南スーダン共和国
運輸・道路・橋梁省

南スーダン国
ジュバ河川港の運用に関する
モニタリング支援及び改善
業務完了報告書

平成 29 年 7 月
（2017 年）

独立行政法人
国際協力機構（JICA）

一般財団法人国際臨海開発研究センター

基盤
JR
17-087

目次

第 1 章　業務の概要 1
1.1　業務の背景 1
1.2　業務の目的 1
1.3　業務の概要 1
1.4　関係機関 2
1.5　専門家の構成 2
第 2 章　活動の内容 3
2.1　国内事前準備（3 月中旬） 3
2.2　現地（ケニア）事前準備：4 月 9 日（日）～4 月 16 日（日） 3
2.3　国内準備：4 月中旬～5 月中旬 3
2.4　現地（ケニア）業務期間：5 月 20 日（土）～6 月 4 日（日） 4
2.5　国内整理：6 月下旬～7 月中旬 7
第 3 章　活動実施運営上の課題・工夫・教訓 8
第 4 章　今後の技術協力に向けての提言 10
添付資料 12
講義資料集（別添） 26

第1章 業務の概要

1.1 業務の背景

南スーダン国における河川港管理運営能力向上に関しては、武力紛争の影響等により専門家派遣による直接的な支援ができない中で、「南スーダン国内水輸送管理運営能力強化プロジェクト」（以下「前回技プロ」と称す）により習得された河川港管理運営に係る知識や技能を如何に維持するか、さらに「前回技プロ」で指定した「モニタリング項目」を如何にフォローしていくかが大きな課題となっている。さらにこれは、南スーダン国の治安情勢回復後に予定されている「無償事業」により整備される施設・設備等の適切な運用、維持管理に結びつけていく命題も有している。

1.2 業務の目的

本業務は、第三国にて港湾管理運営に係る研修を実施することにより、「前回技プロ」の成果を維持し、無償事業や後続の技術支援の円滑な開始に資することを目的とするものである。

1.3 業務の概要

本業務は、第三国（ケニアのモンバサ港・バンダリカレッジ）にて JRPA 職員を対象として研修（以下、「バンダリ研修」と称する）を実施するに際して必要となる研修計画の企画立案、受け入れ機関との調整、実施機関との連絡・調整、研修への参加・実施等を通じて、管理運営に係る技術支援を行うものである。なお、研修項目は、日々の港湾運営に特に重要である荷役機械運用・維持管理、港湾施設維持管理、並びに河川港管理運営にとって必須の情報である港湾統計とした。

JRPA からの研修参加者はチーフクラスの 6 名であり、機械化荷役及び港湾施設・荷役機械の維持管理の担当者 4 名、港湾統計の担当者 2 名であった。

また、JICA 専門家 3 名が参加し、以下の活動を行い、円滑で効果的な研修実施に努めた。

① 全体調整/研修計画策定貴機構と連携した研修生の招聘準備
   a) 研修受け入れ機関との研修計画等の調整・取り纏め
   b) 他専門家指導項目以外で特に必要と思われる内容の技術指導。施設利用規則など JRPA 業務マニュアルの復習

② 荷役機械運用・維持管理
   a) JRPA 業務マニュアル内容の復習指導
   b) 安全な機械化荷役に係る技術指導
   c) 荷役機械の維持管理に係る技術指導

③ 港湾施設維持管理

a) JRPA 業務マニュアル内容の復習指導

b) 港湾施設維持管理現場における施設維持管理等の実技指導

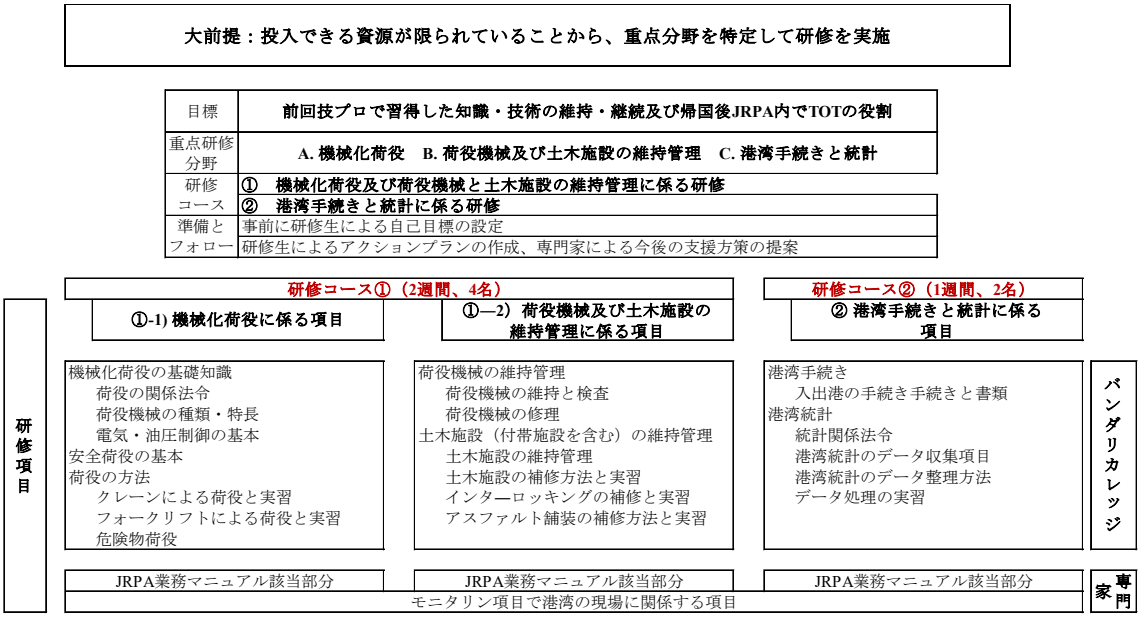
④ 港湾手続きと港湾統計（以下「港湾統計」と称す）

a) JRPA 業務マニュアル内容の復習指導

b) 港湾入出港手続きに係る技術指導

c) 港湾統計に係る技術指導

研修の体系



1.4 関係機関

実施機関：南スーダン国運輸道路橋梁省内陸水運総局（責任者：同局長）

実施機関：中央エクアトリ州インフラ省（責任者：同第一局長）

C/P 機関 ：ジュバ河川港管理組織（JRPA）

1.5 専門家の構成

専門家の構成は以下の通りである。

氏名	担当業務	所属先	現地事前準備	現地業務
小山　彰	総括/全体調整/ 研修計画策定/ 港湾統計(1)	一般財団法人 国際臨海開発研究 センター（OCDI）	○	○
木村　進	荷役機械運用/ 維持管理	OCDI		○
長谷部英司	港湾施設維持管理/ 港湾統計(2)	OCDI	○	○

第2章 活動の内容

2.1 国内事前準備（3 月中旬）

1) C/P である JRPA 港長と連絡を取り、ジュバ河川港の現状いついて情報収集を行った。これについてはジュバ河川港港長である Mr. Zubeir が JICA 課題別研修「港湾戦略運営」(本邦研修期間 1 月 16 日～2 月 26 日)に参加していたので、その機会を捉え、現地状況について情報収集した。ジュバ河川港では、物流が停止しているため、港湾活動は行われていないということであった。また、港長には本業務の内容、すなわちバンダリ研修の趣旨について説明し、演習参加の候補者選定の準備をお願いした。このことにより結果として、港長帰国後メールのやり取りにて研修生選定がスムーズに行われることとなった。
2) ワークプランを作成し、貴機構に提出した。ワークプランには、技術支援実施の基本方針、業務工程、研修手法などの項目を整理した。

2.2 現地（ケニア）事前準備：4 月 9 日（日）～4 月 16 日（日）

1) ワークプランを基にケニアの研修受け入れ機関（バンダリカレッジ）と研修内容、日程に関する協議を行った。研修は、機械化荷役及び港湾施設と荷役機械の維持管理を主体とした研修と港湾統計を主体とした研修の 2 つとし、日程は、前者が 5 月 22 日（月）～6 月 2（金）の 2 週間、後者が 5 月 22 日(月)～5 月 26 日（金）の 1 週間で決定した。最も重要な研修プログラムについては、本業務実施側が C/P の能力や現地の状況等を最もよく承知していることから主体的にプログラム案を作成したうえで受け入れ機関と協議・調整した。その際には、研修生はチーフクラスであり、帰国後 TOT（Training of Trainer）の役割を期待されている職員であり、それに相応しい内容の研修となるように協議・調整した。また、研修生の理解を促すため、現場研修を多く取り入れることや講義資料の配布について強く要請した。現地滞在中に、バンダリ研修に係る契約を締結した。
2) 併せて C/P の宿泊先、モンバサでの移動等円滑な研修に必要な手配を行った。

2.3 国内準備：4 月中旬～5 月中旬

1) 事前調査報告書（和文）及び研修詳細計画（和文・英文）を作成し、貴機構に提出した。（研修詳細計画書を巻末に添付する。）
2) 本業務で行う研修はチーフクラスを対象とし、モチベーションの高い職員を選定するよう事前に JRPA 港長に依頼していたため、選定はスムーズに行われた。結果として、モチベーションの高い候補者が選定された。
3) 研修の効果を上げるため、事前に自己目標の設定をお願いした（結果として研修生全員

が自己目標を設定して研修に臨むこととなった。うち 2 人の研修生は現状紹介の資料までも用意していた。）

研修生と個人目標

		What os your purpose for participation on the study tour?	What kind of skills do you want to acquire in the study tour?	How to utilize the skills and know-how acquired in the study tour?
Training Course I	Willian Wruda	I want to increase my low carrier to upper carrier as a refreshment course	I want to aquire the new technique, modern machinery which is now computerized.	/Improvement of the new skills in the operation management /I want to make sure to train the young one.
	Emmanuel Kamal	To increase my carrier to upper carrier as to refreshment course	To acquire the modern technology which is computerizes	To improve the system in operation
	Kamal Awad	To acquire more skills in maintenance and operation cargo handling equipment at electrical port	Maintenance of cargo handling equipment and repair of electrical port	This is by implementation of the skills acquired practical at Juba river port.
	Joel Pauline	To acquire a skill in port management operation	Maintenance of cargo handling equipment and maintenance of port facility	To utilize the skill, is through implementation of the study tour course at Juba river port Administration (JRPA)
Training Course II	Charles Juma	To acquire a skill on port management operation and cargo handling facilities	A skill on cargo handling of statistics datas and ware house logistics	To utilize the skill, is through implementation of the study tour course at Juba river port
	Charplain Jansuk	/Refreshment of my carrier /Upgrading of my carrier /Sharing of the knowledge with my advance friends /Building of good relationship with my partners	/Acquiring the modern skill in the world technology /Unique and famous system of operation /Collection of real and standard statistical information	/Preventing the skills by using it /Production of annual report to the institution and the public at large /Train the other friends

4） さらに、研修員の南スーダンからの渡航等がスムーズに行われるように、貴機構等の連絡を密に行った。

2.4 現地（ケニア）業務期間：5 月 20 日（土）～6 月 4 日（日）

ケニア・モンバサ港のバンダリカレッジにて JRPA 職員を対象に研修を実施した。研修は、機械化荷役及び港湾施と荷役機械の維持管理の研修と港湾統計の研修を同時に開始し、前者は 2 週間程度、後者は 1 週間程度の期間で行った。

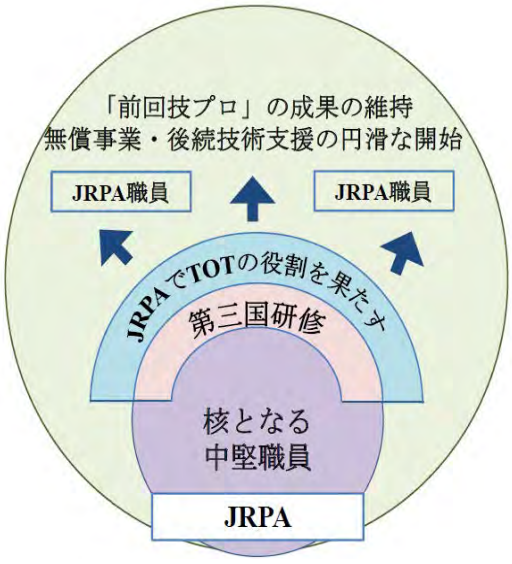
研修期間中は、研修の状況について中間報告及修了報告を貴機構に行った。

1） 研修開始に当たって、本研修の意義・目的、特に TOT としての役割を期待されていることを研修生に説明した。

2） JICA 専門家はそれぞれが 2 回の講義を行い、その際には、JRPA 業務マニュアルも活用しつつ、荷役機械の運用・維持管理、港湾施設の維持管理、港湾統計の収集・整理等の復習指導を行った。

3） 指導に当たっては、現場に役立つ技術、身に付く技術との観点から、バンダリカレッジにたいしては、実技を多く取り入れた指導を行ってもらった。

4） 研修期間中に研修生一人が体調不良を訴えたが、バンダリカレッジの素早い対応もあり、重大な事態には至らなかった。



成果目標のイメージ（TOT）

5） 最終的な研修プログラムを以下に示す。

機械化荷役及び港湾施設・荷役機械の維持管理

KPA/HR-BC/FM/010A
ISSUE NO: 001
DATE OF ISSUE: 11/11/15
ISSUED BY: DP (ACAD)
AUTHORISED BY: HBC

BANDARI COLLEGE
COURSE TIMETABLE
COURSE TITLE: *CARGO OPERATIONS INFRASTRUCTURE &EQUIPMENT MAINTENANCE COURSE.*

START DATE: *22.05.2017.* **END DATE:** *02.06.2017*

TIME/DATE	0800 – 1000		1030 – 1230		1400 - 1500		1530 -1630
MONDAY 22/05/2017	Registration/ Trainee presentation/Outline **Twalib & Z. Otwori**	B	Lecture by **JICA Expert**	L	Cargo handling Operations- Conventional Cargo **Lugho**	B	Cargo handling Operations- Container Operations. **Lugho**
TUESDAY 23/05/2017	Equipment Operations in Cargo Handling **Mbalanya**	R	Equipment Operations in Cargo Handling **Mbalanya**	U	Equipment Operations in Cargo Handling **Mbalanya**	R	Equipment Operations in Cargo Handling **Mbalanya**
WEDNESDAY 24/05/2017	Lecture by **JICA**	E	Import cargo Documentation **Shigali**	N	Export Cargo Documentation **Shigali**	E	Export Cargo Documentation **Shigali**
THURSDAY 25/05/2017	Stevedoring operations **Kenga**	A	Stevedoring operations **Kenga**	C	Bulk Cargo Operations **Mwajambia**	A	Bulk Cargo Operations **Mwajambia**
FRIDAY 26/05/2017	Practical- conventional cargo, Terminal Engineering & Container Operations. **Lugho & Nyamao**	K	Practical- conventional cargo, Terminal Engineering & Container Operations **Lugho & Nyamao**	H	Practical- conventional cargo, Terminal Engineering & Container Operations **Lugho & Nyamao**	K	Practical- conventional cargo, Terminal Engineering & Container Operations **Lugho & Nyamao**

Course Coordinator: *M. Twalib* ……..**Signature** …….. **Date**…….

Training Officer: *Zipporah Otwori*……**Signature**……..**Date**..28/05/2017…..

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BANDARI COLLEGE
COURSE TIMETABLE
COURSE TITLE: *CARGO OPERATIONS, INFRASTRUCTURE & EQUIPMENT MAINTENANCE COURSE.*

START DATE: *22.05.2017.* **END DATE:** *02.06.2017*

TIME/DATE	0800 – 1000		1030 – 1230		1400 - 1500		1530 -1630
MONDAY 29/05/2017	Repair of Cargo Handling Equipment **Nyamao**	B	Repair of Cargo Handling Equipment **Nyamao**	L	Replacement of equipment parts **Nyamao**	B	Replacement of equipment parts **Nyamao**
TUESDAY 30/05/2017	Lecture by **JICA**	R	Lecture by **JICA**	U	Outline- Civil Works/ Maintenance of interlocking block pavement **Okwar**	R	Maintenance of interlocking block pavement **Okwar**
WEDNESDAY 31/05/2017	Maintenance of Asphalt concrete pavement **Okwar**	E A	Maintenance of Asphalt concrete pavement **Okwar**	N C	Maintenance of other civil infrastructure **Okwar**	E A	Maintenance of other civil infrastructure **Okwar**
THURSDAY 01/06/2017	**HOLIDAY**						
FRIDAY 02/06/2017	Maintenance of other civil infrastructure **Okwar**	K	Maintenance of other civil infrastructure **Okwar**	H	Action Plan **JICA Expert**	K	Course Evaluation/ Closing ceremony **R. Watene**

Course Coordinator: *M. Twalib*……..**Signature** …….. **Date**…….

Training Officer: *Zipporah Otwori*……**Signature**……..**Date**..22/05/2017…..

港湾手続きと港湾統計

KPA/HR-BC/FM/010A
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AUTHORISED BY: HBC

BANDARI COLLEGE
COURSE TIMETABLE

COURSE TITLE: *BASIC PORT DOCUMENTATION & STATISTICS COURSE FOR S/SUDAN.* **START DATE:** *22.05.2017.***END DATE:** *26.05.2017*

TIME/DATE	0800 – 1000		1030 – 1230		1400 - 1500		1530 -1630
DAY/ DATE	0800-1000	1000-1030	1030-1200	120-1400	1400- 1500	1500-1530	1530 - 1700
MONDAY 22/05/2017	Registration/ Trainee presentation/Outline **Twalib &Z. Otwori**	B	Port documentation **Shigali**	L	Inbound Cargo Documentation **Shigali**	B	Inbound Cargo Documentation **Shigali**
TUESDAY 23/05/2017	Outbound Cargo Documentation **Shigali**	R	Outbound Cargo Documentation **Shigali**	U	Productivity of Cargo Handling Equipment **B. Mwajambia**	R	Productivity of Cargo Handling Equipment **B. Mwajambia**
WEDNESDAY 24/05/2017	Collection of Port Statistics **E. Katana**	E	Collection of Port **E. Katana**	N	Collection of Port Statistics (Office Visit) **E. Katana**	E	Collection of Port Statistics (Statistics Office Visit) **E. Katana**
THURSDAY 25/05/2017	Methods of Compiling Port Statistics **Golicha**	A	Methods of Compiling Port Statistics **Golicha**	C	Sample statistics of the port **Golicha**	A	Practical- Sample statistics of the port **Golicha**
FRIDAY 26/05/2017	Lecture **JICA Expert**	K	Action Plan **JICA Expert**	H	Course Evaluation & Closing **R.Watene/ ALL**	K	**END**

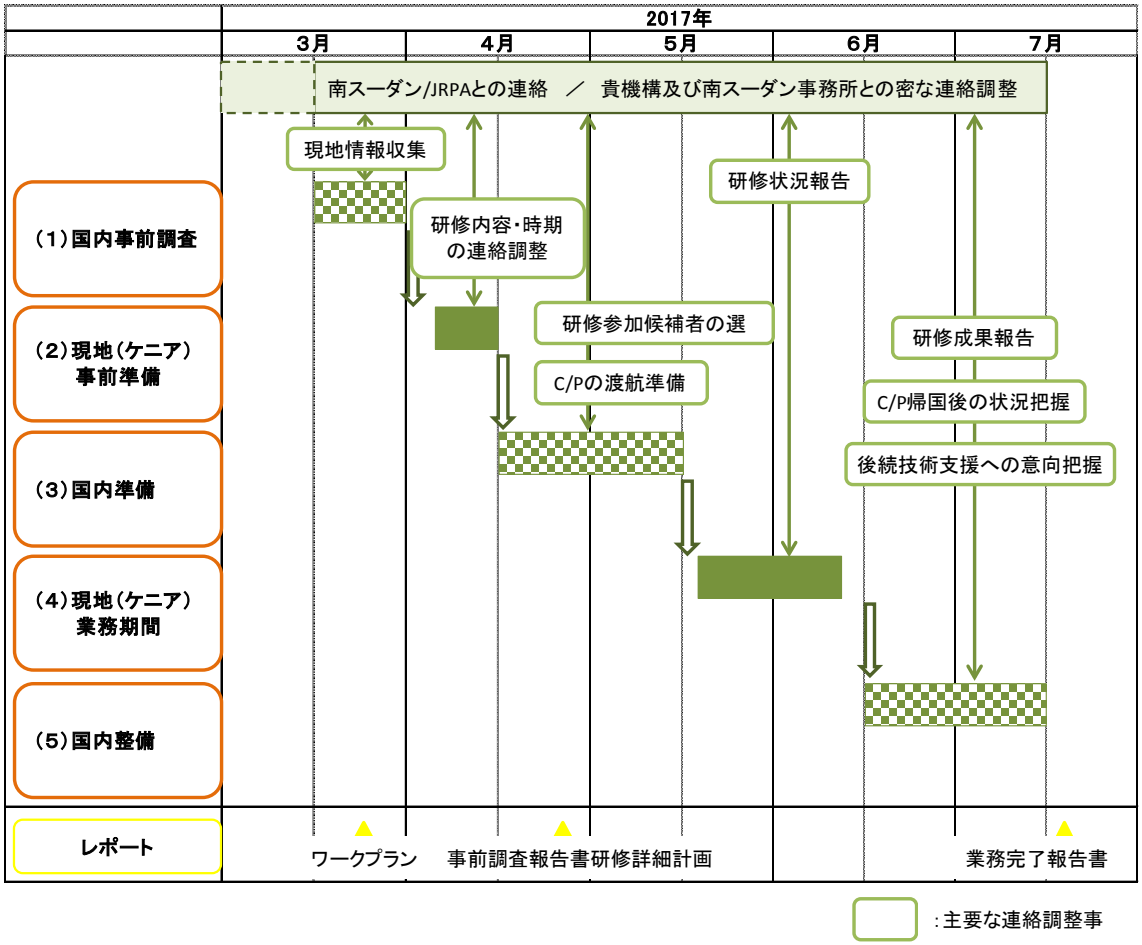
Course Coordinator: *M. Twalib* **.....Signature ..... Date.....**

Training Officer: *Zipporah Otwori*.....**Signature**.....**Date**..22/05/2017.....

2.5 国内整理：6 月下旬～7 月中旬

本業務の活動内容等を業務完了報告書（和文・英文）として取りまとめ、貴機構に提出した。業務完了報告書には今後の技術協力実施に係る助言。提言も盛込んだ。この場合、すべての検討は、南スーダン国の治安が回復し、国情が安定した後との条件が付くのが残念であるが、致し方ないことである。また、治安回復が遅れる場合、考え得る技術支援のあり方についても若干の助言を行った。これに加え、後続の技術協力の検討に際して鍵になるのが、無償事業の進捗である。従って、それぞれのタイミングにおいて、無償事業の動向に注目する必要性も指摘した。

業務の全体工程



第3章 活動実施運営上の課題・工夫・教訓

今回の研修は、研修生へのアンケート調査結果やアクションプラン記述内容に見られるように、研修生にとって十分に満足いくものであったことから、大きな成果を得たと考える。

今回の研修を実施するうえでの課題・工夫・教訓等を以下の通り整理する。

まず、JRPA 職員とメール等でやり取りすることは容易ではないことが今までの経験でよく分かっていた。従って、大変幸運ではあったが、JICA 課題別研修「港湾戦略運営」に参加していた JRPA 港長 Mr. Zubeir と事前に十分な意見交換を行ったことが、業務のスムーズな準備・実施に繋がった。

また、受け入れ機関であるバンダリカレッジに対しても、既に 2014 年 10 月に同様な研修を行った経験により、JICA 専門家とバンダリカレッジとの間で意思疎通が可能であったことから、事前に今回の研修の主旨や JICA 専門家が考える研修プログラムを送付し、研修目的や内容を知ってもらっていたことも研修の準備・実施をスムーズに行えた要因であった。

さらに研修生に対しては、JRPA 港長を通じ、今回研修の意義・目的等が事前準備段階で相当程度に理解されていたことも大きい。すなわち、研修初日に JICA 専門家より今回の研修の意義・目的、さらには TOT になることへの期待を説明したが、既に十分に承知しているとの雰囲気が伝わってきたことである。事前の自己目標、終了後のアクションプランを研修生は戸惑うことなく準備が出来たことからも事前準備が周到であったことが判断できる。一方、ここでの課題は、アクションプランで示されたことが、JICA 専門家としてフォローできないことである。これにつては、貴機構（南スーダン事務所）にフォローをお願いせざるを得ないと考える。

具体的なフォローアップの項目としては、

① 今回研修で得た知識や資料を他の JRPA 職員と共有すること、

② 統計スタッフによる船会社等からの輸送貨物の情報を入手すること、等である。

JICA 専門家がほとんどずっと講義や現場活動に付き合ったのも研修成果を得るにはよかったと考える。研修生の意向と汲み取って、講師に対し柔軟な対応をお願いしたり、ジュバの状況を講師に伝えることが出来たりしたからである。また、JICA 専門家が JRPA 業務マニュアルを活用したことも、研修生に今後の知識・技術の維持に役立ったのではないかと考える。

JICA 専門家側の実施運営体制は、それぞれのコースに専門家一人が張り付き、主に講師との間の調整役となり、3 人目の専門家は主にバンダリカレッジの幹部や研修担当との意見交換・調整の役割を果たす体制とした。この役割分担をベースに円滑な研修実施に努めた。

周到な準備と十分な意思疎通が良い成果を生むことが改めて確認された。

しかしながら、課題も存在する。研修生は比較的高いモチベーションを有していたが、若干の個人差が生じる場面もあった。すなわち、自分の担当分野、専門分野に関しては積極的な参加姿勢が見られたが、担当分野から離れた一部の分野（例えば書類手続き関係）に関しては興味の程度が低くなった研修生が一部見受けられた。これは、担当分野以外の分野についての理解が難しかったのではないかと考える。ごく狭い分野に特化した研修プログラムを組みことが現状では難しく、テーラメードの研修プログラム構築には限界があるので仕方のないことであろう。

バンダリカレッジ側の対応は、前回（2014 年 10 月）に比べ、相当程度によくなっていた。JICA 専門家が事前に資料準備等について申し入れ、研修担当が調整役として機能したためと考えられる。しかしながら、すべての講師に情報が共有されていない場合も見受けられた。一方、研修担当からは、情報を早くくれれば一層より良い準備が可能になるとの発言もあった。必ずしも言葉通りとは思えないが、もし再び同様な研修を行う場合には、バンダリカレッジとの情報交換を密にし、当方の要望も何度も何度も繰り返し説明することが重要であると判断される。

第4章 今後の技術協力に向けての提言

現下の状況、すなわち南スーダン及びジュバの治安が回復しない状況下にあっては、技術協力の方策は限られると言わざるを得ない。そのような状況の中で、実施可能な技術協力方策を 2～3 列挙する。

