Addis Tire	Joint Venture	Matador Addis & Slovakia Private Co.
Industry	Ambo Mineral Water	Joint Venture	SABMiller : South African brewery(51%) , Tewodros Ashenafi (16%), & GE (in 2016 Ambo International Holding PLC bought the reaming share)
Business	Addis Ababa Exhibition and Market Development Enterprise	Management Contract	Chamber of Commerce – Addis Ababa & Addis Ababa City Government
Service Provision	Lehulu: Unified billing of water, electricity, telephone services on pilot basis	BOOT	Ministry of Communication and Information Technology & Kifiya Financial Technology
Agriculture	Africa Juice Tibila SC. / Upper Awash project/	Joint Venture	MoA, Africa JUICE, ICCO & Farmer's Associations and Cooperatives
Housing	Housing Construction	Service Construct	MoUDC & Private Developers

Case Study

There are different projects that are similar in purpose with the study at hand. Taking the project objectives and functions that will be implemented in the project area, the team used Ethiopian Airlines experience as a case study. (See Fig. below)

Figure 19. The Airlines Academic and Hotel Business of Ethiopian Airlines

As stated above, PPP model has become a popular strategy for infrastructure development and other related development activities executed by the government in partnership with the private developers. Of the above stated PPP models, the JICA EIPP team subjected Joint Venture and BOOT using the implemented projects experience.

Part Five: Implementation Strategy

5.1 Implementation Approach

As stated above, this project will be executed in three phases: pre-construction, Construction and Post-construction.

A. Pre-construction: at this stage all the necessary preparatory works such as conducting a feasibility study, bid document preparation, flouting and award issuing, partnership contract etc. this stage is performed by IPDC.
B. Construction: here the construction work of the building will be performed by the private investor(s) with close supervision of IPDC.
C. Post-construction: after the construction work finalized the learning and development center will be administered by IPDC and the remaining business activities will be operated and managed by private developers.

Table 10: Functins and Implementing Organs for the Entertainment Center

Developable Area	Function	Implementing Organ(s)		
		Pre-Construction	Construction	Post-construction
Residential	Apartment or Guest house	IPDC	Development Partner/Private Investor	IPDC
IPRB	Office space, conference hall, Family Entertainment center, Shopping center, A hands-on science center's/Discovery center, Artisan center, Traditional restaurants and bars, Retail outlets, Temporary Exhibition Space,	IPDC	Private Investor	Private Investor +IPDC

5.2 Operation and Management Cost

The operation and maintenance cost for each project is computed in line with the corresponding responsible organizations using 2% of the total construction cost.

5.3 Development plan

In order to realize the development plan in Gulele Sub-city, different parties will engage in development and implementation activities. This development process can be categorized in to: Pre-construction, Construction and Post-construction phases. The time schedule to finalize these activities is presented as follow.

Table 11: Time Schedule

Developable Area	Function	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	Apartment /Guesthouse/												
Entertainment & Business Complex	Office space, conference hall, Family Entertainment center, Shopping center, A hands-on science center's/Discovery center, Artisan center, Traditional restaurants and bars, Retail outlets, Temporary Exhibition Space,												

Legend

Pre-construction

Construction

Operation

5.4 Financial Plan

For the realization of this development, project finance is a very important element. This development plan mainly has learning and development and business functions. The source of the fund will be loan form financial institutions, land lease price and private developers finance.

Part Six: Business Plan

6.1 General Construction Cost

The different organization experience indicates that the construction cost for M^2 is, at an average ETB 32,500.00 or USD 881.71. We calculate the construction cost using the rule of thumb method by taking the different organizations' experiences. Based on this average construction cost, the crude construction cost will be ETB ***2,545,595,000.00*** *or USD* ***68,061,177.40***

Table 92. Sample Organization Construction cost per M^2

Company	Function	Unit cost/M^2
Addis Ababa University	Office & classrooms	21,000
Buna Bank	Office & Business	40,000
Nib International Bank	Office & Business	32,000
Nib Insurance	Office & Business	38,000
Commercial Bank	Office & Business	35,000
Ethio-telecom	Office	29,000
Average		32,500

Basic Assumption

- ✓ 75% of the area allotted for Apartment will be developed
- ✓ 75% of the area allotted for Business and Entertainment will be developed
- ✓ According to the Addis Ababa Master plan, the area allows constructing up to G+11 building
- ✓ 2B+G+10 type building will be constructed for other business/commercial and as an apartment/guest house
- ✓ 1 USD = 36.86 ETB
- ✓ To calculate construction cost: 21,000.00 ETB Per M^2
- ✓ Professional cost: 5% of the total construction cost
- ✓ Contingency: 10% of the total construction cost
- ✓ Administration cost: 2% of the total construction cost