まず、JICA 課題別研修への積極的参加を促すことである。港湾関係では、現在「港湾開発計画」、「港湾戦略運営」、「アフリカ物流効率化」の 3 つの課題別研修が実施されている。「前回技プロ」期間中には、「港湾開発計画」に 3 名、最近では「港湾戦略運営」に 1 名の JRPA 職員が参加している。2015 年の「港湾開発計画」に参加した Mr. Kamal Awad を 2 年ぶりにバンダリ研修で一緒になったところ、彼の成長ぶりには驚かされた。受講の姿勢が大変素晴らしく、他の研修生の模範となっていた。彼は受講姿勢だけでなく、時間厳守の点、何事でも率先して行う点、研修生をまとめ、引っ張って行こうとする点など、3 年前のジュバでは見られなかった数々が確認できた。前回のバンダリ研修での指導（2014 年 10 月）や 2 か月余りに亘った日本での研修により多くの開発途上国の仲間と生活し、色々な点で良き刺激を受けたものと考えられる。今回のバンダリ研修もそうであるが、日本で研修を受けたものが帰国後、JRPA 内で TOT の役割を果たすことは大いに期待できることである。

今回の研修生の中では、Mr. Charles、Mr. Chaplain（いずれも統計担当）、Mr. Joel（維持管理担当）が課題別研修（特に「港湾開発計画」や「アフリカ物流効率化」）傘下の有資格者と考える。他にも有資格者が存在するので、貴機構として積極的な対応をお願いしたい。

次に、バンダリ研修の定期的な実施である。研修の効果を高めにはもっと多くの研修生がもう少し長い期間の研修を受けたい、そしてそれが経済的との意見がある。今回のアンケート調査結果でも、研修期間が短かったとした研修生が多くいた。従って、次回実施する場合には、研修期間を 3 週間～4 週間にし、研修人数も 6～7 人にするといった対応も考えられる。研修プログラムの作成については、早い段階からバンダリカレッジに伝え、JICA 専門家が積極的にプログラムつくりに参画することにより解決できる問題であると考える。しかしながら、問題は研修生の受け入れ能力である。研修期間が長くなる分、研修項目も多岐にわたると考えられる。正直言ってすべての研修分野に亘って研修生が高いモチベーションを維持するのは難しいかもしれない。一つの解決策として、研修期間中により多くの実習・実技、現場視察などを組み入れることである。これにより、モチベーションを維持し、受け入れ能力不足を補うことが可能となるかもしれない。

現実的には今回の研修と同規模の研修を行い、一人でも多くの JRPA 職員が「前技プロ」で習得した知識、技術・技能を復習できる機会が与えられることが望ましい。その際には、港湾保安や環境管理、コンピュータ技術の習得といった研修項目を組み入れることも検討すべきである。

2016 年度の JICA 課題別研修「港湾戦略運営」に参加した港長 Mr. Zubeir の Action Plan では、更なる研修の必要性を訴えており、2018 年 3～4 月頃にバンダリカレッジにて①出入り管理研修、②コンピュータを用いた会計管理研修を提案している。それぞれ 3 名ずつ、2 週間の研修計画となっている。この提案、特に②のコンピュータを用いた会計管理研修の提案に対する支援は重要であると考える。

さらに、バンダリカレッジに南スーダン以外の国（例えば他の東アフリカの国）からも港湾関係者を招へいし、複数国の仲間と一緒に研修を実施することも考えられる。これはバンダリカレッジの受け入れ態勢等を関係し簡単ではないが、研修生が相互に刺激を受けあって、JRPA 職員単独の場合よりも高い成果が得られる可能性を考えられる。

本邦にて研修を行うことも選択肢ではあるが、JRPA 職員にとって研修は実技主体の方が好ましいことを考えると、費用対効果の観点からバンダリカレッジが望ましくなる。また政策・法制度分野の研修も考えられるが、現時点で先方関係機関の職員やその実行能力を見回すと、残念ながら投資効果は低いものと考えられる。

今回のバンダリ研修で研修生は多くのことを学び、技術・技能を身に付けたと考えられる。しかしながら、最大の問題は、その技術や技能を実践する場がないことである。これらの技術・技能を維持するためにも定期的な研修の実施が必須である。

そして何より、技術・技能の実践の場である無償資金協力事業の再開が待たれるところである。

同時に技プロが再開できるまでの間、JICA 課題別研修への参加及び第三国研修の実施により常に JRPA の誰かを刺激することにより、JRPA 全体のモチベーション維持を図る努力が引き続き必要である。

添付資料

1. 研修資料リスト

バンダリカレッジ

- 「Key Performance Indicators (KPLs), Presentation on Statistics」
- 「Productivity of Cargo Handling Equipment」
- 「Export Documentation」
- 「Import Documentation」
- 「Statistics Section (KPA)」
- 「Study on Development of Port Statistics and Performance Indicators in PMAESA Ports」
- 「Cargo-Handling Equipment on Board and in Port」
- 「Repairs in Maintenance」
- 「An Introduction to Cranes」
- 「Equipment Safety Checklist」
- 「How to Maintain a Forklift」
- 「Forklifts」
- 「Port Equipment」
- 「Infrastructure Maintenance, Concrete Material」

JICA 専門家

- 「Training in Bandari」
- 「Monitoring after Leaving of the Project Team」
- 「Regulation on the Use of the Public Property」
- 「Regulation on Cargo Handling Service Provider」
- 「General Rules for the Use of the Jetty Area (Draft for Consultation)」
- 「Port Statistics (Overview of the Statistics)」
- 「Cargo Handling Operation Manual in Juba River Port (Mechanized Cargo Handling)」
- 「Manual for Safe Cargo Handling Operations」
- 「Manual for Port Statistics」
- 「Port Facility Maintenance」
- 「Harmonized System」

2. 研修写真

オリエンテーション

講義状況（バンダリカレッジ講師）

講義状況（JICA 専門家）

講義状況（JICA 専門家）

講義状況（JICA 専門家）

講義状況（バンダリカレッジ講師）

現場実習（荷役機械運用・維持管理）

現場実習（港湾施設維持管理）

現場実習（荷役機械運用・維持管理）

現場実習（港湾施設維持管理）

修了証書授与

修了式

3. その他の活動実績

1) 最終要員計画

					2017年										月数（MM）		
					3月		4月		5月		6月		7月		現地	国内	
現地業務	**総括/全体調整/研修計画策定/港湾統計(1)**	小山　彰	(一財)国際臨海開発研究センター（OCDI）	2			8				16				0.80		
	荷役機械運用・維持管理	木村　進	OCDI	3							14				0.47		
	港湾施設維持管理/港湾統計(2)	長谷部　英司	OCDI	3			8				16				0.80		
															0.00		
	第三国研修計画						事前調整				研修実施				2.07		現地+国内
国内作業	**総括/全体調整/研修計画策定/港湾統計(1)**	小山　彰	(一財)国際臨海開発研究センター（OCDI）	2	3				4				3			0.50	1.30
	荷役機械運用・維持管理	木村　進	OCDI	3	1				1				3			0.25	0.72
	港湾施設維持管理/港湾統計(2)	長谷部　英司	OCDI	3	2				4				3			0.45	1.25
																0.00	0.00
																1.20	3.27
	報告書	ワークプラン、事前調査報告書			▲ワークプラン		▲事前調査報告書						業務完了報告書▲			評価団員計	2.55
		業務完了報告書															
	段階及び合計														2.07	1.20	3.27
															3.27		

凡例　現地業務
国内作業
第三国研修

注）1．要員は現地業務と国内作業に分けて担当分野、氏名、所属先、格付を記載すること。各要員の配置期間は実線（当該期間全体日数を人月として計上する場合）または点線（当該期間中において部分的に業務に従事する期間をのべ人月として計上する場合）で表示し、線の下に従事日数を表示する
2．総括（業務主任者）及び副総括は、現地業務、国内作業とも同一人物を配置すること。また、配置期間も全て実線で表示すること。
3．現地業務については必ず、該当業務従事者全員について、担当分野、氏名、所属先、格付を全て記載し、配置期間を実線で表示すること。国内作業のうち、総括（業務主任者）及び副総括以外の業務従事者については、氏名及び所属先については記載不要である。

2) 研修詳細計画書

研修詳細計画書

1. 研修コース

① 機械化荷役及び荷役期間と土木施設の維持管理に係る研修
② 港湾手続きと統計に係る研修

2. 研修場所

ケニア国モンバサ港にあるバンダリカレッジ

3. 研修期間

研修①：2017 年 5 月 22 日（月）～6 月 2 日（金）（旅行日を含めると 5 月 21 日～6 月 3 日）
研修②：2017 年 5 月 22 日（月）～5 月 26 日（金）（旅行日を含めると 5 月 21 日～5 月 27 日）

4. 研修生

研修コース①
Willian Wruda
Kamal Emmanuel
Kamal Award
Joel Pouline
研修コース②
Charles Jume
Charplein Jansul

5. 研修プログラム

① 機械化荷役及び荷役機械と土木施設の維持管理に係る研修

6. 宿泊と食事

バンダリカレッジがカレッジ内にて提供する。

7. 空港往復の交通手段

バンダリカレッジが手配する。

8. 研修手当

JICA 専門家チームが JICA 基準に則り支払う。

9. JICA 専門家チーム

JICA プロジェクトチームの小山、木村、長谷部の 3 人が研修に随行するとともに、専門家自身も講義を行う。

10. 航空券

JICA 南スーダン事務所が手配する。

11. 査証

JICA 南スーダン事務所がケニア国入国に必要な査証取得の詳細情報を提供する。

12. イエローカード

ケニア国入国にはイエローカードが必要である。

3) アクションプラン

William Wruda

Action Plan

(Name) Willian Wruda

(Title of Training Course) Mechanaized Cargo Handling, Maintenance of Infrastructure and Equipment

1. Your Goal

i) Learning the new technology and operation of computerized cargo handling equipment
ii) Making operation training of cargo handling equipment to the young staff of the operation department of JRPA
iii) Acquiring the capability to perform operation o the nes cargo handling equipment without accident

2. What you learnt in this training Course

i) How to operate Fork Lift and Harbor Crane
ii) Cargo handling operations and container operations
iii) Civil works maintenance of interlocking block pavement
iv) Repair of cargo handling equipment
v) Export and import documentations

3. Actions to be taken after going back to JRPA

i) My Actions is to train JRPA staff in the operation department of JRPA
ii) I will teach them on cargo operation using materials which I obtained in this training course.
iii) I will train them on how to handle cargo safely.

4. Required outputs

i) We need;
Fork Lift 25 ton
Crawler Crane 120ton
Belt Conveyer
ii) I need more training; therefore I ask JICA and OCDI to continue to train us.
iii) I hope Juba River Port Extension Project by JICA will start soon. We need new facilities and equipment.

Emmanuel Kamal

Action Plan

(Name) Emmnuel Kamal

(Title of Training Course) Cargo Operations, Infrastructure & Equipment Maintenance

1. Your Goal

i) Learning the new technology and operation of computerized cargo handling equipment
ii) Making operation training of cargo handling equipment to the young staff of the operation department of JRPA
iii) Acquiring the capability to perform operation o the nes cargo handling equipment without ccident

2. What you learnt in this training Course

i) Cargo handling operation of conventional cargo
ii) Equipment operation in cargo handling
iii) Practical operation of conventional cargo terminal equipment
iv) Export and import documentations

3. Actions to be taken after going back to JRPA

i) My Action Plan is to implement the skills obtained on the study tour course in JRPA
ii) To provide good services to JRPA operation department such as safe cargo handling and efficient cargo handling
iii) To train young JRPA staff. There are six or seven staff in the operation department of JRPA

4. Required outputs

i) We need;
Fork Lift 25 ton
Crawler Crane
Reach Stacker
Mobile Crane 35ton
ii) I need more training; therefore I ask JICA and OCDI to continue to train us.
iii) We want more support from Japanese Government and JICA. Juba rive port needs more facilities and equipment.

Kamal Awad

Action Plan

(Name) Kamal Awad Fraialla

(Title of Training Course) Cargo Operations, Infrastructure & Equipment Maintenance

1. Your Goal

i) To achieve knowledge, competences and experiences in cargo handling operations.
ii) To acquire skill, knowledge about maintenance of operation equipment.
iii)Learning the new technology about port facilities.

2. What you learnt in this training Course

i) Have acquired knowledge about types of cargoes
- Containerizing - Conventional cargo - Bulk Cargoes (Liquid – Dry)

ii) Have acquired knowledge about types of operation equipment
- Mobile Crane - Crawler Crane - Huber Crane - Forklift

iii)Have acquired knowledge how to maintain and repair cargo handling equipment.
iv)Have acquired knowledge in documentation of export, import cargo and stevedoring operation.
v) Have acquired idea about civil works, asphalt and civil infrastructure.
- Interlocking block pavement
- Asphalt concrete pavement

3. Actions to be taken after going back to JRPA

i) I will be able to train technicians of JRPA about the knowledge acquired during the training course.
ii) Training of trainors (TOT) from another port in south Sudan about cargo handling operation equipment.
iii) Awareness about the importance of safety for staff of JRPA in general and maintenance section in particular.
iv) I will be able to supervise about civil works and civil infrastructure in JRPA.

4. Required outputs

i) To JICA ,OCDI more training for JRPA staff to improve capacity building and skills
ii) To JICA ,OCDI specialized training for maintenance section of JRPA preferably practically
iii) Implementation of JRPA construction project is needed.
iv) Link of relationship needed between JICA,OCDI, KPA and JRPA for consultation

Joel Pauline

Action Plan

(Name) Joel Pauline

(Title of Training Course) Cargo Operations, Infrastructure & Equipment Maintenance

1. Your Goal

i) My goal is to change the current condition of maintenance and repair of port facilities in JRPA
ii) To present good service to the port users in maintenance of computerized machines and other equipment
iii) To acquire the capability to maintain the new cargo handling without breakdown, and train the other new staff in JRPA

2. What you learnt in this training Course

i) How to manage and how to maintain port equipment (Fork-Lift, Mobile Crane, Crawler Crane, Reach stacker, Harbor Crane, Hopper and Grab
ii) Maintenance of Asphalt concrete pavement and repair of crocodile cracks, Interlocking block pavement and Civil Engineering work
iii) Export documentation and import documentation. Export documentation means shipping the goods and service out of the country and Import documentation means shipping the goods and service in the country.
iv) Repair of cargo handling equipment and Replacement of equipment parts

3. Actions to be taken after going back to JRPA

i) To utilize the skills by implementation of the study tour course of Juba River Port Administration
ii) Initially I start by organizing the two important sections of Maintenance department and Operation department in JRPA, these two departments need complete materials every one need (warehouse,workshop,and all type of tools…so on)
iii) Secondly I will make same training to my staffs who did not attend in this training in Bandari college

4. Required outputs

i) Crawler crane, mobile crane, 120t-----35t
ii) Fork-lift, truck with crane 15t /25t-----20t
iii) Belt conveyer ,hopper, grab 10m------
iv) Reach stacker and one gantry crane 40t
v) Two small cars for JRPA staffs for the services
vi) Capacity building of JRPA needs more training in all sections ,I request to JICA/OCDI to organize training in maintenance and Operation before end of the Project, because OCDI/JICA well provide as with cargo handling equipment and this port equipment need good management For this reason I request to ocdi to arrange for as training title mechanized cargo handling and Maintenance of cargo handling equipment, civil engineering work in JAPAN duration of two Months, before end of the Project.

Charles Juma

Action Plan

(Name) Charles Peter

(Title of Training Course) Basic Port Documentation and Statistics

1. Your Goal

To achieve statistics data collection and information which is to be analyzed, compiled and presented

2. What you learnt in this training Course

A lot as for statistics data information, book documentation, port procedures, etc.

3. Actions to be taken after going back to JRPA

Action is to implement what has been achieved physical or practical
Establishment of collecting data and information is very important. I will invite people from barge companies periodically and ask them to submit data. JRAP will compile such data as port statistics
I will also

4. Required outputs

Required outputs are the goal in every business of whatever we do, but with the use of port facilities or equipment to achieve the outputs as targeted ends.
We need more training; therefore we request JICA to prepare more training course in Japan and/or other countries. I will appeal my idea to my boss.

Other comments

1. Training of Juba river port administration staff to a level as the one of port Mombasa and like any other ports in the world through JICA technical cooperation project and enhancement of operation management capacity of inland waterway in the Republic of South Sudan will be still necessary.
2. The construction of Juba river port which is an expansion project of Juba river port through JICA grant aid is very essential.
3. The Port is supposed to be like any sustainable organization just like airport or civil aviation which develops by revenue collection that it collects. In the near future, Juba river port depends on revenue collection for it is progress of development, not to depend on the third party from outside resources for it is development.
4. Tariff system; There must be law that governs the procedures.
5. Collection of data information is very essential because for future use. Of course, we analyze statistics and compile and present

Chaplain Jansuk

Action Plan

(Name) Chaplain Jansuk Augustino

(Title of Training Course) Basic Port Documentation and Statistics

1. Your Goal

i) Setting f new system of statistics development in Juba River Port
ii) Addition of new staffs in statistics department
iii) Setting up in new facilities to enable the work of statistics more smooth (e.g. computer, printer and furniture)
iv) TO make the use of statistic useful

2. What you learnt in this training Course

i) Method of compiling and documentation of port statistics
ii) How to generate and be more productive in my home port
iii) How to control statistics to be in right information for wise decision making
iv) How to differential the types of cargo, transshipment, transit and cargo handling

3. Actions to be taken after going back to JRPA

i) Quick improvement of statistics data and information in a right channel
ii) Compiling of statistics information for further decision in a new future
iii) I am going to organize and train our more staffs to join the statistics and know the importance of statistics
iv) To improve the new system of data entry and reporting duration to the management oboard

4. Required outputs

i) From the point of view, Juba River Port in the near future is going to be one of the standard port which is going to have good modern system of revenue collection.
ii) All the staffs of Juba River Port has acquired basic knowledge of managing the port function.
iii) Juba River Port is going to acquire its financial budget independently.
iv) Also, once more through with the help of JICA and OCDI with the training that supported us, it makes Juba River Port strong. We still need more support from you for better knowledge
v) We need your support to install the statistic development in Juba River Port Administration (JRPA).

4) JICA アンケート

William Wruda

~ Questionnaire ~

◆ Purpose of Questionnaire:
Questionnaire is used for the evaluation and monitoring of the program. Please give us your constructive opinions to improve our program.

◆ Date of Submission:
Please follow the instructions of the JICA Officer and Training Coordinator.

◆ Basic Information:
Please fill out the following.

Course Name	The Project on Monitoring Support and Improvement for the Operation and Management of Juba River Port
Name of Participant	Mr./Ms. WILLIAM WURDA DANIEL
Country	The Republic of South Sudan
Sex	☑ Male ☐ Female
Age	43 YEARS
Course Duration	Two WEEKS

PART I Program output

Course Objective

The purpose of this project is to ensure that the know-how and skills acquired during the previous technical assistance are maintained and to help facilitate the commencement of the grant aid project and succeeding technical assistance.

Q1. Have you achieved Course Objective?

← Fully Achieved 十分達成できた		達成していない Not achieved →	
☑4	☐3	☐2	☐1

Q2. Any comments or suggestions, especially if your rating is 1 or 2.

NO

Q3. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
- cargo handling	<Reason>
(2)Subjects that were not necessary	
—	<Reason>
(3) Subjects that were not covered, but should have been included	
—	<Reason>

1/4

Q4. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
- conventional cargo handling - export in our operation in cargo handling	<Reason>
(2)Subjects that were not necessary	
NO	<Reason>
(3) Subjects that were not covered, but should have been included	
NO	<Reason>

PART II Program Design

Q1. Do you find the design of the course appropriate for you (your organization) to achieve the Course Objective?
(※design of course: structure of modules in the course)

← Yes, appropriate 適切である		適切ではない No, inappropriate →	
☑4	☐3	☐2	☐1

Q2. Do you find the period of the course appropriate?

Long 長い	Appropriate 適切	Short 短い
☐	☐	☑

Q3. Do you find the number of participants in the course appropriate?

Too many 多い	Appropriate 適切	Too few 少ない
☐	☑	☐

Q4. Did you have enough opportunities to get direct experiences such as site-visits and practices in the course?

← Yes, enough 十分あった		なかった No, very few →	
☑4	☐3	☐2	☐1

Q5. Did you have enough opportunities to participate actively in the course, such as discussions and workshops?

← Yes, enough 十分あった		なかった No, very few →	
☑4	☐3	☐2	☐1

Q6. Was the quality of lectures good enough for you to understand clearly?

← Yes, very good 良かった		不十分だった No, poor →	
☑4	☐3	☐2	☐1

Q7. Were you satisfied with the textbooks and materials used in the course?

← Yes, very much 満足した		満足していない No, not at all →	
☑4	☐3	☐2	☐1

Q8. Do you think the knowledge and experience you acquired through the course is useful?

- ☑A Yes, it can be directly applied to work.
- ☐B It cannot be directly applied, but it can be adaptable to work.
- ☐C It cannot be directly applied or adapted, but it can be of reference to me.
- ☐D No, it was not useful at all.

Q9. Did you get appropriate facilitation (e.g. an advice for better understanding of the lectures, advice for making an action plan, etc.) by Japanese side in order for you to achieve your objective?

← Yes, very much 満足した		満足していない No, not at all →	
☑4	☐3	☐2	☐1

Q10. Concerning the accommodations, please mark your level of satisfaction.
(※If you didn't stay at JICA Center or Hotels, please mark X.)

	←Satisfied 満足した		満足していない Unsatisfied →		X
■Facilities at Bandari College	☑4	☐3	☐2	☐1	☐
■Meals at Bandari College	☑4	☐3	☐2	☐1	☐
■Service at Bandari College	☑4	☐3	☐2	☐1	☐

Q11. Any comments or suggestions for improvement concerning Q1～Q10 above, especially if your ratings are negative. Please also write the question number corresponding to each of your comment (See an example). NO

example:
Q6――We had many important lectures. But in the most of lectures we didn't have enough time to ask questions. I think we need more discussions for deepening our understanding. I also wanted to have opportunities to exchange opinions with other participants to polish my idea of action plan.

PART III Findings and Learnings

1~4.(Essential):"Your findings on useful Knowledge"

Q1. Of the knowledge you acquired through the program, please choose the useful knowledge (method, service, organization, system, institution, concept), techniques and skills which can be adoptable or adaptable to solve problems in your country.

2/4

Q2.Please describe why the knowledge you chose is useful.

- It is useful for better productivity of conventional operations

Q3. Please describe how to adopt or adapt it (them) into your organization or your country. Also, if there are any obstacles when adopting or adapting it, please describe.

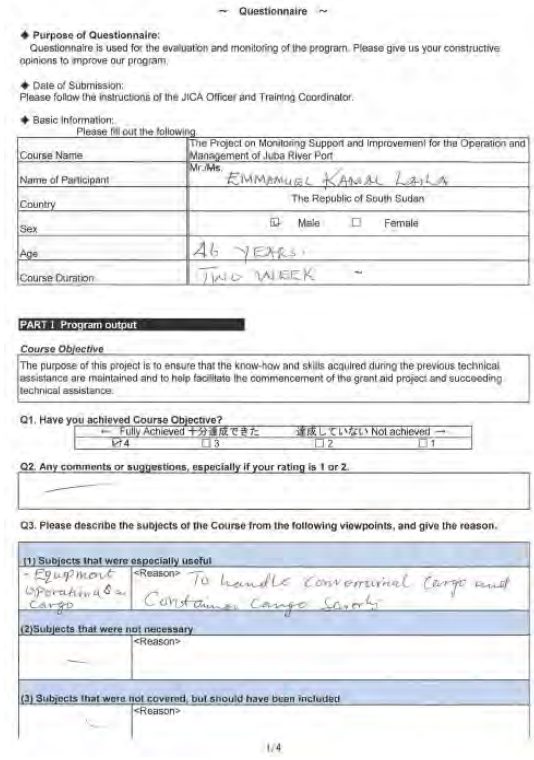
- The adoption is through practical operation of conventional cargo and container handling system.

※あなたの回答はJICAが事業改善のために使用させて頂きます。ご協力ありがとうございます。
※Your comments may be quoted and used by JICA for improving our program.Thank you very much for your cooperation.

- Please it is of very grateful for your support project to handling our situation in Juba River port, please keep supporting.

4/4

Emmanuel Kamal



～ Questionnaire ～

◆ Purpose of Questionnaire:
Questionnaire is used for the evaluation and monitoring of the program. Please give us your constructive opinions to improve our program.

◆ Date of Submission:
Please follow the instructions of the JICA Officer and Training Coordinator.

◆ Basic Information:
Please fill out the following.

Course Name	The Project on Monitoring Support and Improvement for the Operation and Management of Juba River Port
Name of Participant	Mr./Ms. EMMANUEL KAMAL LAILA
Country	The Republic of South Sudan
Sex	☑ Male ☐ Female
Age	46 YEARS
Course Duration	TWO WEEK

PART I Program output

Course Objective

The purpose of this project is to ensure that the know-how and skills acquired during the previous technical assistance are maintained and to help facilitate the commencement of the grant aid project and succeeding technical assistance.

Q1. Have you achieved Course Objective?

← Fully Achieved 十分達成できた			達成していない Not achieved →
☑4	☐3	☐2	☐1

Q2. Any comments or suggestions, especially if your rating is 1 or 2.

Q3. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
- Equipment operating - Cargo	<Reason> To handle conventional cargo and Containers cargo shortly
(2)Subjects that were not necessary	
—	<Reason>
(3) Subjects that were not covered, but should have been included	
—	<Reason>

1/4

Q4. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
- Equipment operating - Stevedoring	<Reason> - for Safety cargo handling
(2)Subjects that were not necessary	
—	<Reason>
(3) Subjects that were not covered, but should have been included	
—	<Reason>

PART II Program Design

Q1. Do you find the design of the course appropriate for you (your organization) to achieve the Course Objective?
(※design of course: structure of modules in the course)

← Yes, appropriate適切である			適切でほないNo, inappropriate →
☑4	☐3	☐2	☐1

Q2. Do you find the period of the course appropriate?

Long長い	Appropriate適切	Short短い
☐	☐	☑

Q3. Do you find the number of participants in the course appropriate?

Too many多い	Appropriate適切	Too few少ない
☐	☑	☐

Q4. Did you have enough opportunities to get direct experiences such as site-visits and practices in the course?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q5. Did you have enough opportunities to participate actively in the course, such as discussions and workshops?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q6. Was the quality of lectures good enough for you to understand clearly?

← Yes, very good 良かった			不十分だった No, poor →
☑4	☐3	☐2	☐1

Q7. Were you satisfied with the textbooks and materials used in the course?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

2/4

Q8. Do you think the knowledge and experience you acquired through the course is useful?

☑A	Yes, it can be directly applied to work.
☐B	It cannot be directly applied, but it can be adaptable to work.
☐C	It cannot be directly applied or adapted, but it can be of reference to me.
☐D	No, it was not useful at all.

Q9. Did you get appropriate facilitation (e.g. an advice for better understanding of the lectures, advice for making an action plan, etc.) by Japanese side in order for you to achieve your objective?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

Q10. Concerning the accommodations, please mark your level of satisfaction.
(※If you didn't stay at JICA Center or Hotels, please mark X.)

	←Satisfied満足した			満足していないUnsatisfied→	X
■Facilities at Bandari College	☑4	☐3	☐2	☐1	☐
■Meals at Bandari College	☑4	☐3	☐2	☐1	☐
■Service at Bandari College	☑4	☐3	☐2	☐1	☐
	☐	☐	☐	☐	☐

Q11. Any comments or suggestions for improvement concerning Q1~Q10 above, especially if your ratings are negative. Please also write the question number corresponding to each of your comment (See an example).

example:
Q6——We had many important lectures. But in the most of lectures we didn't have enough time to ask questions. I think we need more discussions for deepening our understanding. I also wanted to have opportunities to exchange opinions with other participants to polish my idea of action plan.

PART III Findings and Learnings

1~4.(Essential):"Your findings on useful Knowledge"

Q1. Of the knowledge you acquired through the program,
please choose the useful knowledge (method, service, organization, system, institution, concept), techniques and skills which can be adoptable or adaptable to solve problems in your country.

- The base of knowledge I do acquire is going to be useful in my Port.

3/4

Q2.Please describe why the knowledge you chose is useful.

- It is for the better cargo handling in Juba River Port in a near future

Q3. Please describe how to adopt or adapt it (them) into your organization or your country. Also, if there are any obstacles when adopting or adapting it, please describe.

- Through direct implementation of cargo handling Equipment.

※あなたの回答はJICAが事業改善のために使用させて頂きます。ご協力ありがとうございます。
※Your comments may be quoted and used by JICA for improving our program.Thank you very much for your cooperation.

- It is very Successful to achive this training in Bandari, for the Better use in Juba Port
- Thanks for Jica and OCAS for their great Support for us, Keep Support Juba River Port- Administration

Kamal Awad

～ Questionnaire ～

◆ Purpose of Questionnaire:
Questionnaire is used for the evaluation and monitoring of the program; Please give us your constructive opinions to improve our program.

◆ Date of Submission:
Please follow the instructions of the JICA Officer and Training Coordinator.

◆ Basic Information:
Please fill out the following.

Course Name	The Project on Monitoring Support and Improvement for the Operation and Management of Juba River Port
Name of Participant	Mr./Ms. Kamal Awad Frajalla Yugu
Country	The Republic of South Sudan
Sex	☑ Male ☐ Female
Age	37 Year
Course Duration	22-05-2017 ~ 02-06-2017

PART I Program output

Course Objective

The purpose of this project is to ensure that the know-how and skills acquired during the previous technical assistance are maintained and to help facilitate the commencement of the grant aid project and succeeding technical assistance.

Q1. Have you achieved Course Objective?

← Fully Achieved 十分達成できた		達成していない Not achieved →	
☑4	☐3	☐2	☐1

Q2. Any comments or suggestions, especially if your rating is 1 or 2.

Q3. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
maintence of cargo handling equipment	<Reason> Because it's a part of my section
(2)Subjects that were not necessary	
/	<Reason>
(3) Subjects that were not covered, but should have been included	
/	<Reason>

1/4

Q4. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
Export and import documentation Cargoes	<Reason> Necessary in (JRPA) Toad AVoid documentation by private Companies.
(2)Subjects that were not necessary	
✓	<Reason> ✓
(3) Subjects that were not covered, but should have been included	
✓	<Reason> ✗

PART II Program Design

Q1. Do you find the design of the course appropriate for you (your organization) to achieve the Course Objective?
(※design of course: structure of modules in the course)

← Yes, appropriate適切である			適切ではないNo, inappropriate →
☑4	☐3	☐2	☐1

Q2. Do you find the period of the course appropriate?

Long長い	Appropriate適切	Short短い
☐	☐	☑

Q3. Do you find the number of participants in the course appropriate?

Too many多い	Appropriate適切	Too few少ない
☐	☑	☐

Q4. Did you have enough opportunities to get direct experiences such as site-visits and practices in the course?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q5. Did you have enough opportunities to participate actively in the course, such as discussions and workshops?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q6. Was the quality of lectures good enough for you to understand clearly?

← Yes, very good 良かった			不十分だった No, poor →
☑4	☐3	☐2	☐1

Q7. Were you satisfied with the textbooks and materials used in the course?

← Yes, very much 満足した			満足していない No, not at all →
☐4	☑3	☐2	☐1

Q8. Do you think the knowledge and experience you acquired through the course is useful?

☑A	Yes, it can be directly applied to work.
☐B	It cannot be directly applied, but it can be adaptable to work.
☐C	It cannot be directly applied or adapted, but it can be of reference to me.
☐D	No, it was not useful at all.

Q9. Did you get appropriate facilitation (e.g. an advice for better understanding of the lectures, advice for making an action plan, etc.) by Japanese side in order for you to achieve your objective?

← Yes, very much 満足した			満足していない No, not at all →
☐4	☐3	☐2	☐1

Q10. Concerning the accommodations, please mark your level of satisfaction.
(※if you didn't stay at JICA Center or Hotels, please mark X.)

	←Satisfied満足した			満足していないUnsatisfied →	X
■Facilities at Bandari College	☐4	☑3	☐2	☐1	☐
■Meals at Bandari College	☑4	☐3	☐2	☐1	☐
■Service at Bandari College	☐4	☑3	☐2	☐1	☐

Q11. Any comments or suggestions for improvement concerning Q1～Q10 above, especially if your ratings are negative. Please also write the question number corresponding to each of your comment (See an example).

example:
Q8――We had many important lectures. But in the most of lectures we didn't have enough time to ask questions. I think we need more discussions for deepening our understanding. I also wanted to have opportunities to exchange opinions with other participants to polish my idea of action plan.

PART III Findings and Learnings

1~4.(Essential):"Your findings on useful Knowledge"

Q1. Of the knowledge you acquired through the program, please choose the useful knowledge (method, service, organization, system, institution, concept), techniques and skills which can be adoptable or adaptable to solve problems in your country.

3/4

1- Cargo handling operations (Conventional Cargo)
2- Equipment operation in cargo handling

Q2.Please describe why the knowledge you chose is useful.

-To avaid the Cargoes is handling manually in (JRPA)

Q3. Please describe how to adopt or adapt it (them) into your organization or your country. Also, If there are any obstacles when adopting or adapting it, please describe.

Currently (ToT) Training of Trainer About the Knowledge I have acquired during the course period.

※あなたの回答はJICAが事業改善のために使用させて頂きます。ご協力ありがとうございます。
※Your comments may be quoted and used by JICA for improving our program.Thank you very much for your cooperation.

Thanks for JICA and OCDI for been Supporting (JRPA) Your ~~Cooperation~~ Cooperation is high ~~appreci~~ appreciated. and We are looking forward for more Cooperation To Improvement of (JRPA)

4/4

Joel Pauline

~ Questionnaire ~

◆ Purpose of Questionnaire:
Questionnaire is used for the evaluation and monitoring of the program. Please give us your constructive opinions to improve our program.

◆ Date of Submission:
Please follow the instructions of the JICA Officer and Training Coordinator.

◆ Basic Information:
Please fill out the following.

Course Name	The Project on Monitoring Support and Improvement for the Operation and Management of Juba River Port
Name of Participant	Mr/Ms. JOEL PAULINO LADO
Country	The Republic of South Sudan
Sex	☑ Male ☐ Female
Age	34 Years
Course Duration	22-05-2017 ~ 02-06-2017

PART I Program output

Course Objective

The purpose of this project is to ensure that the know-how and skills acquired during the previous technical assistance are maintained and to help facilitate the commencement of the grant aid project and succeeding technical assistance.

Q1. Have you achieved Course Objective?

← Fully Achieved 十分達成できた		達成していない Not achieved →	
☑4	☐3	☐2	☐1

Q2. Any comments or suggestions, especially if your rating is 1 or 2. NO COMMENTS

Q3. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful: Port equipment	
	<Reason>: Because of the equipment working in a good condition = Output
(2)Subjects that were not necessary: All are necessary for all experience	
	<Reason>:
(3) Subjects that were not covered, but should have been included: NO.	
	<Reason>:

1/4

Q4. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful: Maintenance of port facilities	
	<Reason>: To give a good Out Put.
(2)Subjects that were not necessary: Mentance of the equipment	
	<Reason>: Because good maintenance results a good output.
(3) Subjects that were not covered, but should have been included: Safety and ware house logistics	
	<Reason>:

PART II Program Design

Q1. Do you find the design of the course appropriate for you (your organization) to achieve the Course Objective?
(※design of course: structure of modules in the course)

← Yes, appropriate適切である			適切ではないNo, inappropriate →
☑4	☐3	☐2	☐1

Q2. Do you find the period of the course appropriate?

Long長い	Appropriate適切	Short短い
☐	☑	☐

Q3. Do you find the number of participants in the course appropriate?

Too many多い	Appropriate適切	Too few少ない
☑	☐	☐

Q4. Did you have enough opportunities to get direct experiences such as site-visits and practices in the course?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q5. Did you have enough opportunities to participate actively in the course, such as discussions and workshops?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q6. Was the quality of lectures good enough for you to understand clearly?

← Yes, very good 良かった			不十分だった No, poor →
☑4	☐3	☐2	☐1

Q7. Were you satisfied with the textbooks and materials used in the course?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

2/4

Q8. Do you think the knowledge and experience you acquired through the course is useful?

☑A	Yes, it can be directly applied to work.
☐B	It cannot be directly applied, but it can be adaptable to work.
☐C	It cannot be directly applied or adapted, but it can be of reference to me.
☐D	No, it was not useful at all.

Q9. Did you get appropriate facilitation (e.g. an advice for better understanding of the lectures, advice for making an action plan, etc.) by Japanese side in order for you to achieve your objective?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

Q10. Concerning the accommodations, please mark your level of satisfaction.
(※If you didn't stay at JICA Center or Hotels, please mark X.)

	←Satisfied満足した			満足していないUnsatisfied →	X
■Facilities at Bandari College	☑4	☐3	☐2	☐1	☐
■Meals at Bandari College	☑4	☐3	☐2	☐1	☐
■Service at Bandari College	☑4	☐3	☐2	☐1	☐

Q11. Any comments or suggestions for improvement concerning Q1~Q10 above, especially if your ratings are negative. Please also write the question number corresponding to each of your comment (See an example).

example:
Q6-----We had many important lectures. But in the most of lectures we didn't have enough time to ask questions. I think we need more discussions for deepening our understanding. I also wanted to have opportunities to exchange opinions with other participants to polish my idea of action plan.

PART III Findings and Learnings

1~4.(Essential):"Your findings on useful Knowledge"

Q1. Of the knowledge you acquired through the program,
please choose the useful knowledge (method, service, organization, system, institution, concept), techniques and skills which can be adoptable or adaptable to solve problems in your country.

Repair of cargo Handling Equipment and maintenance of Port Facilities.

Q2.Please describe why the knowledge you chose is useful. Maintenance of Port facilities.

Q3. Please describe how to adopt or adapt it (them) into your organization or your country. Also, If there are any obstacles when adopting or adapting it, please describe.

Adopting through by practicing.

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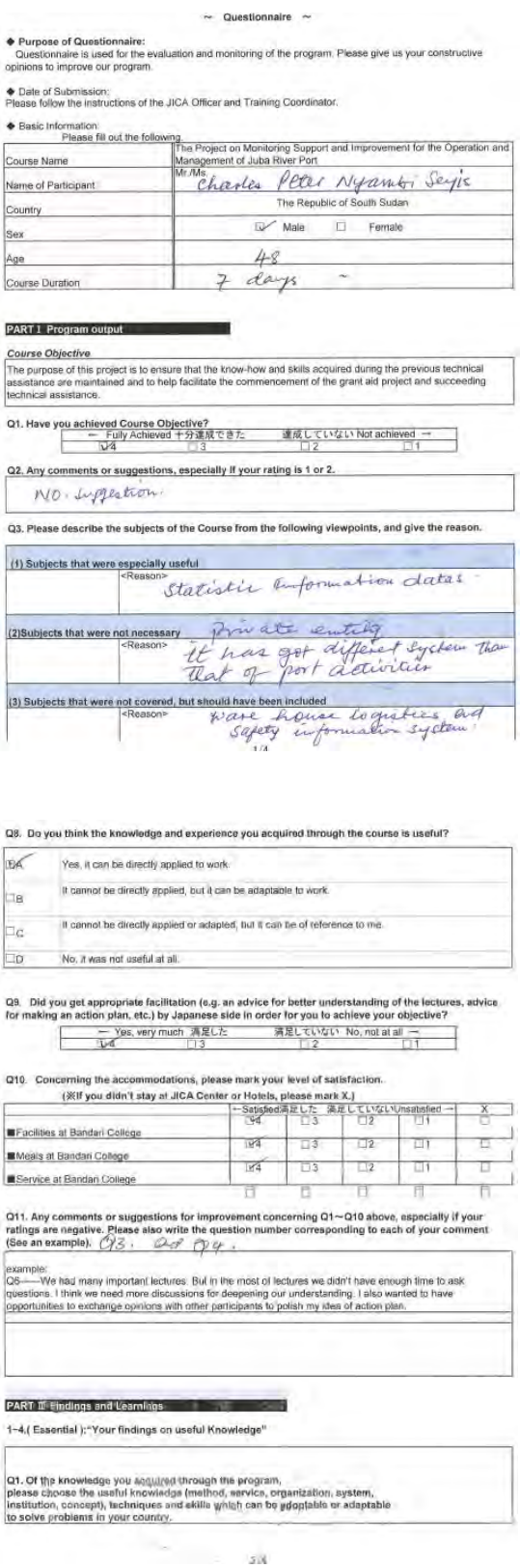
※Your comments may be quoted and used by JICA for improving our program.Thank you very much for your cooperation.

Charles Juma



~ Questionnaire ~

◆ Purpose of Questionnaire:
Questionnaire is used for the evaluation and monitoring of the program. Please give us your constructive opinions to improve our program.

◆ Date of Submission:
Please follow the instructions of the JICA Officer and Training Coordinator.

◆ Basic Information:
Please fill out the following.

Course Name	The Project on Monitoring Support and Improvement for the Operation and Management of Juba River Port
Name of Participant	Mr./Ms. Charles Peter Nyamuti Seyis
Country	The Republic of South Sudan
Sex	☑ Male ☐ Female
Age	48
Course Duration	7 days

PART I Program output

Course Objective

The purpose of this project is to ensure that the know-how and skills acquired during the previous technical assistance are maintained and to help facilitate the commencement of the grant aid project and succeeding technical assistance.

Q1. Have you achieved Course Objective?

← Fully Achieved 十分達成できた			達成していない Not achieved →
☑4	☐3	☐2	☐1

Q2. Any comments or suggestions, especially if your rating is 1 or 2.

NO. suggestion.

Q3. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
<Reason>	Statistic information datas
(2)Subjects that were not necessary	Private entity
<Reason>	It has got different system than that of port activities
(3) Subjects that were not covered, but should have been included	
<Reason>	Base house logistics and safety information system

1/4

Reason: Safety information is very essential for every worker at the port or at work place.

Q4. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	Port documentation
<Reason>	Because it Contains vast port unit of section, carrying work at the port.
(2)Subjects that were not necessary	Private entity
<Reason>	It has nothing to be done with port activities because it is out side the port mission
(3) Subjects that were not covered, but should have been included	Safety information
<Reason>	It aware every one about the danger of accident, so safety is first

PART II Program Design

Q1. Do you find the design of the course appropriate for you (your organization) to achieve the Course Objective?
(※design of course: structure of modules in the course)

← Yes, appropriate適切である			適切ではない No, inappropriate →
☑4	☐3	☐2	☐1

Q2. Do you find the period of the course appropriate?

Long長い	Appropriate適切	Short短い
☐	☑	☐

Q3. Do you find the number of participants in the course appropriate?

Too many多い	Appropriate適切	Too few少ない
☐	☑	☐

Q4. Did you have enough opportunities to get direct experiences such as site-visits and practices in the course?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q5. Did you have enough opportunities to participate actively in the course, such as discussions and workshops?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q6. Was the quality of lectures good enough for you to understand clearly?

← Yes, very good 良かった			不十分だった No, poor →
☑4	☐3	☐2	☐1

Q7. Were you satisfied with the textbooks and materials used in the course?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

Q8. Do you think the knowledge and experience you acquired through the course is useful?

☑A	Yes, it can be directly applied to work.
☐B	It cannot be directly applied, but it can be adaptable to work.
☐C	It cannot be directly applied or adapted, but it can be of reference to me.
☐D	No, it was not useful at all.

Q9. Did you get appropriate facilitation (e.g. an advice for better understanding of the lectures, advice for making an action plan, etc.) by Japanese side in order for you to achieve your objective?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

Q10. Concerning the accommodations, please mark your level of satisfaction.
(※If you didn't stay at JICA Center or Hotels, please mark X.)

	←Satisfied満足した		満足していない Unsatisfied →		X
■Facilities at Bandari College	☑4	☐3	☐2	☐1	☐
■Meals at Bandari College	☑4	☐3	☐2	☐1	☐
■Service at Bandari College	☑4	☐3	☐2	☐1	☐

Q11. Any comments or suggestions for improvement concerning Q1~Q10 above, especially if your ratings are negative. Please also write the question number corresponding to each of your comment (See an example). Q3. and Q4.

example:
Q5 ---We had many important lectures. But in the most of lectures we didn't have enough time to ask questions. I think we need more discussions for deepening our understanding. I also wanted to have opportunities to exchange opinions with other participants to polish my idea of action plan.

PART III Findings and Learnings

1~4.(Essential):"Your findings on useful Knowledge"

Q1. Of the knowledge you acquired through the program, please choose the useful knowledge (method, service, organization, system, institution, concept), techniques and skills which can be adoptable or adaptable to solve problems in your country.

Port documentation because it facilitate easy running of operation of the port.

Q2.Please describe why the knowledge you chose is useful.

As mentioned above, port documentation can be at a base or reference for any previous data

Q3. Please describe how to adopt or adapt it (them) into your organization or your country. Also, if there are any obstacles when adopting or adapting it, please describe.

Adopting is through by practising, because Practicing makes better or improves more

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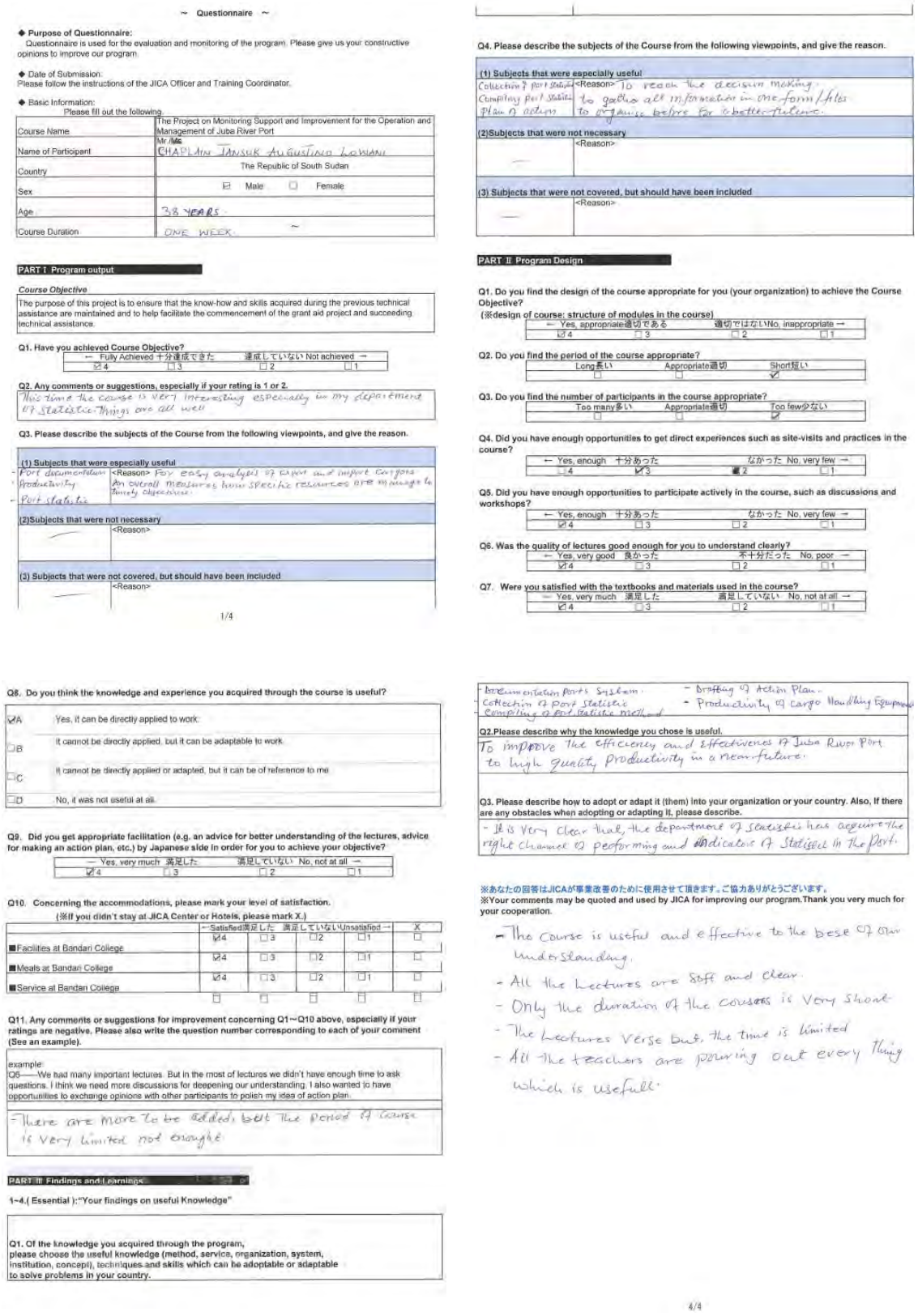
※Your comments may be quoted and used by JICA for improving our program.Thank you very much for your cooperation.

Chaplain Jansuk



~ Questionnaire ~

◆ Purpose of Questionnaire:
Questionnaire is used for the evaluation and monitoring of the program. Please give us your constructive opinions to improve our program.

◆ Date of Submission:
Please follow the instructions of the JICA Officer and Training Coordinator.

◆ Basic Information:
Please fill out the following.

Course Name	The Project on Monitoring Support and Improvement for the Operation and Management of Juba River Port
Name of Participant	Mr./Ms. CHAPLAIN JANSUK AUGUSTINO LAWIANI
Country	The Republic of South Sudan
Sex	☑ Male ☐ Female
Age	38 YEARS
Course Duration	ONE WEEK

PART I Program output

Course Objective

The purpose of this project is to ensure that the know-how and skills acquired during the previous technical assistance are maintained and to help facilitate the commencement of the grant aid project and succeeding technical assistance.

Q1. Have you achieved Course Objective?

← Fully Achieved 十分達成できた		達成していない Not achieved →	
☑4	☐3	☐2	☐1

Q2. Any comments or suggestions, especially if your rating is 1 or 2.

This time the course is very interesting especially in my department of statistic. Things are all well

Q3. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
- Port documentation - Productivity - Port statistic	<Reason> For easy analysis of export and import cargoes An overall measures how specific resources are managed to timely objectives.
(2)Subjects that were not necessary	
—	<Reason>
(3) Subjects that were not covered, but should have been included	
—	<Reason>

1/4

Q4. Please describe the subjects of the Course from the following viewpoints, and give the reason.

(1) Subjects that were especially useful	
Collection of port statistic Compiling port statistic Plan of action	<Reason> To reach the decision making. To gather all information in one form/files to organize before for a better future.
(2)Subjects that were not necessary	
—	<Reason>
(3) Subjects that were not covered, but should have been included	
—	<Reason>

PART II Program Design

Q1. Do you find the design of the course appropriate for you (your organization) to achieve the Course Objective?
(※design of course: structure of modules in the course)

← Yes, appropriate適切である			適切ではないNo, inappropriate →
☑4	☐3	☐2	☐1

Q2. Do you find the period of the course appropriate?

Long長い	Appropriate適切	Short短い
☐	☐	☑

Q3. Do you find the number of participants in the course appropriate?

Too many多い	Appropriate適切	Too few少ない
☐	☐	☑

Q4. Did you have enough opportunities to get direct experiences such as site-visits and practices in the course?

← Yes, enough 十分あった			なかった No, very few →
☐4	☑3	☐2	☐1

Q5. Did you have enough opportunities to participate actively in the course, such as discussions and workshops?

← Yes, enough 十分あった			なかった No, very few →
☑4	☐3	☐2	☐1

Q6. Was the quality of lectures good enough for you to understand clearly?

← Yes, very good 良かった			不十分だった No, poor →
☑4	☐3	☐2	☐1

Q7. Were you satisfied with the textbooks and materials used in the course?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

Q8. Do you think the knowledge and experience you acquired through the course is useful?

☑A	Yes, it can be directly applied to work.
☐B	It cannot be directly applied, but it can be adaptable to work.
☐C	It cannot be directly applied or adapted, but it can be of reference to me.
☐D	No, it was not useful at all.

Q9. Did you get appropriate facilitation (e.g. an advice for better understanding of the lectures, advice for making an action plan, etc.) by Japanese side in order for you to achieve your objective?

← Yes, very much 満足した			満足していない No, not at all →
☑4	☐3	☐2	☐1

Q10. Concerning the accommodations, please mark your level of satisfaction.
(※If you didn't stay at JICA Center or Hotels, please mark X.)

	←Satisfied満足した		満足していないUnsatisfied →		X
■Facilities at Bandari College	☑4	☐3	☐2	☐1	☐
■Meals at Bandari College	☑4	☐3	☐2	☐1	☐
■Service at Bandari College	☑4	☐3	☐2	☐1	☐
	☐	☐	☐	☐	☐

Q11. Any comments or suggestions for improvement concerning Q1~Q10 above, especially if your ratings are negative. Please also write the question number corresponding to each of your comment (See an example).

example:
Q5——We had many important lectures. But in the most of lectures we didn't have enough time to ask questions. I think we need more discussions for deepening our understanding. I also wanted to have opportunities to exchange opinions with other participants to polish my idea of action plan.