- ✓ Tax: 15% of the total construction cost

Taking the above mentioned assumptions, the over all development cost of the project area will be ETB **2,693,455,950.00 or $73,072,600.00.**

Table 13: Construction Cost

A. Direct Construction Cost							
Development Category	Function	Allotted Area /M^2/	Floor Height	Floor Area/M^2/	FAR	Cost/ETB/ (000)	Cost/USD/ (000)
Apartment	Residential	1,417	2B+G+10	18,416	13	386,731.80	10,491.91
Business/ Commercial	Business & Entertainment	5,666	2B+G+10	73,663	13	1,546,927.20	41,967.64
Open Space	Outdoor recreational space	2,361		2,361	1	2,361.00	64.1
Sub-Total -A		**9,444**	**6,527**		**78,326**	**1,936,020**	**52,523.65**
B. Professional Cost (5% of Sub-Total A)						96,801.00	2,626.20
C. Contingency (10% of Sub-Total A)						193,602.00	5,252.00
Sub-Total -B						**290,403.00**	**7,878.20**
D. Tax & Administration Cost							
Tax (15% of Sub-Total A + B)						319,443.30	8,666.00
Administration Cost (2% of Sub-Total A + B)						42,592.44	1,156.00
Sub Total - C						**362,035.74**	**9,822.00**
Furniture Cost						104,997.21	2,849.00
Grand Total (Sub-Total A+ B +C+Furniture)						**2,693,455.95**	**73,072.60**

6.2 Source of Revenue for IPDC

The major source of revenue for IPDC will emanate from renting rooms and hotel services ranging from 5 to 20 % from the net profit based on contractual agreements.

6.3 Financial Viability

Table 14: Assumptions

Apartment			Entertainment & Business			Outdoor recreational space		
Rental Price/M2	Year	Occupancy rate Year	Rental Price/M2	Year	Occupancy rate Year	Rental Price/ M2	Year	Occu pancy rate Year
1200	1 to 5	60%	600	1 to 3	50%	100	1 to 3	50%
1440	6 to 10	75%	700	4 to 6	75%	150	4 to 6	65%
1680	>10	85%	800	>6	85%	200	>6	75%

6.3.1 Cash flow and Internal rate of Return/IRR/

- **Internal Rate of Return**

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. The project 10 years FIRR is 18.05%. (See the Table below)

Table 15: FIRR for 10 years

Year	*Costs*				*Revenue*	*Net Cash Flow*
	Capital Cost	*Other Cost*	*O & M Cost*	*Total*		
2020	20134.05	402.68	0.00	20536.73	0.00	-20536.73
2021	40268.10	805.36	0.00	41073.46	0.00	-41073.46
2022	0.00	0.00	1050.47	1050.47	12988.45	11937.97
2023	0.00	0.00	1050.47	1050.47	12988.45	11937.97
2024	0.00	0.00	1050.47	1050.47	12988.45	11937.97
2025	0.00	0.00	1050.47	1050.47	16981.91	15931.43
2026	0.00	0.00	1050.47	1050.47	16981.91	15931.43
2027	0.00	0.00	1050.47	1050.47	19158.23	18107.76
2028	0.00	0.00	1050.47	1050.47	22908.03	21857.56
2029	0.00	0.00	1050.47	1050.47	22908.03	21857.56
2030	0.00	0.00	1050.47	1050.47	22908.03	21857.56
Financial Internal Rate of Return (FIRR) = 18.05%						

- **Net Present Value**

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project into a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle, a project is accepted if the NPV is non-negative. The net present value of the project for with ten years will be ETB 2,639,591,530.00 or $ 71,8611,273.00.

6.3.2 Benefits

A. Socio-Economic

The project can create direct employment opportunities for more than 170 persons. It also creates indirect job opportunities for home workers, agents, etc.

The project will generate Birr **319,443,300.00** in terms of tax revenue. This kind of construction development will have a foreign exchange saving effect to the country by substituting some construction materials.

The project will also create backward linkage with the construction sector and also generates income for the Government in terms of payroll tax.

B. Environmental

The realization of this project will create a livable environment by constructing eco-friendly standardized green buildings that have great aesthetical value, well-insulated indoor and outdoor air quality, sustainable rainwater management, sustainable solid and liquid waste management and appropriate green coverage. Due to this, the area becomes attractive for both residential and commercial activities.