- There are more to be added, but the period of course is very limited not enought

PART III Findings and Learnings

1~4.(Essential):"Your findings on useful Knowledge"

Q1. Of the knowledge you acquired through the program,
please choose the useful knowledge (method, service, organization, system, institution, concept), techniques and skills which can be adoptable or adaptable to solve problems in your country.

- Documentation Ports System
- Collection of Port Statistic
- Compiling of Port Statistic method
- Drafting of Action Plan
- Productivity of cargo Handling Equipment

Q2.Please describe why the knowledge you chose is useful.

To improve the efficiency and effectiveness of Juba River Port to high quality productivity in a near future.

Q3. Please describe how to adopt or adapt it (them) into your organization or your country. Also, If there are any obstacles when adopting or adapting it, please describe.

- It is very clear that, the department of statistic has acquire the right channel of performing and indicators of statistic in the port.

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※Your comments may be quoted and used by JICA for improving our program.Thank you very much for your cooperation.

- The course is useful and effective to the base of our understanding.
- All the lectures are staff and clear.
- Only the duration of the courses is very short.
- The lectures verse but, the time is limited
- All the teachers are pouring out every thing which is usefull.

4/4

講義資料集（別添）

Training Materials

Bandari College

B1. 「Key Performance Indicators (KPLs), Presentation on Statistics」

B2. 「Productivity of Cargo Handling Equipment」

B3. 「Export Documentation」

B4. 「Import Documentation」

B5. 「Statistics Section (KPA)」

B6. 「Study on Development of Port Statistics and Performance Indicators in PMAESA Ports」

B7. 「Cargo-Handling Equipment on Board and in Port」

B8. 「Repairs in Maintenance」

B9.「An Introduction to Cranes」

B10. 「Equipment Safety Checklist」

B11. 「How to Maintain a Forklift」

B12. 「Forklifts」

B13. 「Port Equipment」

B14. 「Infrastructure Maintenance, Concrete Material」

JICA Experts

J1. 「Training in Bandari」

J2. 「Monitoring after Leaving of the Project Team」

J3. 「Regulation on the Use of the Public Property」

J4. 「Regulation on Cargo Handling Service Provider」

J5. 「General Rules for the Use of the Jetty Area (Draft for Consultation)」

J6. 「Port Statistics (Overview of the Statistics)」

J7. 「Cargo Handling Operation Manual in Juba River Port (Mechanized Cargo Handling)」

J8. 「Manual for Safe Cargo Handling Operations」

J9. 「Manual for Port Statistics」

J10. 「Port Facility Maintenance」

J11. 「Harmonized System」

KEY PERFORMANCE INDICATORS (KPIs)

PRESENTATION ON STATISTICS

25TH MAY 2017

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TYPES OF PERFORMANCE MEASURES

1. **Output/Production measures**: An indicator that capture total tonnage, port throughput, berth throughput, number of ship call, receipts and delivery at the gate.
2. **Productivity measures**: An indicator that measure port productivity per hour/day.
3. **Utilization measures**: An indicator that measure the intensity of facility utilization.
4. **Service measures**: Efficiency indicator on service delivery

PRODUCTION MEASURES

- **TRAFFIC MEASURES**
  (quantity per unit time)

- containers/time
- TEUs/time
- tonnage/time
- cargo value/time
- revenue/time

Secondary measures —
- container status
- origin or destination
- commodity class

- **THROUGHPUT MEASURES**
  (movements per unit time)

- ship throughput
- quay transfer throughput
- container yard throughput
- receipt/delivery throughput

total equivalent terminal throughput

TERMINAL TRAFFIC EXAMPLE

VESSEL	Discharged		Loaded		Transshipped		
	20´	40´	20´	40´	20´	40´	
Alpha	146	41	161	56	40	11	
Beta	208	72	197	37	57	21	
Gamma	127	90	212	111	33	17	
Delta	241	63	301	59	61	25	
Epsilon	308	81	362	107	97	34	
Zeta	170	53	192	105	87	17	
TOTALS	1200		1425		375		3000
		400		475		125	1000
	1600		1900		500		4000

Traffic = 4000 Containers

= 3000 X 20’ + 1000 X 40’

= 5000 TEUs

SHIP THROUGHPUT

ACTIVITY		MOVES
'Local' containers discharged	— 1600	1600
'Local' containers loaded	— 1900	1900
Transshipment containers discharged	—500	500
Transshipment containers loaded	— 600	600
Containers shifted via quay	— 125	250
Containers shifted in vessel	— 40	40
Containers restowed via quay	— 50	100
Containers restowed in vessel	— 40	40
Hatch covers lifted and replaced	— 70	140
TOTAL EQUIVALENT CONTAINER MOVES		5170

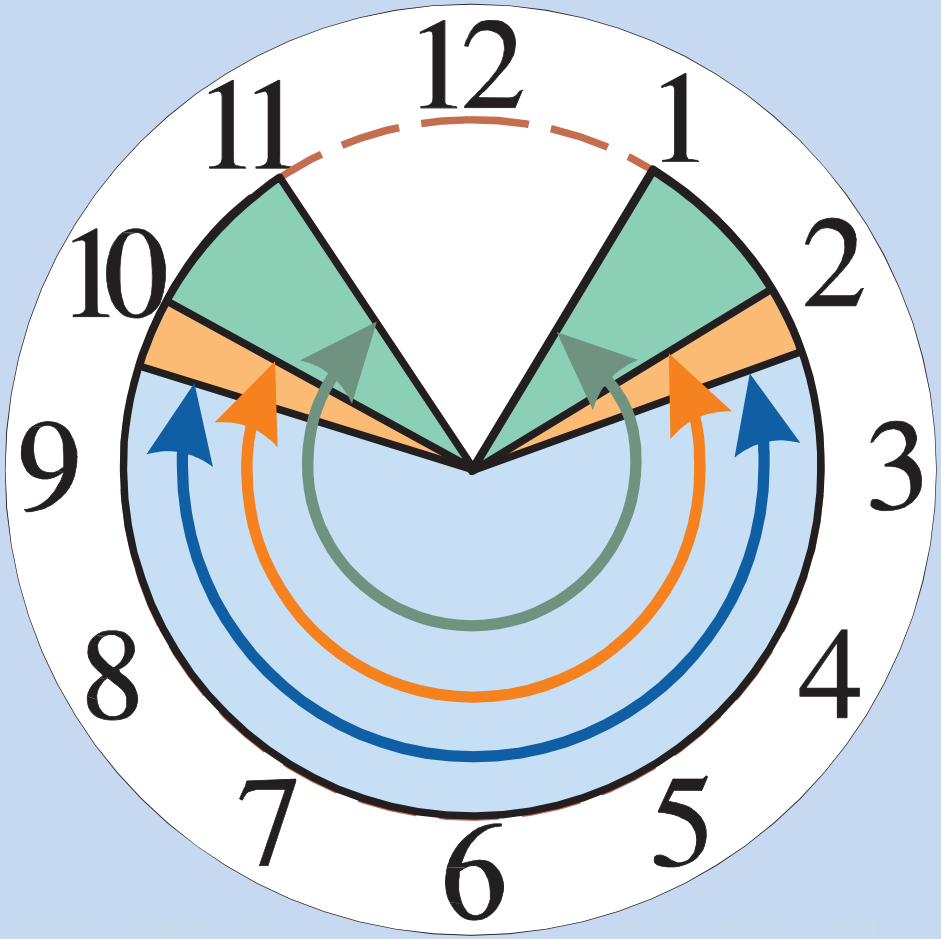
TRAFFIC

'ADDITIONAL' MOVEMENTS

PRODUCTIVITY INDICATOR

- Ship productivity
- Crane
- Quay productivity
- Terminal area productivity
- Storage area productivity
- CFS area productivity
- Equipment productivity
- Labour productivity
- Cost-effectiveness

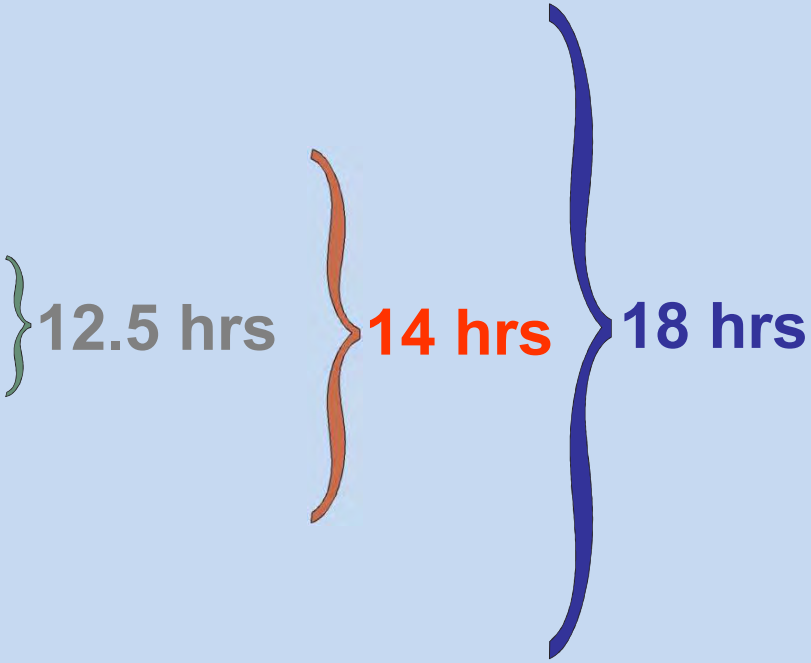
SHIP PRODUCTIVITY MEASURES



- Container moves/ship-hour in port
- Container moves/ship-hour at berth
- Container moves/ship-working hour

SHIP PRODUCTIVITY MEASURES

EVENT	TIME
Ship arrives in port	05.30
Ship berths	08.15
Work starts	09.15
Work finishes	21.45
Ship leaves berth	22.15
Ship leaves port	23.30



SHIP PRODUCTIVITY EXAMPLE

$$= \frac{638 \text{ moves}}{\text{ship's time in port}} = \frac{638}{18.0} = 35.4 \text{ moves/ship-hour in port}$$

$$= \frac{638 \text{ moves}}{\text{ship's time at berth}} = \frac{638}{14.0} = 45.6 \text{ moves/ship-hour at berth}$$

$$= \frac{638 \text{ moves}}{\text{ship working hours}} = \frac{638}{12.5} = 51.0 \text{ moves/gross ship working hour}$$

NET WORKING TIME

= Gross working time – (non-operational time + idle time)

= 12.5 - ([2 × 0.5] + [0.5 + 0.25]) hrs

= 12.5 - 1.75 hrs = 10.75 hrs

PRODUCTIVITY

$$= \frac{638}{10.75} = 59.3 \text{ moves/net ship working hour}$$

GROSS CRANE PRODUCTIVITY

Gross Berth Working Time = 12.5 hours

No. of cranes at work = 3

$\therefore$ Gross Crane Working Time = 37.5 hours

Equivalent container moves = 638

$$\therefore \text{Gross crane productivity} = \frac{638 \text{ moves}}{37.5 \text{ hours}}$$

= 17.0 moves/crane/gross working hour

NET CRANE PRODUCTIVITY

Non-operational time = 2 × 0.5hr mealbreaks/crane
= 3hrs

Idle times = 0.25hr/crane + 0.5hr delay
= 1.25hrs

∴ Non-working time = 4.25hrs

∴ Net working time = 37.5 - 4.25hrs = 33.25hrs

$$\therefore \text{Net crane productivity} = \frac{638 \text{ moves}}{33.25 \text{ hours}}$$

= 19.2 moves /crane / net working hour

LABOUR PRODUCTIVITY

TRAFFIC = 4000 CONTAINERS

WORKFORCE	LABOUR-HOURS	PRODUCTIVITY
All employees (300)	300 x 8 x 5 = 12,000 staff-hours	4000 ÷ 12,000 = 0.33 container/staff-hour
Operational employees (180)	180 x 8 x 5 = 7,200 staff-hours	4000 ÷ 7200 = 0.55 container/staff-hour
One operation (75)	75 x 8 = 600 staff-hours	520 ÷ 600 = 0.87 container/staff-hour 615 ÷ 600 = 1.0 TEU/staff-hour 675 ÷ 600 = 1.1 moves/staff-hour

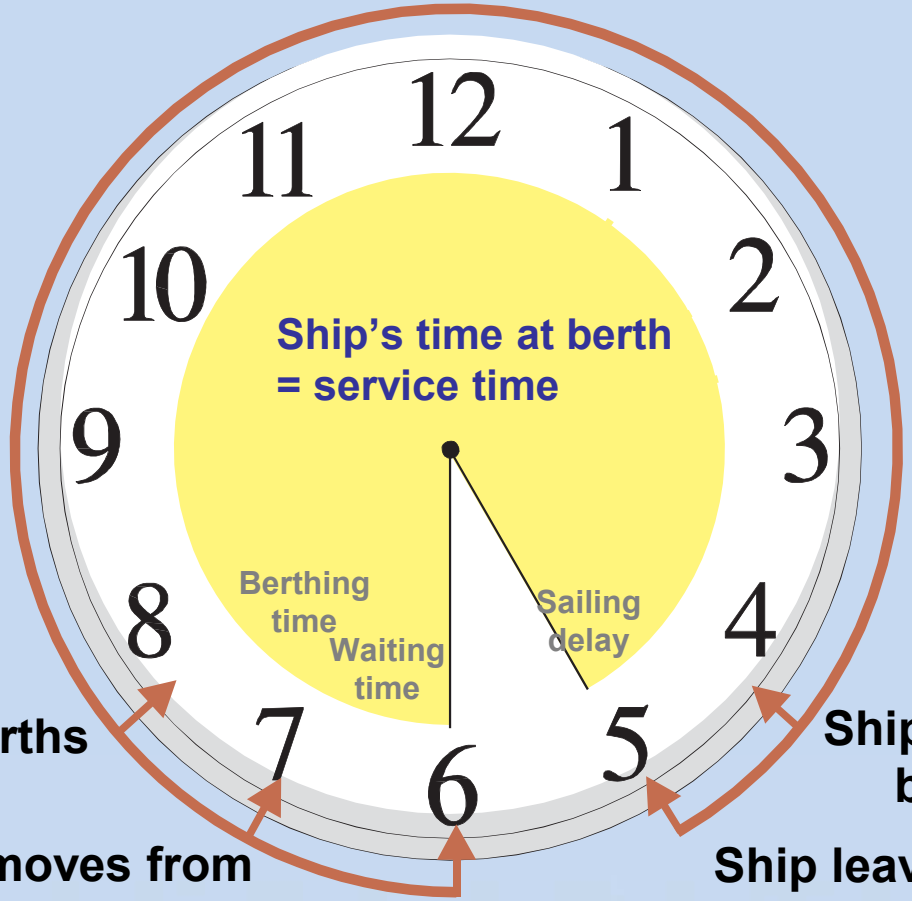
UTILIZATION INDICATOR

- Quay utilization
- Storage utilization
- CFS storage utilization
- Gate utilization
- Equipment utilization
- Berth Occupancy

SERVICE MEASURES

- Ship turnaround time
- Cargo dwell time
- Road vehicle turnaround time
- Rail service measures
- Equipment downtime
- Equipment availability & reliability

SHIP TURNAROUND TIME



Ship berths

Ship moves from anchorage

Ship arrives in port

Ship leaves port

Ship leaves berth

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SHIP TURNROUND TIME EXAMPLE

Waiting time 1.0hr (06.00 - 07.00)	1.75 hours
Berthing time 0.75hr (07.00 - 07.45)	
Service time (07.45 - 16.15)	8.5 hours
Sailing delay (16.15 - 17.00)	0.75 hours
SHIP TURNROUND TIME	11.0 hours

THANK YOU

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PRODUCTIVITY OF CARGO HANDLING EQUIPMENT

B. A. Mwajambia

OVERVIEW

- Ships and Ports compete
  - Innovations and technological changes.
- If a port fails to follow the changes in shipping, in time it will fall behind the competition.
- The changes in ports are mainly in connection with **port cargo handling techniques** and construction of dedicated terminals.
- Cargo Handling Equipment vital in operations.
- The main objective of the port is to ensure **good** and **effective services** to its **customers** at **minimum cost**.
- Good services are offered by the equipment, facilities and the management.
- Huge investment needs ROI.
- ROI = Financial thru repeat customers and new customers = reputation in terms of performance (productivity & Customer satisfaction)

Productivity

- If you cant measure it, you cant manage it (Peter Drucker)
- You can’t improve what you can’t measure
- How to measure performance:
  - Efficiency – doing things in a right way
  - Effectiveness – doing the right things
  - **Productivity – combination of efficiency and effectiveness**

    measure of outputs divided by inputs

The Relationship Between Efficiency, Effectiveness And Productivity

- **Efficiency**

  Determined by the amount of resources that are necessary to obtain certain results.

  To meet daily production quota, a specific machine that uses up energy is committed to an operation.

  If we are able to meet our daily production with less energy and fewer operators, we have operated more efficiently.

- **Effectiveness**

  Determined by comparing what a process can produce with what they actually produce

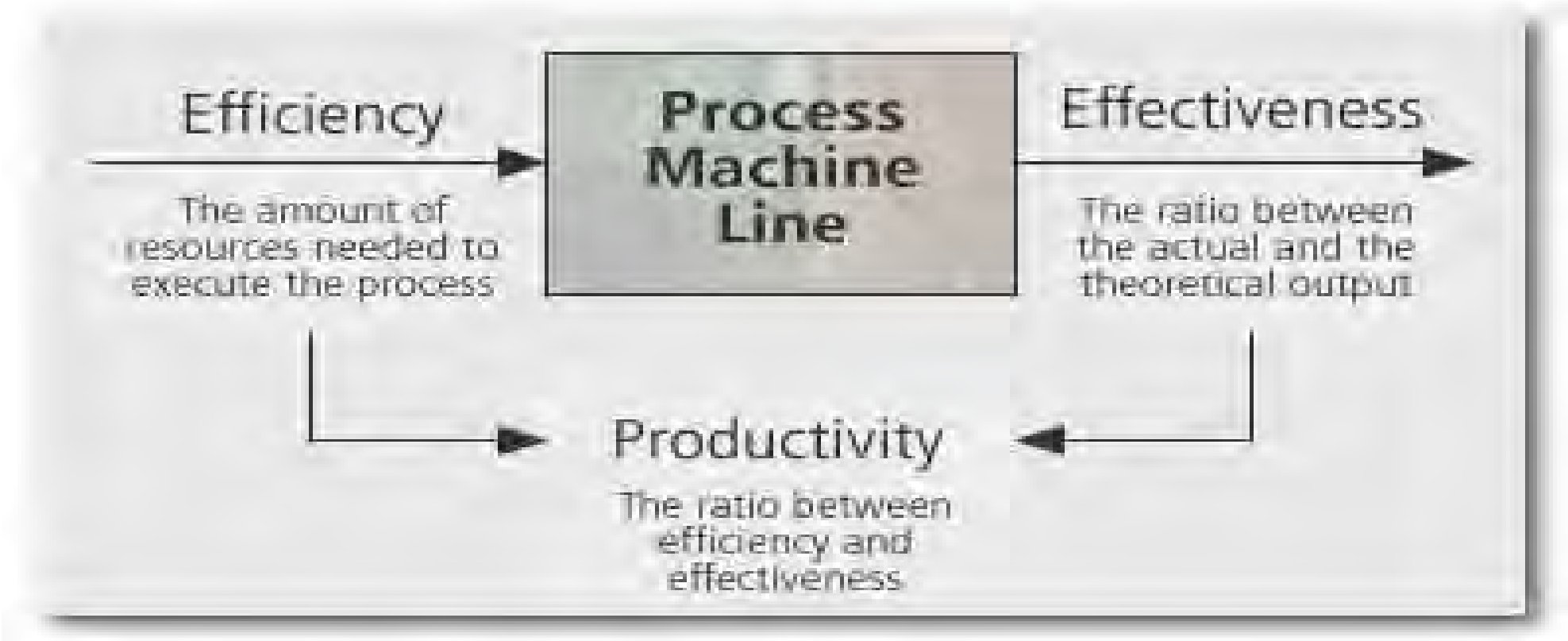
  It does not tell anything about the efficiency – the amount of resources that have to be committed to obtain that output

- **Productivity**

  Determined by looking at the production obtained (effectiveness) versus the invested effort in order to achieve the result (efficiency)

  - If we can achieve more with less effort, productivity increases.

The Relationship Between Efficiency, Effectiveness And Productivity



PRODUCTIVITY

- An overall measure of the ability to produce a good or service.
- Productivity measures **how specified resources are managed to accomplish timely objectives** stated in terms of **quantity** and **quality**.
- Productivity may also be defined as an **index that measures output** (goods and services) **relative to the input** (labour, materials, energy, etc., used to produce the output).
- Equipment performance and productivity are closely related.
  - Performance = the total optimization of all elements related to the equipment to get the desired productivity.
- Productivity of equipment is mainly based on performance of maintenance and operation.

Equipment maintenance

- A World Bank technical report stated that, on average, equipment maintenance costs range from 15–25 per cent of the total operating costs in a port.
- Maintenance of equipment is the most important aspect of equipment productivity.
- Equipment deteriorates and fails to attain its economical life because of poor maintenance.
- Technological growth of equipment handling systems has led to procurement of sophisticated equipment by ports to improve their productivity.
- This equipment needs proper maintenance and management.

Factors directly affecting maintenance and operation

- Poor equipment inventory and too much old equipment
- No standard system of maintenance
- Non-availability of spare parts
- Poor supervision and control of maintenance work
- Poor leadership
- Lack of control and supervision of operators
- Bad driving practices
- Lack of skilled manpower
- Poor incentives and motivation schemes
- Shortage of technicians and operators
- Poor working environment
- Employee participation

Categories of Maintenance

- There are three broad categories of maintenance:
  i. Preventive maintenance,
  ii. Corrective maintenance
  - Running maintenance.

Preventive Maintenance

- Preventive maintenance is mainly **based on routine inspection of equipment at scheduled time** in order to avoid major breakdown of the equipment.
- This maintenance for all types of equipment is **done according to a monthly schedule** prepared by the engineer in-charge at the end of every month.
- All **equipment is grouped by type and model** in order to list out maintenance tasks to prepare weekly, monthly, quarterly, half-yearly and yearly schedules according to the manufacturers recommendations.
- These **schedules are printed in ready-made forms** for instant use.
- Technicians assigned for doing maintenance work are instructed by the supervisor giving instructions in a repair book where name, type of maintenance (weekly or monthly, for example), and time of starting work are noted.
- The **repair book is used as a document instead of a job card** for giving instructions to the technicians and keeping records of all types of repairs.

Example of Preventive Maintenance Schedule

TASKS	SCHEDULE A WEEKLY	SCHEDULE B MONTHLY	SCHEDULE C QUATERLY	SCHEDULE D HALF- YEARLY	SCHEDULE E YEARLY
Washing & Cleaning	P	P	P	P	P
Air filter element	C	C	R	R	R
Air compressor	--	--	CL	CL	CL
Lift chain and Chain wheel	A	A & L	A & L	A & L	A & L
Tyres and Rims	W	W	W	W	W & I

Source: Shahjahan A. S. M. (2000)

Corrective Maintenance

- Corrective maintenance involves:
  - breakdown repairs resulting from irregular component failures
  - damages due to accidents, caused by defective components and human errors.
- Done in the same way as preventive maintenance:
  - Instructions are written in different column of the repair book.
- No printed schedule is prepared.
  - The repair book acts as a job card to the technicians.

Running Maintenance

- This maintenance is often performed during operation.
- Mobile workshops and small forklifts are used by the technicians to attend to the running problems of equipment in different locations.

Productivity

- Productivity = output/input
  - i. **Partial Productivity** (measures of output against a specific input) Partial Productivity e.g. items made/employee
    - concerned with efficiency of one particular characteristic
  - ii. **Multifactor Productivity** (ratio of output to a group of inputs such as labour and material)
    - an index of output obtained from more than one of the resources used in production/service.
  - iii. **Total Productivity** (includes all inputs in an organization i.e. labour, materials, overheads, capital)
    - broadest measure of productivity & is concerned with the performance of entire organization.
    - Total Productivity = Revenues, Profits/All inputs

Cargo Handling Equipment Productivity

- Partial Productivity
  - Machine Units of output per machine hour, Output per unit machine
- Why Cargo Handling Equipment Productivity?
  - How much does it cost to handle each tonne of cargo?
  - Are set targets being achieved?
  - Are customers being satisfied by the services being offered?
  - Are we being effective in our services?
  - Are we being efficient in our services

Cargo Handling Equipment Productivity Measures

- Machine / Equipment productivity:
  - Usually the tonnage / moves made per equipment or group of equipment per working hour
  - Calculated per machine and can be expressed in gross and net values.
    - Crane Productivity
    - Reachstacker
    - Forklift
    - Terminal tractor
    - Bulk loader / unloader
    - etc

Equipment Downtime

- The total time in hours when each or type of equipment is not available for operation due to breakdown repairs, preventive maintenance, waiting for spares and other reasons.
- It is calculated for a given period by using the formula:

  Downtime = (Downtime in hrs. /possible machine hrs.) * 100

  where possible machine hours are the number of hours that berths in the port are scheduled to work in that period.

Equipment Availability

- This is a measure of the proportion of the time that each or type of equipment is accessible for berth operations.
- It can be calculated for a given period by using the formula:
  - Availability = (available machine hours / possible hours) * 100

  where available machine hours are calculated by subtracting downtime from possible machine hours.

Equipment Utilization

- This is a measure of proportion of the time that a machine is actually engaged in work.
- It is calculated by using the formula:

$$\text{Utilization} = \frac{\text{Recorded machine hours}}{\text{possible machine hours}} * 100$$

where the recorded machine hours are the **number of hours actually worked by the machine in a given period**.

Type of equipment	Capacity (ton)	Numbers	Down time		Availability		Utilization	
			hrs.	%	hrs.	%	hrs.	%
Mobile crane	20-30	5	31500	75	10500	25	8400	20
Mobile crane	6-10	17	52836	37	89964	63	57120	40
Forklift truck	5	20	33600	20	134400	80	80640	48
Forklift truck	3	46	200928	52	185472	48	123648	32
Forklift truck	2.5	16	30912	23	103488	77	64512	48
Tractor	20-25	13	61152	56	48048	44	38220	35
Trailer	6-25	39	117936	36	209664	64	127764	39
Shore crane	2-3	25	54600	26	155400	74	94500	45

Source: Shanmugan A. S. M. (2000)

Demand Availability

- This is a measure of the time that equipment is available when requisitioned by the operation department.
- It can be calculated for a given period using the formula:

$$\text{Demand availability} = \frac{\text{(No. of machines supplied)}}{\text{No. of machines demanded}} * 100$$

Mean Time Between Failure (MTBF)

- This denotes reliability of the equipment and is expressed as duration of time the equipment is utilized before failure occurs.

$$\text{MTBF} = \frac{\text{Worked hours}}{\text{Frequency of failures.}}$$

Mean Time To Repair (MTTR)

- This measures the average duration of time the equipment is laid up for repair
- It can also denote the maintainability of the equipment.

$$\text{MTTR} = \frac{\text{Breakdown time}}{\text{Frequency of failures.}}$$

Factors Influencing Choice of Cargo Handling Equipment

- Different types of equipment is used for handling different cargo.
- Choice of type of equipment / equipment system will depend on:
  - The nature of the cargo,
  - Type of packing / packaging
  - Handling costs,
  - Resources available including land, labour and equipment,
  - Weather conditions,
  - Competitive situation compared with other ports,
  - Types of vessels,
  - Distribution arrangements,
  - Tidal conditions,
  - Inter-modal transport facilities etc.

END

EXPORT DOCUMENTATION

INTRODUCTION

WHAT IS A DOCUMENT.

Is a written or printed paper furnishing information or evindence .

Any written item as a book article or letter,especially of a factual or informative nature.

A computer data file.

Export documentation refers to documents or systems used to transact business in Export processes.

DEFINE EXPORT

Term Export means Shipping the goods and services out of the Port of a country.The seller of such goods is refered to as an Exporter and is based in the country of Export whereas the overseas buyer is refered to as an Importer.

Export is a product that is sold to another country.

It can be agricultural,oil , services etc.

The business or process of selling goods to other countries

To send a product to another country so that it can be sold there.

A country can also export information technolegy eg CATOS system exported to Kenya by South Kore.

The economic growth of any country depends on the volumes of its Exports and Imports.But its economy will grow faster if the country Exports more than it can import.

YEAR UNDER REVIEW

Statistics available from the year 2013 show that Kenya is placed number 102 in the World leading Exporters having exported goods worth a total of $6,580,000,000.

China leads with $17,779,000,000.

European Union $ 2,252,000,00.

United States $ 2,173,000,000.

Germany $1,610,000,00.

Japan $ 1,547,000,000.

MCT & MCC

MONTHS	IMPORTS (DISCHARGE)						EXPORTS (LOADED)					
	FULL			EMPTIES		TEU'S	FULL			EMPTIES		
	20'	40'	TEU'S	20'	40'		20'	40'	TEU'S	20'	40'	TEU'S
Jan-15	18847	11291	41429	17	183	383	3840	2411	8662	12988	9491	31970
Feb-15	17084	11931	40946	4	332	668	5429	2876	11181	11250	7974	27198
Mar-15	16608	11162	38932	167	241	649	5208	2596	10400	12656	8163	28982
Apr-15	19534	11762	43058	144	247	638	5093	2960	11013	14139	9634	33407
May-15	17876	13451	44778	38	159	356	4898	2264	9426	13263	9515	32293
Jun-15	19445	13830	47105	3	445	893	4919	2677	10273	11720	10063	31846
Jul-15	18457	12932	44321	0	123	246	5278	3222	11722	13098	11242	35582
Aug-15	18196	11796	41788	13	367	747	5199	2945	11089	17639	11269	40177
Sep-15	16040	11768	39576	46	174	394	5481	2211	9903	14064	10986	36036
	162087	1E+05	381933	432	2271	4974	45345	24162	93669	1E+05	88337	3E+05

TRANSHIPMENTS

MONTHS	IMPORTS (DISCHARGE)						EXPORTS (LOADED)					
	FULL			EMPTIES		TEU'S	FULL			EMPTIES		
	20'	40'	TEU'S	20'	40'		20'	40'	TEU'S	20'	40'	TEU'S
Jan-15	2407	293	2993	47	67	181	1951	295	2541	0	0	0
Feb-15	2021	338	2697	73	150	373	1754	241	2236	73	169	411
Mar-15	763	83	929	0	0	0	1675	472	2619	127	47	221
Apr-15	1043	133	1309	0	0	0	380	110	600	0	0	0
May-15	685	100	885	284	103	490	531	105	741	0	0	0
Jun-15	683	123	929	171	106	383	517	92	701	8	47	102
Jul-15	561	100	761	0	34	68	491	95	681	61	0	61
Aug-15	789	210	1209	112	82	276	472	202	876	0	0	0

Sep-15	1309	145	**1599**	1	26	**53**	1130	149	**1428**	0	1	**2**
	10261	**1525**	**13311**	**688**	**568**	**1824**	**8901**	**1761**	**12423**	**269**	**264**	**797**
	TOTAL TEUS FROM JAN TO SEP			**806422**								

EXPORT PROCESS

Currently in Export we are using both manual and on line through KWATOS to process Exports

We will look at the manual system which runs along the KWATOS system.

For an Exporter to have his or her goods reach the buyer abroad the following process will apply

1.The need to identify a buyer

2.Identify a shipping agent and a shipping line

3.Identify a transporter and the unit carrier

4.Need to purchase a shipping order from the ships agent or shipping line.

A ships agent is a ships contractor

SHIPPING ORDER

Definition: Is a document issued by the ship carrier or its agent to the Exporter requesting for space on the board the vessel.

A copy is normally signed by the Master of the vessel confirming that cargo has been received on board the vessel and in its original condition.

FUNCTIONS OF A SHIPPING ORDER

It serves to show the list of Export cargo which has been booked for shipment on its account.

It requests the master of the ship to accept cargo declared there onboard his vessel.

STUFFING EXPORT AT THE GODOWN

With the shipping order and delivery note cargo is stuffed to a container in the presence of KRA officer who seals the container to confirm that the cargo inside tallies with what is declared on the shipping order and a customs entry is issued.

A customs entry allows cargo to be shipped.It is send to port on line.

Payments for the port and KRA are secured on line or by cash at port accounts and cargo allowed to proceed to the port entry.

BOOTH GATES

These are inbound and outbound entries where cargo is regulated to allow only legal and Authorised goods to enter and leave the port.

Once a KRA officer is satisfied with the documents KPA Export clerk generates a positionslip allowing the cargo to proceed to scanning before being offloaded at the Export yard.

Cargo can not be stacked in Export yard without a KRA release

CLUSTERING EXPORTS IN THE YARD

In Export yard containers are clustered to reduce ship waiting time in port.

They are arranged according to

1.ships name

2.port of discharge

2.commondity

3.weight

4.size.

5.height

6.special containers eg refeers,out of gauge,currency and explosives are segregated.

Apart from reefers which can be plugged at reefer point the rest follow under direct delivery.when the documents are not ready overheights can be stored in port but storage will apply immediately Export reefers can also follow direct delivery route.

HANDLING OF SPECIAL CARGOES

There are four major special cargoes

1.Reefers

Before discharging reefers the following steps should apply

(a) Documents must be completed once it is confirmed that the container is pensharable it is plugged at reefer point. If it is dry it can be received in the regular blocks.
(b) Confirm space at reefer point
(c) A terminal tractor should be on quay
(d) Handle with care
(e) Confirm plugging at reefer point

2.Overheight containers

(a) Documents must be complete

(b) Delivery truck to be at quayside

(c) Overheight gears to be at quayside

(d) Handle with care

Incase the documents are not ready they can be received in yard but storage will apply up on landing to discourage congesting the yard.

3.Currency

(a) Documents should be ready

(b) KRA,police,and KPA security officers should be at quayside to escort the Cargo out of port

(c) Delivery truck should be at quayside

4.Explosives

(a) Documents should be ready

(b) Delivery truck to be at quayside

(c) KRA,police,fire and KPA security officers to be at quayside to escort The cargo out of port.

HANDING OVER EXPORTS

With a shipping order,positionslip,payment invoices and customs entry the agent hands over these documents to Export office where Berth records clerks generate Export loading list.

LOADING LIST

It is a compiled list of all handed over shipping order,quantities that are available in yard,due for loading on a particular vessel. Sometimes known as an onhandlist.

Details on the loadinglist

1. Ships name
2. Voyage number
3. Date of arrival
4. Port of discharge and destination
5. Operator
6. Container number
7. Shipping order number

8. Weight

9. Yard allocation

10. Commodity

11. Size

12. KRA release.

BILLING

Once the vessel is through with loading of Exports, the master of the vessel signes a copy of the shipping order which will be dispatched to Berth records clerk for reconciliation.

The purpose of the reconciliation is to validate containers loaded onboard the vesel and if any shutouts. After the reconciliation has been done, a shutout statement is prepared showing any shutout and if none a nill shutout statement is done and fowarded to Billing for securing of KPA charges.

EXPORT WITHDRAWAL

Export withdrawal is a return out of port a container initially planned and delivered in to the port area for Exportation. This is done by the Shipper/forwarder through formal application stating the reason necessitating the withdrawal.

Reasons for withdrawing Exports

1.Damaged container

2. Need for repackaging

3. Change of mode of transport

4. An express order from a government agency e.g KRA, KWS, KEBS etc

Charges collected

Withdrawal charges include:

1. Withdrawal charges

2. Storage charges which apply from the indate to delivery date.

Export withdrawal Process flow

- An application for withdrawal is made by the shipper/forwarder to the HCO
- The shipper writes to KRA requesting the withdrawal release
- The shipping line should give a no objection letter to port management

With the three documents bearing the endorsement of either HCO or the POO(Shore), it is then dispatched to the Export Documentation Officer.

The documents are validated in respect to the status and the true owner of the container (who preadviced)

If they are corresponding and in order, then the processing commences through the CATOS system as follows:

- Container is cancelled from the CLL. (identify the container in the CLL, on cancel/Return column select retun and select appropriate reason for the return)
- On Export pickup order menu, select Export return – the container preadvice – and select new on the menu.
- Fill all the mantatory fields plus the remark column
- Indicate the charges due on the remark column.
- Save and Interface for billing.

NB: Charges are raised through the document on line and the client allowed to withdraw the container within 24 hours after securing the charges.

EXPORT ACCEPTANCE

Export acceptance is given 24 hours before the vessel comes alongside

Exportorters are given 7 days to consolidate their cargo before the ship comes alongside.

UN-NOMINATED CONTAINERS

Unnominated containers are containers accepted and delivered in to the port prior to the nomination of the carrer vessel. They are only applicable to transit cargo.

PROCESS

The agent applies to management requesting for storage of un-nominated containers

Period alloewd for un-nominated are

Coffee—15 days before attracting storage (transit)

Others—9 days for local

The management is now allowing transit cargo ei Ugandan coffe only to be received as un-nominated cargo.

TRANSSHIPMENT

Def. These are containers that are discharged from one vessel not for storage at the port and subsequent delivery by inland transport but for loading onto another vessel for shipment to the port destination.

TRANSHIPMENTS												
	IMPORTS (DISCHARGE)						EXPORTS (LOADED)					
	FULL			EMPTIES			FULL			EMPTIES		
MONTHS	20'	40'	TEU'S	20'	40'	TEU'S	20'	40'	TEU'S	20'	40'	TEU'S
Jan-15	2407	293	2993	47	67	181	1951	295	2541	0	0	0
Feb-15	2021	338	2697	73	150	373	1754	241	2236	73	169	411
Mar-15	763	83	929	0	0	0	1675	472	2619	127	47	221
Apr-15	1043	133	1309	0	0	0	380	110	600	0	0	0
May-15	685	100	885	284	103	490	531	105	741	0	0	0
Jun-15	683	123	929	171	106	383	517	92	701	8	47	102
Jul-15	561	100	761	0	34	68	491	95	681	61	0	61
Aug-15	789	210	1209	112	82	276	472	202	876	0	0	0
Sep-15	1309	145	1599	1	26	53	1130	149	1428	0	1	2
	10261	1525	13311	688	568	1824	8901	1761	12423	269	264	797
			TOTAL	28355	TEUS							

Precedure:

Agent applies for a permit through shipping line to Kenya Ports Authority (KPA).

A hard copy of manifest is attached to the application. Agent must identify the importing vessel and onward carrier vessel.

The letter is approved by the Head of Container operations and forwarded to the Export superintendent to process the permit.

The permit is prepared by the Export clerk after confirming the document details against the EDI manifest.

If in order, a permit is prepared and signed by the Export superintendent. In case the manifest is not in order, the client is refered to EDI manifest staff for amendment. If there is amendment, a C11 is prepared for the amendment of the manifest.

Charges are confirmed and underlined in the permit. The following are some of the charges.

i. Storage due on the 16th day from the actual arrival time of the importing vessel.
ii. Transfer charges
iii. Alteration charges (in case of change of vessel)
iv. Plugging ccharges for reefer containers
v. Dangerous surcharge
vi. Full import charges in case of ship store.

For storage, the first 15 days from the arrival of the vessel thereafter up to the date container is re-shipped the following charges will apply.

16 to 30 days $ 15.00 for twenty feet

$ 30.00 for fourty feet

31 to 40 days $ 20.00 for twenty feet

$ 40.00 for fourty feet

Over 40 days $ 25.00 for twenty feet

$ 50.00 for fourty feet.

IMPORT DOCUMENTATION

1. INTRODUCTION.

In order to comprehensively discuss Import Documentation, it is very important to first of all understand and appreciate trade from an International perspective and the underlying economic dynamics which shape up International Maritime trade or the movement of goods from one country to another, especially via the sea.

The movement of goods by sea is a critical component of International trade since over 90% of the World trade moves by sea.

Preference to such a level is borne out of the obvious economic advantages of highly reduced cost through economies of scale where large volumes of cargo can be moved at the same time affordably.

Whilst the movement of trade by sea offers such preferred economic advantage, it is equally important to appreciate that there are factors which contribute to the advantage of economies of scale. These factors include, but not limited to, cargoes, ships and seaports.

Cargo availability, shipping capacity, logistics and seaports locations and services are primary critical factors that affect pricing and movement of trade by sea, imports not being an exception.

WHAT IS INTERNATIONAL TRADE

International Trade is the exchange of goods, and services across International borders or Territories. This is strongly supported by movement of goods by sea which accounts for over 90% International trade.

International Trade is also affected by:

- **Pattern of trade (trade model)** – which goods are traded by which countries, and how much of those goods are traded.

- **Gains from trade- why should nations exchange their products and services? Who is gainer and who is loser, if there is any?**

- **Protectionism: should we protect our industries from International competition? Using what selection criteria? What may be economic consequences of trade protectionism or trade liberalization?**

- **Free Trade Agreements (F T As) what are the required criteria to benefit from a special FTA? What are policies to be considered? How to measure the impact on trade between countries; members and non-members?**

Trade and development: - What are the impacts of trade on industrial specialization?

Why are goods and/ or services exchanged across international borders?

International trade or the exchange of goods, and services across International borders or Territories arises from two primary reasons viz ;

- **Absolute advantage**
- **Comparative advantage**

Absolute advantage: is the situation where country A has resources (x) which are sufficient to meet the demands of its domestic market and a surplus . At the same time country B does not, at all, have resources x but requires them to meet demands of its domestic market.

In this case country A has absolutely advantage over country B concerning resources x therefore compelling country B to import the resources x from country A

The lack of resources x and surplus of same leads to the exchange of goods across International borders hence International trade.

Comparative advantage: is where country A and B, both have same resources x however country B does not have enough (deficit) to meet the demands of her domestic market while country A has the resources in surplus.

This means that despite country B having similar resources as country A, country B has a deficit of such resources and is therefore compelled to import the resources from country A. Another contributor to this is the economic advantage enjoyed by one country over the other being able to cheaply produce a given commodity than the other.

This scenario leads to the exchange of goods across International borders hence International trade.

The role of Shipping and Port services in International Trade.

Shipping and Port services plays an indispensable and integral role in International trade since they are responsible for facilitating and regulating efficiency and connectivity to other land based modes of transport in the International maritime transport chain

None the less, Shipping and Ports services are a derived demand.

It is out of the need to move cargo from one country to another (import/ export) that the need for transporting the cargo and offloading same at the port of discharge come in to being.

Therefore the need to move cargo from one country to another by sea in International trade creates the demand for Shipping and Port services.
In this case therefore, shipping and Port services are a derived demand out of the need to move cargo from one country to another.

2. IMPORT DOCUMENTATION.

Background.

What is Import? - Import refers to commodities, articles. Or service brought in to a country from abroad / another country mainly for purpose of sale. Is also known as inbound.

What is Documentation;- Documentation refers to materials that provide official information or evidence or that serve as a record.

Nonetheless it is important that import Documentation is not an end in itself but a means to an end.

It is evidence of International transaction or International sales agreement and is used to facilitate sales contracts, International payment, contract of affreightment , customs clearance and removal of import cargo from the seaport etc.

The import process and the Documents used to facilitate its International Trade.

Import begins from the time a consignee has a need for goods / services that may not necessary be available locally.

The consignee will then look for a person/ company that can meet his /her needs.

This will then lead to an International sales contract which will spell out, among other things , how payments will be done in exchange of

the goods/services. The INCOTERMS will be applied in the respective sales contract to determine the responsibility of each party.

What are INCOTERMS?

Incoterms are trade terms published by the International Chamber of Commerce (ICC) that are commonly used in both International and domestic trade contracts.

Incoterms, short for International Commercial Terms are used to make International trade easier by helping traders in different countries understand one another

Why Incoterms

Trade terms used in different countries may appear identical on the surface but actually have different meanings as they are used domestically. Incoterms are internationally recognized and thus help to prevent confusion in terms of foreign trade contracts, by helping sellers and buyers understand their obligations in any transaction.

Examples of incoterms include DAT (Delivered at Terminal) , DDP (Delivered Duty Paid) and CIF (Cost, insurance and freight) , DES (Delivered Ex ship), FAS (Free alongside), FOB (Free on board) etc.

The buyer and seller will then meticulously agree and engage the payment process.

Since both the International seller and International buyer do not know each other and neither the credit worthiness of each other, a form of guarantee is sort in the payment process so that the buyer does not risk by sending money and then not getting the product. The buyer and the seller would want to cushion him/herself from such risk. A letter of credit would be engaged at this position.

What is a letter of credit?

Commonly abbreviated as LC , a letter of credit is a letter from a bank guaranteeing that a buyers payment to a seller will be received on time and for the correct amount in the event that the buyer is unable to

make payment on the purchase , the Bank will be required to cover the full or remaining amount of the purchase.

Why a letter of credit

Letters of credit are often used in International transactions to ensure that payment will be received. Due to the nature of International dealings including factors such as distance, differing laws in each country and difficulty in knowing each party personally, the use of letters of credit has become a very important aspect of International trade.

The Bank also acts on behalf of the buyer (holder of letter of credit) by ensuring that the supplier will not be paid until the Bank receives a confirmation that the goods have been shipped.

THE ISSUING LETTER OF CREDIT BY THE BANK WOULD ALSO REQUIRE A CLEAN BILL OF LADING SO AS TO RELEASE PAYMENTS TO THE INTERNATIONAL TRADER.

What is a clean bill of lading?

A clean bill of lading is a shipping document issued by a carrier declaring that the goods have been received in an appropriate condition, without the presence of defects. The product carrier will issue a clean bill after thoroughly inspecting the packages for any damage, missing quantities or deviation in quality.

Why is a clean bill of lading necessary in issuance of a letter of credit?

Often a clean bill of lading must be used to fulfil the requirements set forth in letters of credit, many purchasers rely on letters of credit to pay for imports and Banks may refuse to supply the funds if a claused bill of lading is presented. A claused or foul bill is issued when the received product is damaged or does not meet specifications.

Depending on the INTERCOMS agreed by the consignor and the consignee in the International sales contract, space on board a ship

will be booked for cargo to be transported to the consignee. A bill of lading will be issued against the cargo loaded.

What is a bill of lading?

A bill of lading commonly abbreviated B/L is a legal document- in shipping – between the shipper of a particular good and the carrier detailing the type , quantity and destination of the good being carried.

The bill of lading also serves as a receipt of shipment when the good is delivered to the predetermined destination. Bills of lading serve three functions:

- **As a Tittle of goods**
- **Evidence of contract of carriage**
- **Receipt of shipment**

The bill of Lading must accompany the shipped goods, no matter the form of transportation, and must be signed by an authorized representative from the carrier, shipper and receiver.

After issuance of the B/L, the ship's argent or shipping line will generate a cargo manifest.

What is a cargo manifest?

A manifest or ships manifest is a document listing the cargo, passengers, and crew of a ship, aircraft, or vehicles, for the use of customs and other officials.

The manifest may be used by people having an interest in the transport to ensure that passengers and cargo listed as having been placed on board the transport at the beginning of its passage continue to be on board when it arrives at its destination.

Upon arrival at the port of destination, the ship must be issued with a clean bill of health normally called free pratique.

What is a free pratique

Free pratique is the permission granted by local medical authorities, denoting that the vessel has a clean bill of health so that people may embark and disembark.

Further, in the event that the ship is a frequent caller to the port of destination (e.g. Mombasa) and may want to be exempted from compulsory pilotage, then the Shipping Line may apply for an exemption and once approved will be issued with an exemption certificate from compulsory pilotage.

Once the ship is berthed, a ship supervisors working report is prepared which records any arising delays before berthing, during cargo handling operations and after completion of cargo operations but before de-berthing of the respective ship.

In case the import cargo to be discharged is damaged, then such cargo will not be handled by KPA until a letter of indemnity is issued by the Shipping Line absolving the Port from any arising and relatable responsibilities.

Once cargo is discharged from the vessel, a Discharge Tally is prepared by KPA to account for the receipt of import cargo at the Port. With the transition of operations from manual to Digital these containers are accounted through the use of HHTS (Hand Held Terminal)

The discharged cargo will then be transferred from the quay side to the storage area where it will be stacked.

Upon receipt of cargo at storage area, a Movement Tally is prepared to account for the receipt of cargo at the storage area and indicate the physical allocation of the cargo stack. This is also being done through the use of HHTS.

Incase an accident happens at the storage area and the stacked import cargo is damaged as a result therefore, an accident report is prepared.

The consignor would have engaged a forwarder to facilitate the customs and other related cargo clearance administrative procedures.

The forwarder will engage the respective Ship's Agent for the issuance of a Delivery Order.

What is a Delivery Order.

A Delivery Order (abbreviated D/O is a document from a consignor, a shipper, or an owner of freight which orders the release of the transportation of cargo to another party.

The forwarder will also fill in the Import Declaration Form (IDF) with the Customs as a declaration of intention to bring in to the country goods from a foreign country.

The Forwarder will then fill out the appropriate Customs Entry for purpose of payment of Duty, excise, VAT etc.

Once the necessary releases have been issued, the forwarder will then use the KPA Tariff for understanding which Port charges are applicable in the clearance of Import cargo from the Port.

The Forwarder will then submit a Pick-up Order through KWATOS so as to be able to pay applicable Port charges and for clearance of the Import from the Port.

The Forwarder is then able to view respective KPA invoice through the biller Direct portal.

After Port charges have been paid, the Forwarder then brings his/her truck to the Port so as to collect the Import cargo.

At the entry gate, the Forwarder will be issued with a Position Slip after the truck has been processed for entry.

Upon arrival at the storage area , the Forwarder will present necessary documents for verification then the Import cargo will be loaded on to the truck.

A movement Tally will be prepared to account for the Delivery of the Import cargo from the stacked position on to the truck. Using the CATOS system and upon verifying completion of documentation, the container is loaded onto a hinterland truck using HHT (positioning it as outgoing). The same container details will then be reflected at the booth gates as outgoing ready to be delivered out.

The truck will proceed to the exist gate and after verification, a Gate Pass is issued. If Delivered through the use of HHTS then the exist Gate clerk is able to confirm through the CATOS system.

The laden truck leaves the Port with the Import cargo.

There are two main Import processes namely; the local Import cargo clearing processes and the transit Import cargo clearing processes.

These two distinct processes and clearly shown on the attachment. (Refer to the attachment).

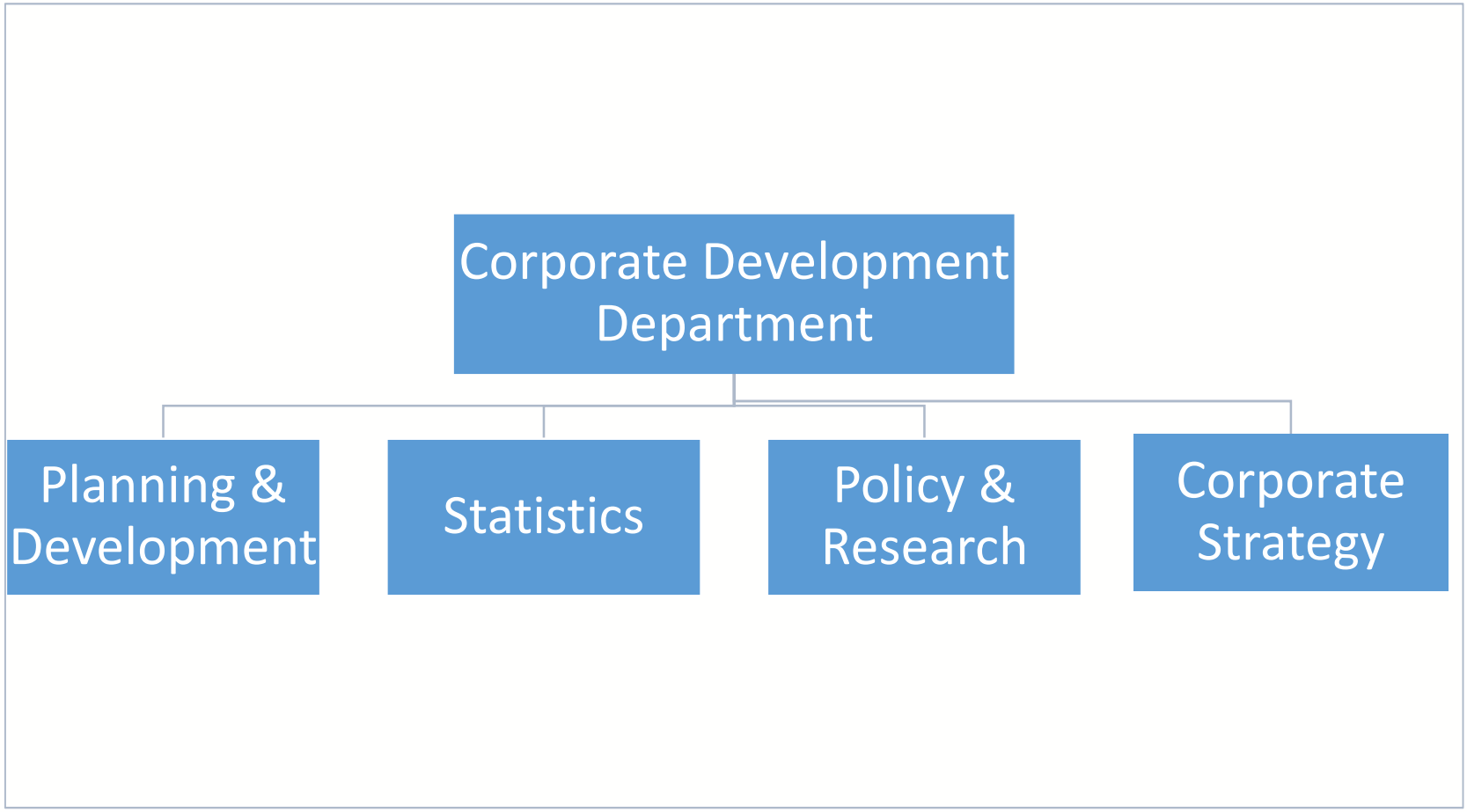
Statistics Section

Statistics Section Objectives

- To provide timely, periodic and accurate statistical information to management and port stakeholders

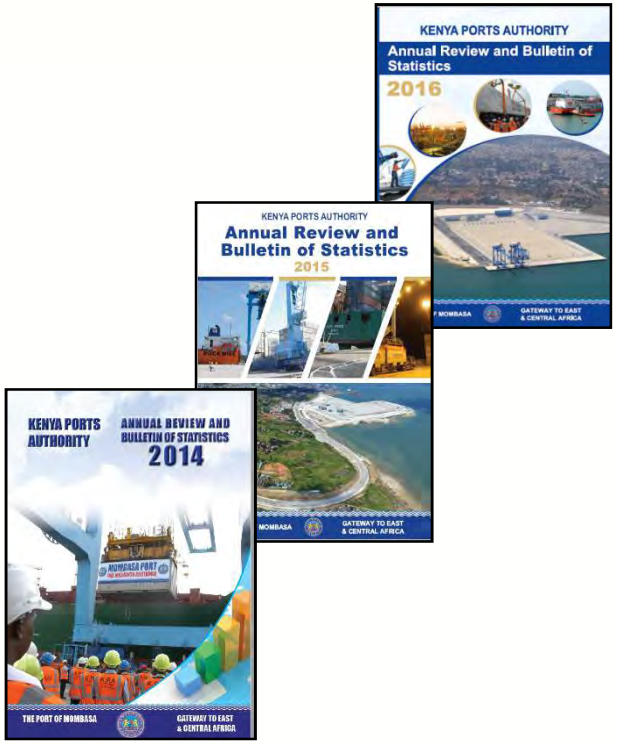
- To implement the statistical policy which defines strategies and objectives pertaining to data collection, collation, compilation, analysis and timely dissemination of statistical information.

Structure of the Corporate Development Department



Key Deliverables

- Monthly Highlights
- Monthly Reports
- Quarterly Reports
- Annual Reports
- Bulletin of Statistics



Types of Data

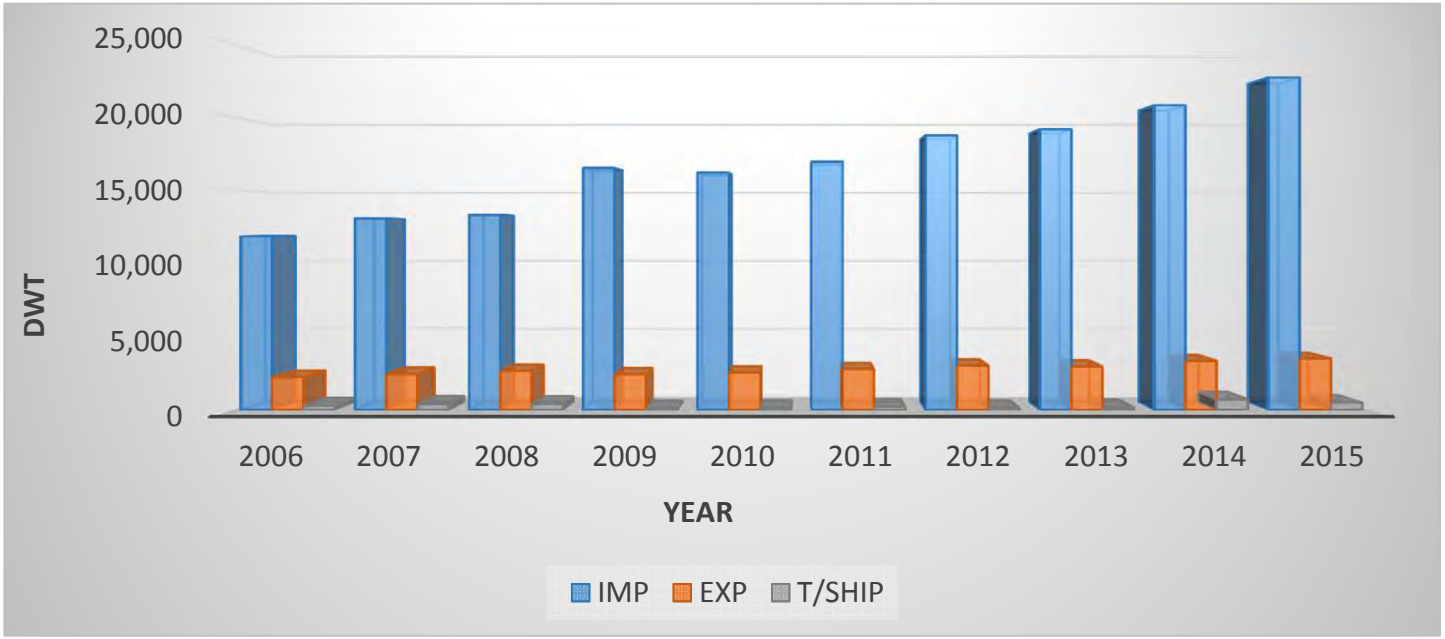
Throughput Traffic (DWT)-Sum total of all cargo handled (imports/exports)

Calculated based on the type of cargo;

- Non- containerized cargo`
  - Dry Bulk i.e. clinker, fertilizer, coal, wheat
  - Liquid bulk i.e. oil & lubricants
  - Conventional/general cargo i.e. Motor cars, steel, cement, fertilizer

Throughput traffic (DWT): 2006 - 2015

YEAR	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
IMP	11,845	13,061	13,311	16,508	16,201	16,938	18,732	19,150	20,777	22,680
EXP	2,255	2,474	2,685	2,449	2,575	2,788	3,045	2,983	3,366	3,534
T/SHIP	318	426	419	105	158	227	143	174	732	518
TOTAL	14,419	15,962	16,415	19,062	18,934	19,953	21,920	22,307	24,875	26,732



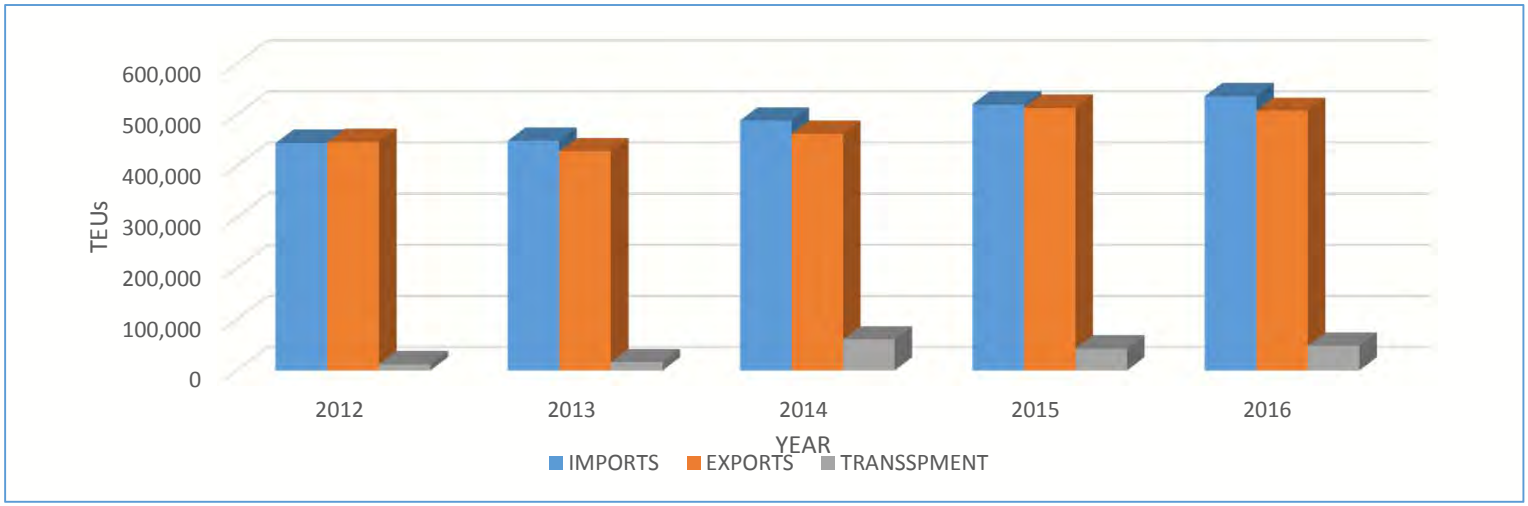
Types of Data Cont'd

Container Throughput Traffic - (TEUs)

- Imports - Full/empty
- Exports – Full /Empty
- Transshipment- Full / Empty

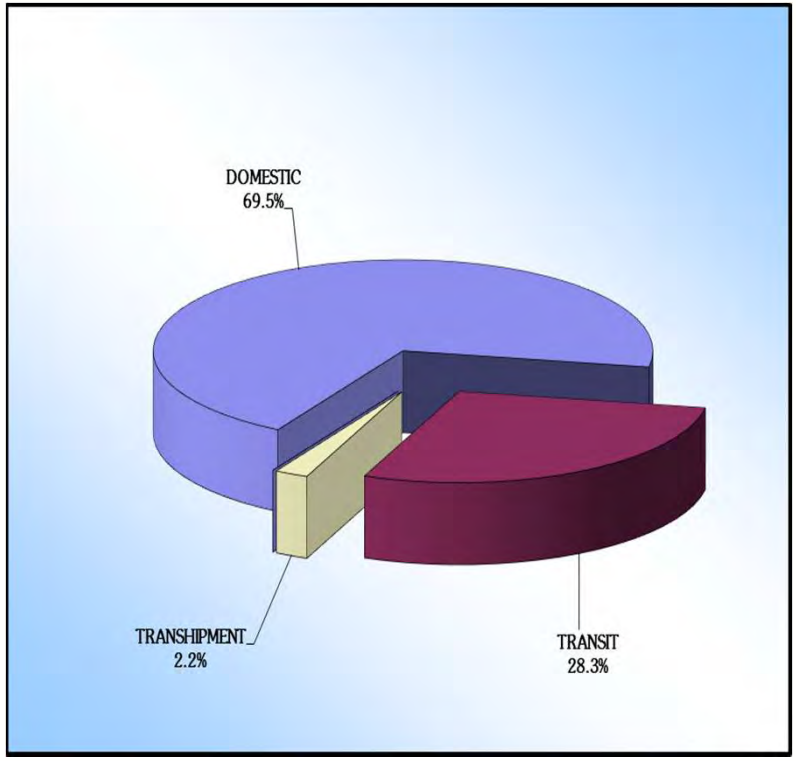
Container Traffic (TEUs): 2012 - 2016

		2012	2013	2014	2015	2016
IMPORTS	Full	441,067	441,004	482,055	514,086	527,816
	Empty	3,705	8,385	6,617	5,970	8,167
TOTAL		**444,772**	**449,389**	**488,672**	**520,056**	**535,983**
EXPORTS	Full	120,712	129,522	130,757	121,531	128,913
	Empty	325,912	298,820	331,719	391,841	378,444
TOTAL		**446,624**	**428,342**	**462,476**	**513,372**	**507,357**
TRANSHIPMENT	Full	10,553	12,118	52,707	37,384	42,586
	Empty	1,514	4,151	8,147	5,306	5,445
TOTAL		**12,067**	**16,269**	**60,854**	**42,690**	**48,031**
TOTAL	Full	572,332	582,644	665,519	673,001	699,315
	Empty	331,131	311,356	346,483	403,117	392,056
TOTAL		**903,463**	**894,000**	**1,012,002**	**1,076,118**	**1,091,371**



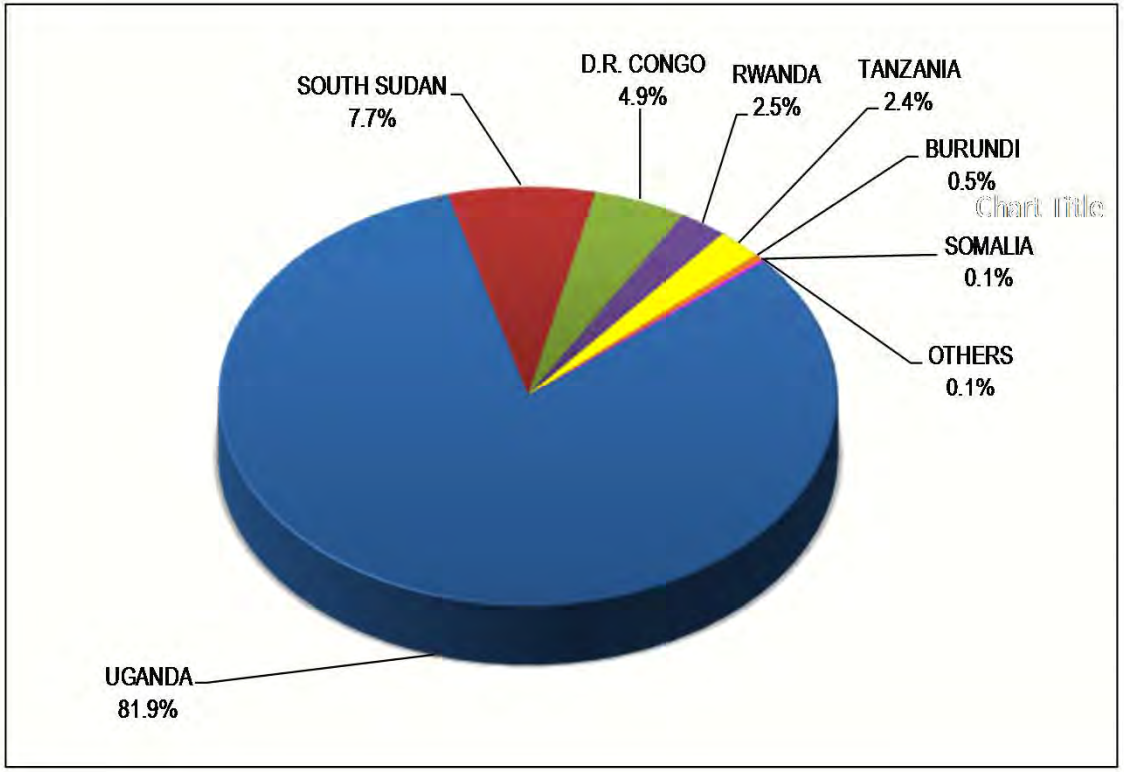
Market Segmentation-2016

- Domestic
- Transit
- Transshipment



Transit Market- 2016

- Uganda
- Sudan
- D.R.C
- Rwanda
- Tanzania
- Somalia
- Burundi



Performance indicators

- **Services indicators**

Service indicators measure the quality of service provided to customers – ship owners, ship operators, porters, transport operators, etc. The most common indicators are:

- Ship turnaround time
- Truck turnaround time
- Container dwell time
- Equipment availability

Contn'd

- **Utilization Indicators**

Measure how intensively port facilities are used i.e. percentage of actual use of resources and maximum possible use of those resources over a period of time.

Contn'd

- **Berth Occupancy**
  - Is the ratio of time the berth is occupied by a vessel to the total time available in that period.
  - High berth occupancy is a sign of congestion (>70%)and hence decline of services, while low berth occupancy signifies underutilization of resources

Contn'd

- **Storage (Yard) utilization**
- Yard utilization is the ratio of number of storage slots(number of containers on hand) to the number of available slots (Terminal capacity).

- The maximum storage capacity for MSA port is set to 65% to avoid yard congestion.

Contn'd

- **Productivity indicators**

- Measures of the **efficiency** and **cost effectiveness** of the terminal operations, i.e. the ratio of output achieved, and to effort put in, and is expressed in terms of quantity of production achieved per unit of resource in unit time.
- These measures indicate how effectively **labor, equipment** and **land** are being used.

Contn'd

- **Ship productivity** – measure container handling rates for a ship's call (container moves/ship-hour in port or at berth or per working hour). The indicator does not consider resources put into operation.

- **Crane productivity** - measure handling rates of a crane(container moves/crane hour)

Performance Indicators: 2011 - 2016

PERFORMANCE INDICATORS	2011	2012	2013	2014	2015	2016
1. SERVICE INDICATORS (Days)						
Ship Turnround Time	4.3	4.0	3.5	3.5	3.5	2.9
Import Container Dwell Time	7.2	7.1	5.0	3.9	4.8	4.0
Ship Waiting Time : Gross	1.1	1.0	0.6	1.0	0.9	0.3
Ship Waiting Time: Net	2.1	2.8	2.1	2.8	2.4	1.7
2. UTILIZATION INDICATORS						
Berth Occupancy (%)						
Mombasa Container Terminal (MCT)	94.5	75.7	82.8	93.0	91.4	73.3
Conventional Cargo (GC)	63.9	61.0	61.4	64.4	63.5	52.9
Kipevu Oil Terminal (KOT)	84.5	80.2	83.5	79.4	86.0	86.6
Shimanzi Oil Terminal (SOT)	81.8	80.1	77.5	75.7	79.2	82.7
Mbaraki (MBK)	76.2	79.3	56.0	62.2	55.8	40.9
3. OUTPUT INDICATORS						
AVG.Tonnage of cargo per gang shift	523	614	645	642	698	916
AVG.Tonnage of cargo per ship working day	3,477	4,127	4,410	4,645	5,036	6,998
4. PRODUCTIVITY INDICATORS						
Ship productivity (MCT) Moves per hour: Gross	12.9	17.4	16.7	17.1	24.3	29.1
Ship productivity (MCT) Moves per hour: Net	14.0	18.1	17.7	17.8	25.3	30.0

Q & A

END

THANK YOU

PMAESA

Port Management Association of Eastern & Southern Africa

Our Ports Our Future

STUDY ON DEVELOPMENT OF PORT STATISTICS AND PERFORMANCE INDICATORS IN PMAESA PORTS

Manual for Port Statistics Conventions and Definitions

Funded by

Trade Mark Southern Africa

June 2011

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IDTS

Contents

Introduction 1

Chapter 1: Summary of Port Statistics, Performance Indicators, and Definitions 3

Chapter 2: Port Statistics 8

Port Traffic 8

Port Throughput and Berth Throughput 8

Transshipment 9

Transit 9

Standard Minimal for Compiling Port Statistics (Formats) 10

Chapter 3: Performance Indicators, Conventions and Definitions 13

Service indicators 13

Output indicators 16

Utilization indicators 18

Productivity Indicators 19

References 22

DEVELOPMENT OF PORT STATISTICS AND PERFORMANCE INDICATORS IN PMAESA PORTS

Introduction

Ports in PMAESA region are aware of the need to keep statistics, and generally keep similar kind of statistics, which though differs in depth, quality, coverage and interpretation depending on composition of traffic handled by the port, economic nature of traffic (containerized, transit, transshipment), revenue and marketing strategy. Ports on compiling ports statistics are faced with peculiar problems, which include:

- Inadequate data capture: this refers to the mixture or existence of only manual or electronic data capture in ports. The degree of data capture determines the depth and accuracy of data prepared.
- Limited use of data prepared: while ports have the capacity to establish within themselves data collection centres, ports are limited on the correct data to be extracted or analysed for various uses in the port e.g. correct data extraction for pricing (tariffs), marketing and improvement of productivity purposes.
- Limited information on performances and competition of ports in the region. Ports have not established benchmark information on performances of their competing ports. Most ports operate in a closed manner and exchange with other ports limited or no information.

Against this background, PMAESA in collaboration with COMESA, EAC, and SADC commissioned a study to develop a harmonized framework for port statistics and performance indicators and a statistical database that will be accessible and regularly updated with data from ports.

The study observed that a few ports do not have dedicated statistical units, and hardly any port has professional statisticians. Statistics are sometimes generated on an ad hoc basis, and mainly upon request. The data required by PMAESA Secretariat is therefore not readily available.

There are no statistical databases or data warehouses managed professionally. Most statistical data is managed using Excel worksheets which have limited data security.

Discrepancies have been observed in data from different offices in the same port. Also there are notable discrepancies between the soft and hard data copies supplied to Consultant.

Inconsistencies have also been observed in data in different tables' e.g. overall total of cargo by cargo type being different from totals by commodities or destinations.

There is limited coverage of port statistics and performance indicators maintained by ports. The situation is worse in performance indicators where majority of the ports maintain a few and others do not provide any performance indicators. In general, there is limited data on

performance indicators, yet these can be obtained by querying the billing and job scheduling systems in use.

The study also observed that the majority of ports in PMAESA ports are aware of the UNCTAD manual on a uniform system of ports statistics and performance indicators yet only few ports use the guidelines on conventions and definitions while compiling ports statistics. The table below summarizes the usage of UNCTAD guidelines for port statistics and performance indicators in ports visited.

Utilization of UNCTAD Guidelines on a uniform system of ports statistics and performance indicators by PMAESA Ports

Port	**Usage of UNCTAD Manual/guidelines**	**Remarks**
Port Sudan	Port aware of UNCTAD guidelines but limited in utilization.	More training required
Djibouti	Port aware of UNCTAD guidelines, but hardly produces any indicators.	More training required
Mombasa	Port aware of UNCTAD guidelines. Has a handy Statistical Policy and Manual	More training required
Dar es Salaam	Port aware of UNCTAD guidelines and utilized the guidelines.	Increase of staff and more training is required
Port Victoria	Port not aware of UNCTAD guidelines.	Only one staff in statistical unit. Increase of staff and more training is required
Port Louis	Port aware of UNCTAD guidelines but limited in utilization.	Increase of staff and more training is required
Maputo	Port aware of UNCTAD guidelines but produces a limited set of indicators.	Increase of staff and more training is required
Durban	Port aware of UNCTAD guidelines but produces a limited set of indicators.	Need more cooperation from private operators
Cape Town	Port aware of UNCTAD guidelines but produces a limited set of indicators	More training required
Walvis Bay	Port aware of UNCTAD guidelines but uses other guidelines (GLC).	No trained statistician or statistical unit. Statistics compiled by accounts and revenue department. Recruitment of statisticians and training is required.

Chapter 1: Summary of Port Statistics, Performance Indicators, and Definitions

Port statistics refers to the general statistics on the number and tonnage of shipping calling at the ports and of the volume of cargo handled measured in metric tonnage (metric tons) for all cargo types, and TEUs for containers. It is worth noting, port performance indicators are also port statistics but tools of measurement of the ports performances. The ships on ports statistics are measured and recorded in numbers and tonnages of shipping calling.

Performance indicators are analytical part of port statistics and quantified as mathematical formulas in order to be objective and calculated in a harmonized way. Performance indicators can further be categorized into port operational performance indicators and financial indicators as indicated below. The study focuses more on operational performance indicators.

Operational performance indicators

The operational performance of a port is generally measured in terms of the speed with which a vessel is dispatched, the rate at which cargo is handled and the duration that cargo stays in port prior to shipment or post discharge. Important information and elements to maintain are the number of ships arrivals (arrival rate); ship's time in port (waiting time, service time, and ship turn-round time); fraction of time berthed ships worked; number of gangs employed per ship per ship; tons per ship hour in port and at berth; tons per gang hour; and fraction of time gangs idle.

Financial performance indicators

These are measures of the cost/revenue performance of various areas of the port. Various elements taken into consideration include:

> Revenue: the ships revenue that may come from berth occupancy charges (ship revenue related to the berth group or type of berth -e.g. dry bulk terminal for coal or iron ore) and port dues; cargo revenue related to the cargo handling services and services of the berth group (cargo dues).

Cost/expenditure: labour costs; and capital expenditures.

The chapter introduces below a summary table of commonly utilized conventions, definitions and data sources for port statistics and performance indicators. Details for the description and computation are provided in the subsequent chapters 3 and 4.

Summary table of ports statistics, performance indicators conventions, definitions and sources

Category	Indicator/ Convention	Description/Definition	Periodicity	Data Source
(A) Cargo Statistics	**Port Traffic**	Port traffic refers to all goods or cargo that has used the port as the transfer centre. Cargo is only counted once as long as it makes use of the port as the transfer centre. Excludes double counting activities such as shifts, reloading, and transshipment out.	Monthly/ Quarterly/ Annual	Time Sheets, Cargo Manifest, Shipping Orders, Monthly/ Quarterly/Annual Statistical Report/Bulletin
	(i) Inward cargo	Inward cargo either for national use or transit cargo continuing to foreign destination by land or inland waterway	Monthly/ Quarterly/ Annual	
	(ii) Outward cargo	Outward cargo either of national origin or transit cargo arriving in port from a foreign destination via land or inland waterway	Monthly/Quarterly/ Annual	
	(iii) Transshipment cargo	Transshipment cargo either national or international (foreign bound) and only counted once when discharged	Monthly/ Quarterly/ Annual	
	Port throughput/ Berth throughput	Same like port traffic, but unlike port traffic, takes into account all activities, operations and resources availed to handle cargo irrespective of its final destination. Includes shifting or reloading of goods erroneously discharged and transshipment out as they use ports resources.	Monthly/ Quarterly/ Annual	
	Transshipment	Cargo traffic designated by transfer of goods from a sea-going vessel to another sea-going vessel before the place of final destination has been reached.	Monthly/ Quarterly/ Annual	
	Transit traffic	Transit traffic is goods or cargo coming into the country (not originating or destined into the country) which is dispatched either by road, rail or inland waterway. However, incoming cargo not destined into the country but dispatched at the port by coaster or sea going vessel becomes transshipment	Monthly/ Quarterly/ Annual	
	Principal export & import commodities	Listing of export and import commodities handled and their tonnages	Monthly/ Quarterly/ Annual	
	Origin/destination	Commodities by major export and import trading partners in tonnages.	Monthly/ Quarterly/ Annual	
	Bunkers loaded	Fuel (e.g. coal or fuel oil) used aboard a ship.	Monthly/ Quarterly/ Annual	
	Receipts/ deliveries by road, rail or inland water	The exports for ships loading and imports deliveries by road, rail or inland water	Monthly/ Quarterly/ Annual	
	Deep sea traffic	Transport of cargo by sea other than sea bordering the country/region. It is the amount of traffic transported by sea that crosses country borders.	Monthly/ Quarterly/ Annual	

	Coastal/coastwise traffic	Traffic to and from ports on the enclosed sea bordering the country/region. It is the amount of traffic transported by sea directly between ports located within the same country.	Monthly/ Quarterly/ Annual	
	Vehicles traffic	Number of automotive units discharged/ loaded	Monthly/ Quarterly/ Annual	Time Sheets, Cargo Manifest, Gate pass
(B) Ship Statistics	Ship calls	Ship calls is the number of ships calling at a port per year including both international and domestic traffic.	Monthly/ Quarterly/ Annual	Vessel Declaration, Harbour Master's Log, Lloyd's Register of Ships (equivalent publication) , Manifest
	Ship type	UNCTAD International Classification of Ship Types, which include container, general cargo, liquid bulk (oil tanker), dry bulk, specialized carrier (e.g. vehicle, livestock or chemical carrier), fishing, tug, passenger ships, barge, naval, others.	Monthly/ Quarterly/ Annual	
	Dead Weight Tonnage (DWT)	DWT is sum of weight of cargo, fuel, lubricating oil, fresh water, ballast, usable supplies, passengers, crews and their possession. Maximum DWT is the amount of weight a ship can carry without riding dangerously low in the water i.e. a weight a ship can carry safely.	Monthly/ Quarterly/ Annual	
	Gross Tonnage (GT)	The tonnage of a ship is not a weight, but a volume. One ton is 100 cubic feet. The total internal volume of a ship is its gross tonnage, and if we subtract all the volume not used for cargo, we get the net tonnage.	Monthly/ Quarterly/ Annual	
	Gross Registered Tonnage (GRT)	GRT is a measure of the internal volume of a ship, which has been replaced by GT. Like GT, GRT is not a measure of the ship's weight or displacement (mass), but a volume.	Monthly/ Quarterly/ Annual	
(C) Operational / Performance Statistics				
(i) Service indicators		**The service indicators show the quality and extent of services provided by the port**		
	Ship related			
	Port time	Ship's turn-round time=waiting time + service time	Monthly/ Quarterly/ Annual	Forms recording movements within the port: Harbour Master's Log,
	Average port time	Average port time= (cumulative time for waiting + service time)/total number of ships	Monthly/ Quarterly/ Annual	

	Waiting time	Waiting time is the cumulative time spent by all ships in the port waiting for berth, documents, pilot, tug, bad weather, availability of cargo, gang, beginning and change of shift etc. Waiting time = cumulative time spent by all ships for waiting time IN + waiting time OUT	Monthly/ Quarterly/ Annual	Harbour Masters Report, Pilot Log
	Service time	Service time includes the pre and post berthing time, i.e. the time pilot is on board and the berth time. Service time = port time – waiting time	Monthly/ Quarterly/ Annual	
	Berth time	Berth time is the first-to-last time that a ship is at berth. Berth time = Berthing time – de-berthing time	Monthly/ Quarterly/ Annual	
	Cargo related			
	Dwell time	Cargo dwell time is the duration of cargo remaining in port before being loaded on board or collected for domestic or transit distribution. It is the time cargo remains in a terminal's in-transit storage area while awaiting shipment or collection by clearance transportation. The main indicator recorded is dwell-time for containerized cargo (average container dwell time for imports and exports full and empties, and transits by countries). Measured as days/container.	Monthly/ Quarterly/ Annual	
(ii) Output indicators	**Berth output/ berth throughput**	**Berth output measures the total tonnage or units of cargo handled at berth in a stated period of time**		The time sheets filled in by the handling supervisors
	(i) General cargo berth throughput	General cargo berth indicator = total tons/1 year on the berth concerned	Monthly/ Quarterly/ Annual	
	(ii) Container berth (s) throughput	Containers berth indicator = total TEU/1 year on the berth concerned	Monthly/ Quarterly/ Annual	
	(iii) Ro-Ro berth throughput	Ro-Ro berth indicator = total vehicles or rolls/1 year on the berth concerned	Monthly/ Quarterly/ Annual	
	(iii) Dry bulk berth throughput	Dry bulk berth indicator = total tons/1 year on the berth concerned	Monthly/ Quarterly/ Annual	
	(iv) Liquid bulk berth throughput	Liquid bulk berth indicator = total tons/1 year on the berth concerned	Monthly/ Quarterly/ Annual	
	Ship Output	**Ship output measures the rate at which cargo is handled to and from a vessel in port or at a berth**		The time sheets filled in by the handling supervisors
	(i) Tons per ship hour	Tons per ship hour in port = tons/ship hours in port=tons/ship/hour in port	Monthly/ Quarterly/ Annual	
	(ii) Tons per ship hour at berth	Tons per ship hour at berth = tons/ship hours at berth=tons/ship/hour at berth	Monthly/ Quarterly/	

			Annual	
	(iii) Tons per ship hour worked	Tons per ship worked hour = tons/ship worked hours=tons/ship/worked hour	Monthly/ Quarterly/ Annual	
	Gang Output	**Gang output indicator is the average tons of cargo handled within a stated period**		Time Sheets, Labour Handling Summary Sheet, Idle Time Form, Summary Sheet
	Average output per gang hour (tonnage handled)	Average output per gang hour = tonnage handled/(gang x hours worked)	Monthly/ Quarterly/ Annual	
	Average output per gang hour (Container TEUs handled)	Average output per gang hour = total TEU (or boxes) handled/(gang x hours worked)	Monthly/ Quarterly/ Annual	
(iii) Utilization indicators		**Utilization indicators are measures of how intensively port facilities and resources are used**		
	Utilization of berth			Weekly Register of Occupation, Berth Occupancy form, Time sheet
	Berth occupancy	Berth occupancy = yearly working hours/365x24 hours	Monthly/ Quarterly/ Annual	
	Idle time ratio	Idle time ratio = total cumulated annual idle time in hours/annual working hours	Monthly/ Quarterly/ Annual	
	Utilization of equipment			Information provided from time sheets
	(i) Availability ratio	Availability ratio = annual hours of availability/365x24 hours	Monthly/ Quarterly/ Annual	
	(ii) Rate of utilization	Rate of utilization = annual worked hours/365x24 hours	Monthly/ Quarterly/ Annual	
(iv) Productivity indicators		**Productivity is the measurement of the volume handled per unit of time**		Time Sheets (e.g. stevedore time sheet), filled in by the handling supervisors, Terminal Performance Report, Traffic Sheets
	Ship productivity	Ship productivity, the divider (denominator) is the duration of the call in the port, which is usually either the total turn-round time (port time), time at berth or ship working time.	Monthly/ Quarterly/ Annual	
	(i) In port	Ship productivity (gross) = total moves/port time	Monthly/ Quarterly/ Annual	
	(ii) At berth	Ship productivity (gross) = total moves/berth time	Monthly/ Quarterly/ Annual	
	(iii) Working	Ship productivity (gross) = total moves/working time	Monthly/ Quarterly/ Annual	
	Crane Productivity	Crane productivity, the divider is the number of gross or net crane hours. Net crane hours is gross crane hours less delays crane hours	Monthly/ Quarterly/ Annual	
	(i) Crane productivity (gross)	Crane productivity (gross) = total moves/crane hours	Monthly/ Quarterly/ Annual	
	(ii) Crane productivity (net)	Crane productivity (net) = total moves/net crane hours	Monthly/ Quarterly/ Annual	

Chapter 2: Port Statistics

Port Traffic

Port traffic refers to all goods or cargo that has used the port as the transfer centre. Thus irrespective of same consignment handled in a number of port activities, the cargo is only counted once as long as it makes use of the port as the transfer centre. The resources or number of activities involved in handling the same cargo are irrelevant when computing port traffic. Activities such as shifting or reloading of goods erroneously discharged do not increase actual amount of cargo received or loaded at the port and are therefore excluded from port traffic count. The definition or computation of port traffic which is also adopted by UNCTACD manual of port statistics and performance indicators comprises the following three classes:

1. Inward cargo either for national use or transit cargo continuing to foreign destination by land or inland waterway.
2. Outward cargo either of national origin or transit cargo arriving in port from a foreign destination via land or inland waterway.
3. Transhipment cargo either national or international (foreign bound) and only counted once when discharged.

Port Throughput and Berth Throughput

The concept or method of computing port throughput and berth throughput is the same. The port throughput is equal to berth throughput in case of ports with only one berth. For ports with more than one berth (e.g. 5 berths), the port throughput is equal to the total throughput of the berths handling cargo. For a port with 5 berths, the port throughput is equal to the sum of the 5 berths throughput. The port or berth throughput takes account of various activities, operations and resources availed to handle cargo irrespective of its final destination. Thus the tonnages or TEUs for reloading of cargo discharged by error or shifting of cargo via the quay will be counted as an activity of the port/berth throughput, and counted in two directions (i.e. counted twice). Shifting of cargo in vessels holds is counted only once.

Cargo discharged from or loaded into a vessel at the quay will be included in both berth throughput and port traffic.

Transshipment via the quay will be counted twice in berth throughput. Direct transshipment from one ship to another is however counted once as only one gang or equipment is involved in one direction. However, transshipment cargo whether national or international will be counted only once in the port traffic.

Cargo transferred from one vessel into another (e.g. due to equipment breakdown or cancellation of a call) will be treated as transshipment cargo and counted twice if the operation is via quay, and once if directly into another ship. The cargo is not included in the port traffic.

Both port traffic and berth throughput are measured in metric tonnes unless otherwise stated (e.g. for container berth also measured in TEUs).

Transshipment

Transshipment traffic is designated by transfer of goods from a sea-going vessel to another sea-going vessel before the place of final destination has been reached. Special attention is made such that for port traffic, transshipment traffic is counted once, while for port/berth throughput, transshipment throughput is counted twice.

The standard practice for the transshipment containers is that each movement is counted, so where necessary, the figure for transshipment container published by the port has been adjusted, either by doubling the figure recorded for the inbound part of the movement or by using additional information.

Factors affecting transshipment

1. Restrictions of port facilities: due to lack of large/adequate berthing facilities and draft limitations
2. Tariff structure: cheaper tariffs/reduce tariffs
3. Efficiency in port services
4. External environment: route changes by shipping lines
5. Economies of scale and trading pattern of each country: can answer “whether the service is direct or a feeder operating via hub-ports”.
    a. Tendency for export-oriented economy to be more served by feeder services than direct services
6. Congestion
7. Shipping lines policies

Direct services among others depend on the volume of trade to and from import and exporting countries or region.

Transit

Transit traffic is goods or cargo coming into the country (and thus not originating or destined into the country) which is dispatched either by road, rail or inland waterway. Special attention has to be made such that, if coming cargo not destined into the country is dispatched at the port by coaster or sea going vessel, the mode of activity becomes transshipment. Though en route, the cargo is categorized as transshipment and not transit traffic. This view is different from customs point of view that would visualize or consider any cargo coming into the country but not destined to that country (i.e. en route), even though dispatched by coaster or sea going vessels as transit. The customs definition is not based on the mode of dispatch. With port authorities, goods en route and dispatched by coaster or sea going vessel are counted as transshipment.

Standard Minimal for Compiling Port Statistics (Formats)

The main objective of ports compiling statistics on cargo throughput is to gather data on trade flows through the ports in order to obtain the most precise description of the overseas trade. Collection of data on proposed formats cab be considerable can be a reasonable initial step data in harmonized data.

(1). Throughput by Cargo Type

Volumes through the port can be related to economic activity irrespective of the type of cargo, or related to port facilities or terminals, in which case the cargo type is the determining factor. Port volumes are classified into the following four main categories, depending on the handling equipment required.

1. Break-bulk (general or conventional)
2. Containers
3. Dry bulk
4. Liquid bulk

Collection of data on these categories can be considered as a reasonable initial step for recording in a harmonized format shown below.

Throughput by cargo type

	Year XX	
	Discharged	Loaded
General Cargo/ Conventional/ Break-bulk		
Containerized		
Dry bulk		
Liquid bulk		
TOTAL		
Of which transit		
Of which transshipped		

Break-bulk cargo:

Include non-containerized general cargo stored in boxes, bales, pallets, pre-slung, big bags, nets, or other units to be loaded onto or discharged from ships or other forms of transportation. Examples include iron, steel, machinery, linerboard and wood pulp.

Container:

Is a box made of aluminum, steel or fiberglass used to transport cargo by ship, rail, truck or barge. Common dimensions are 20' x 8’ x 8' (called a TEU or twenty-foot equivalent unit) or 40' x 8' x 8' (forty-foot). Variations are collapsible containers, tank containers (for liquids) and "rag tops" (open-topped containers covered by a tarpaulin for cargo that sticks above the top of a closed box).

Dry Bulk:

Include minerals or grains stored in loose piles moving without mark or count (e.g. ores, coal, cereals and fertilizers). These low-density products are transported in bulk-carriers of various ranges. Handling of export products is mainly operated with conveyers. Ship to shore operations of import products requires cranes and hoppers. On the apron, small cargoes are generally loaded in trailers while large cargoes are carried through conveyor belts to warehouses or silos.

Liquid Bulk:

Cargo includes petroleum products, molasses, and vegetable oil, which is transported by liquid bulk carriers. The unloading is by pumps provided by ship and port. Unloading performance depends on the size of the ship, viscosity, temperature, and safety regulation for hazardous products.

(2). Containerized traffic

Although, in an apparent simplicity, there are numerous problems linked to different conventions, focus and characteristics of the containerized trade. The most striking example of difficulties on convention concerns transshipment traffic, which is counted once by some ports, or twice by others. Also on focus is the absence of information on tonnage on containers in some ports. One example on characteristics of containerized trade is the fact that if there is no distinction between empty and full containers, any imbalance in the containerized trade is hidden.

Collection of data can be recorded in different or combined tables for tonnages or TEUs as shown below.

Containerized cargo (different or combined tables for tonnage or TEUs)

		Year XX
Discharged	Full	
	Empty	
Loaded	Full	
	Empty	
Transshipment	Full	
	Empty	

Only “net weights” of containers that are measures of weight of cargo are recorded. The tare weight of the container is excluded.

“Full” means the container contains cargo. This does not mean the container has been filled to its weight or cubic capacity. Almost always, transshipment containers are full load containers.

“Empty” containers are containers which are moving without any freight paying cargo.

For port traffic, transshipment traffic is counted once, while for berth/port throughput, transshipment throughput is counted twice.

(3). Transit Traffic

Transit traffic is goods received in a port en route and from which they have to be transferred and dispatched to their ultimate foreign destination by road, rail, or inland waterway.

Collection of data for transit traffic can be recorded in different or combined tables for tonnages and TEUs (for containers) as shown below.

Transit traffic (tonnages and TEUs)

		Year XX
Discharged going to	Country A	
	Country B	
	Country C	
Loaded coming from	Country A	
	Country B	
	Country C	

As shown in the table, transit traffic is also recorded by country of destination for cargo discharged (i.e. inward cargo) and country of origin for cargo loaded (i.e. outward cargo).

Chapter 3: Performance Indicators, Conventions and Definitions

The manual aims to introduce a standardized view and computation of ports performance indicators, which takes into the account the UNCTAD manual on a uniform system of ports statistics and performance indicators and international standard practices that meet the current needs. The ultimate goal is to enhance the knowledge and information on performance indicators among PMAESA members, and use the information to increase ports operational efficiency and how as a group PMAESA ports can benchmark for comparison with other ports in the world.

Ports performance indicators can roughly be classified into four types:

1. Service indicators: time spent by a ship in port, time spent by cargo in port, etc…
2. Output indicators: traffic and throughput indicators
3. Utilization indicators: berth occupancy
4. Productivity indicators: productivity in port, productivity at berth, crane productivity etc.

A few types and major performance indicators in the above categories are given below.

Service indicators

Time is a major indicator for service indicators. There is need to consider separately the service time for ship and service time for cargo.

Ship Related

The service indicators are useful for the ship-owners and shippers because the time the ships spend in port is paid by the ship owner and also by the shipper. In addition, charter ships have to pay for the demurrage, though some costs are recovered through surcharges imposed on shippers (e.g. Vessel Delay Surcharge – VDS). The service indicators show the quality and extent of services provided by the port. Main service indicators are:

- Total port time (ship turn-round time)
- Waiting time: working period (operating time at berth) and non- working periods
- Time at berth

Port time (ship turn-round time)

The time in port (turn-round time) is the time the ship spends in the port from arrival in front of the port up to the departure after leaving the limits of the port. The total time in port is inclusive of all the steps of a life of a ship in a port.

Port time = Waiting time + Service time

Average port time = (cumulative time for waiting + service time)/total number of ships

Waiting time

Waiting time is the cumulative time spent by all ships in the port waiting for berth, documents, pilot, tug, bad weather, availability of cargo, gang, beginning and change of shift etc. The waiting time can be considered as the waiting time IN and waiting time OUT, and further classified by causes onto ship side and port side:

- Ship's convenience (ship side) e.g.
    - Non availability of cargo
    - Technical problems aboard the ship
    - Bad weather conditions
    - Waiting for high tide sufficient for berthing or entering or leaving the harbour

  Port convenience (port side) e.g.
    - Traffic congestion
    - Non-availability of berths
    - Accident in the channel
    - Regulation

Waiting time = cumulative time spent by all ships for waiting time IN + waiting time OUT

Service time

Service time includes the pre and post berthing time, i.e. the time pilot is on board and the berth time.

Service time cannot be equated to berth time because there are some services undertaken before and after berthing of the ship (e.g. pilot and tug services in port).

Literally,

Service time = port time – waiting time

Berth time

Berth time is the first-to-last time that a ship is at berth. It is the period of time during which a ship is berthed in a port, including working and non-working periods.

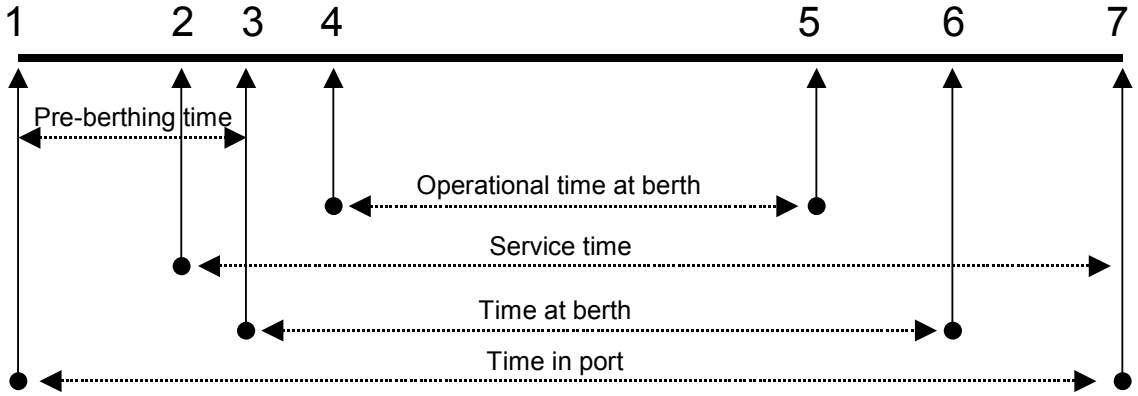
Berth time = Berthing time – deberthing time

Source of data

Data for the ships hour in port is provided by the office of the Harbour Master, which registers the date, hour and minute of arrival of ships to where the pilot is awaiting, the date and time when the ship leaves the berth, the type and size of the ships, the time of the nautical operations, and the name of the berth that ship is berthed.

Ship hour in port

A graphical presentation of the ship hour in port from the UNCTAD manual for port statistics summarizes the ship hour in port as given below.



Number	Event
1	Arrival at port (outer anchorage for instance)
2	Pilot on board
3	Ship at berth (end of mooring for instance)
4	Start of operations
5	End of operations
6	Departure from berth
7	Departure from the port (pilot dropped for instance)

Whereby,

- Ship's time in port (or ship turn-round time) = **7 - 1**
- Service time = **7 - 2**
- Time at berth = **6 – 3**
- Operating time at berth = **5 – 4**

Factors influencing service indicators

1. Topographical and geographical factors
    - Port estuary (affect access)
    - Tide time
    - Weather

2. Operational
    - Port congestion, unavailability of berths
    - Priorities of other ships
    - Unavailability of pilots or tug

Cargo related:

The main indicator recorded is dwell-time for containerized cargo. Cargo dwell time is the duration cargo remains in the port before being loaded on board or collected for domestic or transit distribution. It is the time cargo remains in a terminal's in-transit storage area while awaiting shipment or collection by clearance transportation.

Container dwell time = Days/Container (monthly and annually), measured for:

- Import full, export full and empties
- Average(overall)
- Total imports, exports and empties dwell time per country

Proposed standard minimal indicators

Ship related:

Minimal set advisable is:

- Total Port Time
- Total Berth Time
- Pre-berthing delays

The information should be available per terminal, and preferably on a monthly basis.

Cargo related:

The minimal advisable set is average container dwell time according to nature of the traffic (import, export, transit). For transit, separation of dwell time by country is necessary to compare and minimize disparities.

Output indicators

Output indicators include:

- Throughput handled in the port or in a berth: berth output
- Handling output: ship output and gang output

Berth output/berth throughput

Berth output measures the total tonnage or units of cargo handled at berth in a stated period of time (usually a year). Formula for berth throughput indicator depends on the type of cargoes:

- General cargo berth indicator = total tons/1 year on the berth concerned

- Containers berth indicator = total TEU/1 year on the berth concerned
- Ro-Ro berth indicator = total vehicles or rolls/1 year on the berth concerned
- Bulk berth indicator = total tons/1 year on the berth concerned

Source of data

The time sheets filled in by the handling supervisors

Ship output

Ship output measures the rate at which cargo is handled to and from a vessel in port or at a berth. They are indicators on how good the cargo handling operations are. Three ship output indicators are:

- Tons per ship hour in port = tons/ship hours in port=tons/ship/hour in port
- Tons per ship hour at berth = tons/ship hours at berth=tons/ship/hour at berth
- Tons per ship worked hour = tons/ship worked hours=tons/ship/worked hour

Ship working output indicates how much the ship is handling in one hour. For container or vehicle handling, the tonnage handled (i.e. tons) is replaced with total number of TEU or boxes i.e. TEU/ship hours.

Source of data

The time sheets filled in by the handling supervisors

Gang output

Gang output indicator is the average tons of cargo handled within a stated period. It indicates the amount of tons the gang can handle in say one hour (20 tons per gang per hour). The following ratios measure the gang output:

Average output per gang hour = tonnage handled/(gang x hours worked)

For containers:
Average output per gang hour = total TEU (or boxes) handled/(gang x hours worked)

Source of data

The time sheets filled in by the handling supervisors

Proposed standard minimal indicators

Suggested indicators are:

- Berth throughput= total tons/1 year on the berth concerned
- Tons per ship hour in port = tons/ship hours in port=tons/ship/hour in port
- Tons per ship hour at berth = tons/ship hours at berth=tons/ship/hour at berth

- Average output per gang hour = tonnage handled/(gang x hours worked)
- Average output per gang hour = total TEU (or boxes) handled/(gang x hours worked)

Factors influencing output indicators

1. Type of cargoes and packages –non unitized cargo (cases, bags and logs), unitized cargo pre-sung (bags, pallets, containers etc.)
2. The cargo mix of the small consignments
3. The shipload tonnage handled
4. The type and age of the ships (conventional, multipulpose, mixture, ro-ro, containership etc.)
5. The route inside the port (direct or indirect delivery)
6. The equipment (port or ship equipment), cranes, conveyor belts or hands)
7. Location of goods inside the holds (specifically for bulk)

Utilization indicators

Utilization indicators are measures of how intensively port facilities and resources are used. Indicators monitor the effective use of the port assets, such as terminals (or berths), handling equipment, etc… Among the most important are given below.

Utilization of berth

- Berth occupancy = yearly working hours/365x24 hours
- Idle time ratio = total cumulated annual idle time in hours/annual working hours

Utilization indicators can also be worked for the yards, sheds and handling equipment utilization.

Berth occupancy

Berth occupancy gives an indication of the intensity of use of the berths. There is a relation between the berth occupancy and the average waiting time before the berth becomes available for a ship.

Low berth occupancy denotes under utilization of assets, but waiting time is negligible and the level of service is high, while a higher rate may lead to congestion.

However, it is risky to take decisions based on the berth occupancy

- A high ratio may be a positive element if ships may stay berthed when they wish so, and pay the corresponding port dues while not inducing waiting time for other vessels, or negative element if the vessels induce a ship queuing phenomena
- A cut of the occupancy ratio may result from a good management which is positive (e.g. by reducing delays at berth or investing on efficient handling equipments), or a management which may induce ships diverting their calls

Rated terminal capacity

The design capacity of a terminal is based on a number of assumptions taking into account several parameters. The ratio between the total throughput of a terminal and its rated capacity is a key indicator for effective planning of the development of new additional capacity.

Utilization of equipment (or yards and sheds)

For each type of equipment the ratio is calculated to know their availability and their use.

Availability ratio = annual hours of availability/365x24 hours

Rate of utilization = annual worked hours/365x24 hours

Source of data

Information is provided from the time sheets. Some difficulties exist in collecting this information:

- If the port authority is operating the port, it is easy to get the time sheets.
- If independent operators or stevedores perform the handling, the port authority has difficulties to be provided with the documents (less solved by strong agreement/contract between the port authority and terminal operators).
- Other difficulties arise from the operators not indicating the effective reasons of idle time to avoid showing the weakness of their work organization.

Proposed standard minimal indicators

The proposed indicators are:

- Berth occupancy (at berth or terminal level), on a monthly and annual basis
- Ratio between throughput of a terminal and its rated capacity

Productivity Indicators

Productivity is the measurement of the volume handled per unit of time. It is the choice of volumes (numerator) and amount of time used (denominator) that differs in ports. The usual productivity indicators are the following:

Ship productivity

- Ship productivity, the divider (denominator) is the duration of the call in the port, which is usually either the total turn-round time (port time), time at berth or ship working time.

  In port: Ship productivity (gross) = total moves/port time

  At berth: Ship productivity (gross) = total moves/berth time

Working: Ship productivity (gross) = total moves/working time

Crane productivity

- Crane productivity, the divider is the number of gross or net crane hours. Net crane hours is gross crane hours less delays crane hours

  Crane productivity (gross) = total moves/crane hours

  Crane productivity (net) = total moves/net crane hours

Proposed standard minimal indicators

Suggested indicators are:

- Ship productivity (gross) = total moves/port time
- Ship productivity (gross) = total moves/berth time
- Crane productivity (gross) = total moves/crane hours

Movements (moves). What is a move?

Not all ports agree on similar way of counting movements. Movements or moves are applicable only on containerized cargo. Movement types include:

- Unloaded/discharged containers (import, inbound transit, unloaded from transshipment). The unloading of each container is considered as 1 move.
- Loaded containers (export, outbound transit, transshipment containers reloaded). Loading of each container is considered as 1 move.
- Shifting on board is counted as 1 movement
- Restow/ landed and reshipped (which is the shifting via quay) is counted for 2 movements
- Hatch cover opening and closing is counted as 2 movements

Containers, whether 20', 40' or out of gauge container (OGC) are considered as units and counted as 1 move each. However, for commercial, billing or monitoring of Vessel Delay Charges, an OGC could be considered to have more than one move.

The use of TEU instead of physical boxes is mainly linked to marketing purposes, as it artificially increases the crane productivity, and cannot be considered as a measurement of productivity.

The total number of moves should include all types of movements. All types of moves should also be defined (i.e. give conventions or principle used).

Efficiency and costs

The combination of the use of the resources and costs is important. You need information on costs to combine it with the operating data. Cost data required include:

- Berth labour costs
- Equipment maintenance costs

- Fuel costs
- Berth overheads (administration, capital costs of sheds and equipment

The most important measures at berth are:

- Total cost/ton of cargo handled

Labour cost/ton

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Unit ***16***

CARGO-HANDLING EQUIPMENT ON BOARD AND IN PORT

Basic terms

cargo-handling equipment	***front/side loader***
cargo gear	***van carrier***
handling facilities	***transtainer***
lifting gear	***container crane / portainer***
conveyor belt	***transit shed***
elevator	***warehouse***
pumping equipment	***cranes:***
derrick	***dockside crane,***
fork lift truck	***quay crane,***
mobile crane	***container crane***
straddle carrier	***gantry crane,***
tractor	***deck crane***
tug-master	***(ship's) cargo gear***

The form of cargo-handling equipment employed is basically determined by the nature of the actual cargo and the type of packing used. The subject of handling facilities raises the important question of mechanization.

BULK CARGO HANDLING EQUIPMENT

So far as **dry bulk cargoes** are concerned, handling facilities may be in the form of power-propelled conveyor belts, usually fed at the landward end by a hopper (a very large container on legs) or grabs, which may be magnetic for handling ores, fixed to a high capacity travelling crane or travelling gantries. These gantries move not only parallel to the quay, but also run back for considerable distances, and so cover a large stacking area, and are able to plumb the ship's hold. These two types of equipment are suitable for handling coal and ores. In the case of bulk sugar or when the grab is also used, the sugar would be discharged into a hopper, feeding by gravity a railway wagon or road vehicle below.

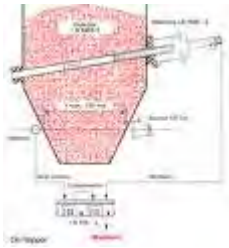
Elevators (US) or silos are normally associated with grain. They may be operated by pneumatic suction which sucks the grain out of the ship's hold.

SHIP UNLOADERS

FRONT LOADER

BELT CONVEYOR

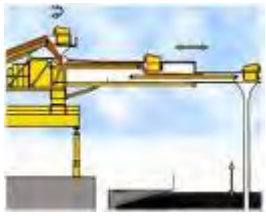
HOPPER



HOPPER

SILO / ELEVATOR

GRAB TYPE UNLOADERS



LOADING BOOM

LIQUID CARGO HANDLING EQUIPMENT

The movement of **liquid bulk cargo**, crude oil and derivatives, from the tanker is undertaken by means of pipelines connected to the shore-based storage tanks. Pumping equipment is provided in the tanker storage plant or refinery ashore, but not on the quayside. In view of the dangerous nature of such cargo, it is common practice to build the special berths a small distance from the main dock system on the seaward side. Oil cargo is discharged from the ship's tanks, via the cargo piping system to the main ship's manifold usually situated amidships, on either port or starboard side. From there by means of shore-based loading arms oil is transferred to the shore manifold and is then distributed to shore-based storage tanks on the oil terminal. The loading arm hose must be flanged oil-tight to the ship's manifold so that oil spills can be avoided.

TERMINAL MANIFOLD

SHIP'S MANIFOLD

LOADING ARMS

GENERAL CARGO HANDLING EQUIPMENT

With regard to **general cargo** (goods, merchandise, commodities), also referred to as break bulk cargo, almost 90 percent of all such cargo in most liner cargo trades today is containerized. Meanwhile the system of dockers handling cargo will continue, but doubtless every effort will be made to expand the a1ready extensive use of various types of mechanized cargo-hand1ing equipment.

General cargo is handled by cranes on the quay, floating cranes or by the ship's own cargo gear (deck cranes, derricks, etc.). Attached to such lifting gear is a shackle which links the crane or derrick with the form of cargo-handling equipment being used. For most lifts a hook is used.

There are numerous types of tools or **loose gear** that can be attached to the shipboard or shore-based lifting gear. They include the sling or strop, which is probably the most common form of loose gear. Such equipment, generally made of rope, is ideal for hoisting strong packages, such as wooden cases or bagged cargo, which is not likely to sag or be damaged when raised. Similarly, snotters

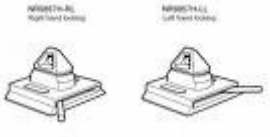
or canvas slings are suitable for bagged cargo. Chain slings, however, are used for heavy slender cargoes, such as timber or steel rails. Can or barrel hooks are suitable for hoisting barrels or drums. Cargo nets are suitable for mail bags and similar cargoes that are not liable to be crushed when hoisted. Heavy lifting beams are suitable for heavy and long articles such as locomotives, boilers or railway passenger coaches. Cargo trays and pallets, the latter being wooden or of steel construction, are ideal for cargo of moderate dimensions, which can be conveniently stacked, such as cartons, bags, or small wooden crates or cases.

CONTAINER FITTINGS

CHAIN SLING

TWISTLOCK

CONTAINER FITTINGS AND LASHING

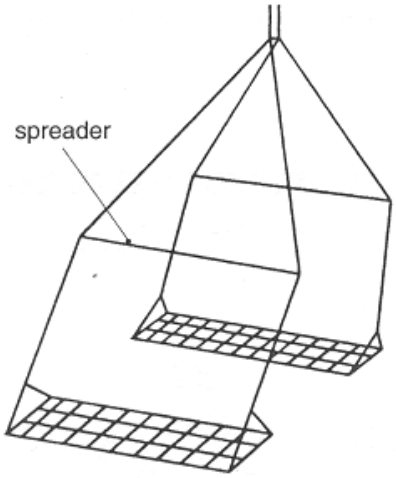


CORNER CASTING

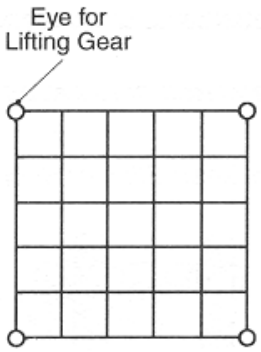
CARGO NET

HOOKS

LIFTING BEAM

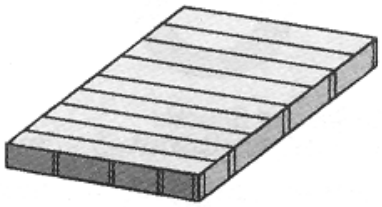


Vehicle Sling



Cargo Net

Canvas Sling



Pallet

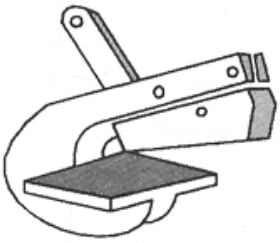
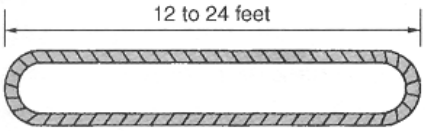
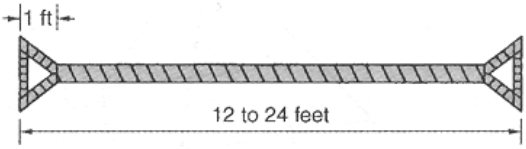


Plate Lifting Clamp

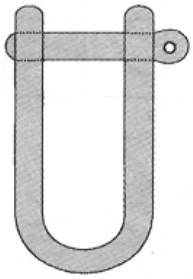
Cargo Handling Equipment or Lifting Gear (loose gear & cargo tools)



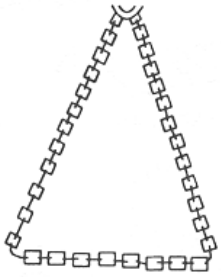
Loose Gear: *Sling or Strop*



Snotter

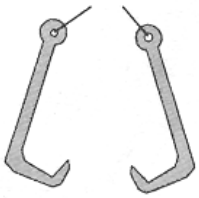


U-Shaped Shackle



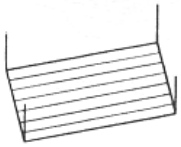
Chain Sling

Hooks: *Timber hooks*

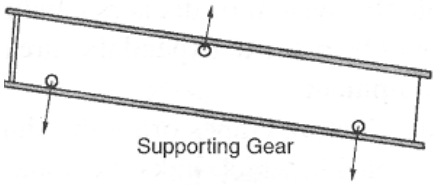


Hooks: *Box hooks*

Hooks: *Can hooks*



Cargo Tray



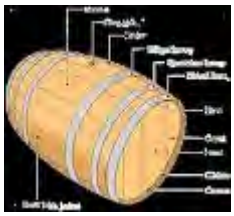
Heavy Lifting Beam: *Lifting Gear*

TYPES OF PACKING AND LIFTING EQUIPMENT/GEAR

WIRE SLING

DRUM/BARREL

KEG

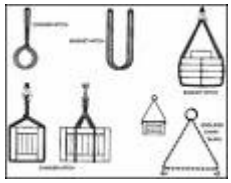


CASKS

CARGO HOOKS

CRATES

BOX / CASE



CARGO SLINGS

BOX HOOK

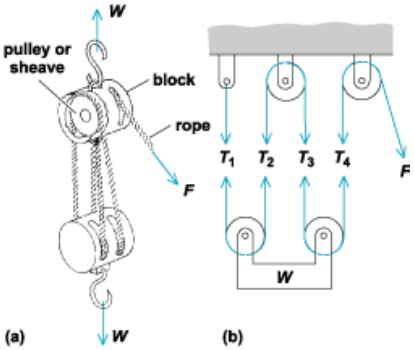
PLATE CLAMP

PALLET

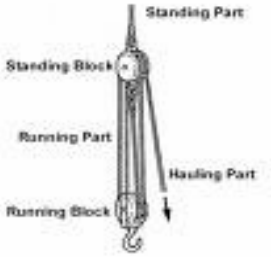
LIFTING GEAR

MODERN CARGO HANDLING

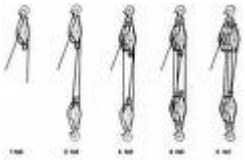
BLOCK AND TACKLE SYSTEMS



TACKLE: BLOCK AND SHEAVE



TACKLE



LIFTING GEAR

Additionally, dog or case hooks and case and plate clamps are suitable for transhipping cargo to railway wagons or road vehicles, but not to or from the ship, except to facilitate trans-shipping the cargo in the hold to enable suitable cargo-handling gear to be attached. Plate clamps are used for lifting metal plates. Dockers working in the ship's holds also use pinch or crowbars for moving heavy packages, and band books for manoeuvring packages into position.

PORT/TERMINAL CARGO HANDLING EQUIPMENT

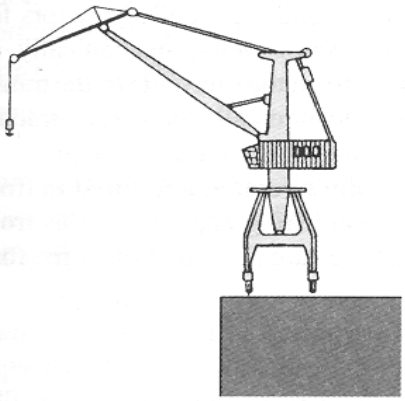
A lot of terminal or port **cargo handling equipment** is provided to facilitate movement of the cargo to and from the ship's side and the transit shed, warehouse, barge, railway wagon or road vehicle. These include two-wheeled hand barrows and four-wheeled trucks either manually or mechanica1ly propelled, and mechanically or electrica1ly propelled tractors for hauling four-wheeled trailers. Ro-ro trailers are moved by tug-masters or ro-ro tractors. There are also belt conveyors mechanically or electrically operated, or rollers, all perhaps extending from the quayside to the transit shed, warehouse, railway wagon or road vehicle. Containers are loaded and unloaded by means of the quayside container cranes, i.e. container gantries also called shiptainers.

Transtainers or stacking cranes, straddle carriers, van carriers, front and side loading fork-lift trucks are used for moving and stacking containers within the terminal up to five-high, i.e. five containers one above the other. Mechanically powered straddle carriers are designed to distribute containers on the quay and on the terminal.

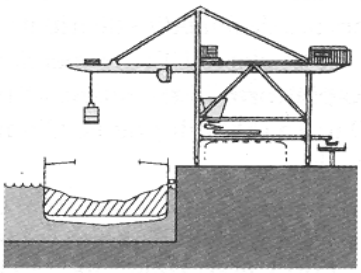
Fork lift trucks (FLT) are mechanically or electrically operated and fitted in front with a platform in the shape of two prongs of a fork; lifting capacity varies from 1 to 45 tons. Clamps for reels and bales are provided on some fork lift trucks.

On the docks various types of dockside cranes, level-luffing cranes, mobile cranes etc. are used for moving and lifting packages. All the vertical cargo movements are conducted by the lifting gear (lift-on/lift-off equipment).

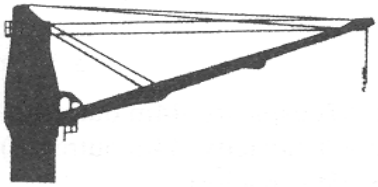
Roll-on/roll-off cargoes, i.e. containers and heavy loads on trailers, roll on and off the ro-ro ship via stern, bow or quarter ramps. They are lifted to various decks on board by means of scissor-supported platforms.



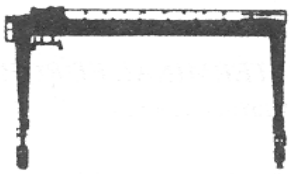
Level-Luffing Crane: *Dockside Crane*



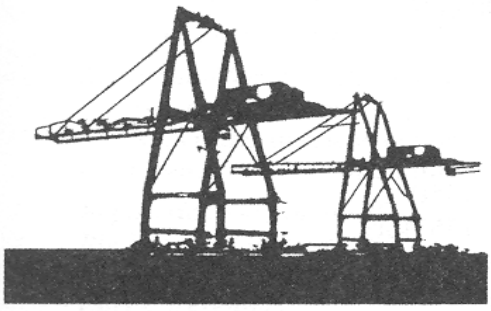
Ship Unloader Gantry



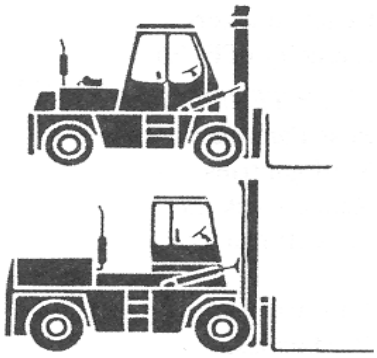
Shipboard Crane: *Deck Crane*



Transtainer Stacking Crane:
Straddle Carrier



Container Crane (Portainer)



For more port cargo handling equipment see also Supplement (End of Unit 16)!!!

IMO STANDARD MARINE COMMUNICATION PHRASES
IV-C - CARGO AND CARGO HANDLING

1.1.4 - Operating cargo handling equipment and hatches

Are cranes/derricks operational?
- *Yes, cranes/derricks operational.*
- *No, cranes/derricks not operational (yet).*
- *Cranes/derricks operational in ... minutes.*

Rig derrick(s)/crane(s) of no. ... hold.
Rig heavy lift derrick.
Shift derrick(s) of no. ... hold to ... side.
Check preventers.
Top derrick(s) over hatch/pier.
Lower derrick(s) over hatch/pier.
Swing derrick(s)/crane(s) outboard.
Keep safe working load of derrick(s)/crane(s).
Instruct winchman/craneman.

1.1.5 - Maintaining/repairing cargo handling equipment

Check hold(s)/hatch cover(s)/derrick(s) for damage and report.
- *Cargo battens damaged.*
- *Rubber seals of hatch cover(s) damaged.*
- *(Container) lashings damaged.*

Are hold ventilators operational?
- *Yes, hold ventilators operational.*
- *No, hold ventilators not operational.*
- *Hold ventilators operational in ... minutes.*

Are winch motors operational?
- *Winch motor of no. ... derrick operational in ... minutes.*

Check repair of crane/winch / ... personally.
Lubricate blocks of crane(s)/derrick(s).

A Comprehension & vocabulary

A.1 *Fill in the appropriate term:*

- ***straddle carriers*** • ***container gantries*** • ***tug-masters***
- ***fork lift trucks*** • ***trailers***

The Auckland Container Terminal

The Auckland Container Terminal is equipped with three Paceco 1._____. The terminal equipment also includes 20 2. _____ to move and stack the containers on the terminal. 3. _____ and 4._____ are used for moving containers into and off the ro-ro vessels. For empty containers more than thirty l8-ton 5. _____ are used.

A.2 *State the kind of loose gear (see p.* 119 - *120) you would use for handling the following types of cargo:*

1. steel plates _____
2. eggs in cartons _____
3. barrels or drums _____
4. heavy machinery _____
5. raw oil _____
6. iron ore _____
7. steel rails _____

8. bagged cargo _____
9. containers _____

A.3 *Classify the following terms under the four headings as appropriate:*

• ship unloader • transtainer • dockside crane • straddle carrier
• mobile crane • FLT • hopper • floating crane • bucket elevator
• conveyor belt • deck crane • derrick • pumping equipment
• tug-master • level-luffing crane • trailer • pneumatic unloader
• grab unloader • loading arm

conventional or general cargo	*containers and ro-ro units*	*bulk cargo*	*liquid cargo*

A.4 *State which of the following sentences are true or false:*

TRUE	*FALSE*

1. Hand books are used with bagged-cargo.
2. Conveyor belts move bulk cargoes.
3. Transtainers are quay container cranes.
4. Straddle carriers are used to load containers on board ship.
5. Tug-masters move co-co cargo info co-co ships.
6. Chain slings are used with lightweight cargo.
7. Cargo nets are suitable for cartons and bags.
8. Fork lift trucks are not used to handle paper rolls.
9. Drums are stowed onto the pallet to facilitate handling.

A.5 *Complete me text below with the appropriate words:*

• boom • officers and crew • cargo handling • ship's gear
• lifting gear • cargo handling equipment • dockers • winch

Handling General Cargo in the US

General cargo used to be handled in the United States chiefly by means of 1._____ . Today the greatest proportion of general merchandise is carried in containers and worked with the terminal 2. _____ . The speed loading and discharging and the adequacy of stowage is highly dependent upon

the skill and experience of 3. _____ and the ship's 4. _____ . However, these must be quite familiar with the methods of 5. _____ . The term ship's gear is used to describe the ship's deck 6. _____, its cargo 7._____ attached either to mast or kingposts. Shore 8. _____ is usually used for handling conventional general cargo in most European ports.

A.6 *For each group of crane types find the type of cargo they handle: dry bulk cargo, containers, or general cargo*

CRANE TYPES	*CARGO TYPES*
dockside crane	
gantry crane	
level-luffing crane	
overhead crane	
ship crane	
derrick	
floating crane	
slewing crane	
portal crane	
semi-portal crane	
quayside crane	
mobile crane	
jumbo (Scotch) derrick	
shiploader	
ship unloader	
stockyard crane	
stacking gantry	
portainer	
container gantry	
transtainer	
shiptainer	
straddle carrier	
front loader	
side loader	

A.7 Underline the cargo-handling equipment in the description of the Amsterdam Westhaven bulk cargo terminal:

The terminal has a quay of 800 m in length and 15 m in depth. Maximum draught of vessels to be accommodated is 13.5 m. Maximum outreach of loading/discharging equipment over water is 45 m. Four gantry cranes, lifting capacity 3 x 30 tons and 1 x 50 tons, are used for handling ore and coal. The material is transported to storage by a conveyor belt system. Grab bridge cranes are used for ore and floating cranes are also available.

A.8 Port of Cork Container Services

Our Services

The Port of Cork offers a wide choice of fast, scheduled lift-on lift-off and roll-on roll-off services to continental Europe. The Port offers a scheduled ro-ro shortsea service to Swansea and Cork is the only Irish port providing a deepsea ro-ro service to Scandinavia, and the Mediterranean, and West Africia. At both the Tivoli Container Terminal and the Ringaskiddy Ro-Ro Terminal, modern port facilites and cargo handling equipment, high productivity levels, competitive pricing and twenty four hour working, seven days per week have contributed greatly to increased unitised throughput.

Lift – on Lift – Off Services

The Tivoli Container Terminal is situated 2 miles / 3 kilometres downriver from Cork city at the junction of two of Ireland's four Euroroutes, the N8 Cork – Dublin and the N25 Cork – Waterford – Rosslare. The terminal is adjacent to the Lee Tunnel and enjoys ready access to the N20 Cork-Limerick- Galway primary route.

Handling equipment includes two modern gantry container cranes and six straddle carriers. The terminal is equipped with a bank of reefer/heater points. The approach channel to Tivoli has been dredged to a depth of 6.5m C.D. to allow fully laden 700/800 teu vessels to access or depart the Terminal at all stages of the tide.

Competitive high frequency sailings have led to increased containerised throughput, thus enabling the Port of Cork to increase its market share of the Irish container market. The wide range of door to door services permit fast and frequent delivery of containers throughout Europe while feeder services allow Irish exporters to service deepsea markets speedily and efficiently.

Modern facilities are available at both Ringaskiddy and Tivoli to cater for the port's increasingly important roll-on roll-off traffic. The Ringaskiddy Ferry Terminal accommodates car ferry services to Britain and continental Europe together with regular shipments of trade vehicles.

The Grimaldi Euro-Med service is Ireland's only deepsea ro-ro service offering weekly connections to Scandinavian and Mediterranean ports. It is operated from the Ringaskiddy Deepwater Terminal which also services the port's considerable trade in deepsea trade vehicles. The Grimaldi West Africa service also calls to the Ringaskiddy Deepwater Terminal on a regular basis. Much of Cork's traffic in trade vehicles is handled at the Tivoli Ro-Ro terminal where regular shipments are discharged from British and mainland European ports. Extensive vehicle storage compounds are situated at Ringaskiddy and Tivoli.

There are four distinct public port facilities situated at the City Quays, the Tivoli Industrial and Dock Estate, the Ringaskiddy Deepwater and Ferry Terminals and the Cobh Cruise Terminal. For centuries the City Quays have handled most of the trade of the port and, while much of that traffic has now moved downriver, this area continues to account for approximately 1 million tonnes of cargo ranging from cereals, animal feedstuffs, fertilisers and coal to timber, acids and salt. In addition, a small number of medium size cruise ships continue to call to the City Quays.

The Port's lift-on lift-off container traffic – door – to – door and feeder – is handled at the Tivoli Container Terminal from where at least ten sailings per week are operated to European ports. Much of the Port's trade in trade vehicles is handled at this location as is the entire output of zinc and lead concentrates from the Lisheen Mine situated in County Tipperary. Other traffic handled at Tivoli includes refined oils, chemicals, LPG, salt, magnesite and livestock.

With a minimum depth alongside of 13.4 metres at low water, the Ringaskiddy Deepwater Terminal handles fully laden Panamax size vessels (60,000 tons deadweight), the only public port facility capable of so doing in any part of Ireland, north or south. Most of the Port's considerable trade in animal feedstuffs is discharged here where there is large – scale private sector investment in specialist warehousing. It is here also that Grimaldi Euro-Med Line's weekly roll-on roll-off service to and from the Mediterranean and Northern Europe is handled. In addition, the Deepwater Terminal handles other dry bulk cargoes, such as molasses, cement and steel scrap. Trade vehicles are discharged at both the Deepwater Terminal and the adjoining Ringaskiddy Ferry Terminal where Swansea Cork Ferries' service to Swansea and Brittany Ferries' service to Roscoff are accommodated. The Terminal's excellent passenger and freight facilities ensure smooth and efficient movement of passengers and freight through the port and onwards to their ultimate destinations – so important for the economic welfare of the region.

The Cobh Cruise Terminal is the only dedicated cruise terminal in Ireland. Situated within a few hundred metres of the centre of the picturesque town of Cobh, it is capable of accommodating cruise ships up to 320 metres in overall length.

B. Grammar

B.1 *Supply the right form of the verb in brackets info the right place in the sentence:*

Loading a Tanker

It now 15.00 hrs *(be).* The loading of cargo on time *(finish).* The personnel from the shore the loading arms *(disconnect).* Same deck hands the tank openings *(batten down).* They the va1ves *(close and sea/).* Under the Bosun's control they various equipments such as dip stick, ullage tapes, sample cans and thermometers *(stow away).* The Chief Officer just his calculations of the quantity of oil loaded *(complete).* He already the draught marks *(check),* and now for shore officia1s to complete the cargo documents *(wait for).*

B.2 *Supply the right article where necessary:*

The Union Purchase

1. _____ union purchase or married-fa11 system is one of 2. _____ most commonly employed systems for 3. _____ both loading and 4. _____ unloading 5. _____ cargo with 6. _____ ship's gear. It is sometimes ca1led 7. _____ union purchase system in 8. _____ UK or burtoning in 9. _____ US. 10. _____ two cargo booms and two winches are employed. One boom extends over 11._____ hatch opening and 12. ____other is swung out so that its peak is over 13. _____ quay apron or edge of 14. _____ pier. The ends of 15. _____ two fa1ls are brought together and terminate in 16. _____ single book.

B.3 *Rewrite the underlined phrases using the following adjectives:*

• ***likely*** • ***liable*** • ***subject*** • ***suitable*** • ***able***

1. Grab unloaders <u>can plumb</u> the whole width of the ship's hold.
2. Chain slings <u>are used for handling</u> heavy slender cargo.
3. Slings made of rope are used with the cargo which <u>does not sag</u> or get damaged when lifted.

4. Pinch or crowbars should not be used with cartons or with cargo which can be damaged by mechanical pressure.
5. Lightweight cargo can get crushed if overstowed by heavy packages.
6. A cargo of citrus fruit deteriorates easily if not carried under the appropriate temperature.

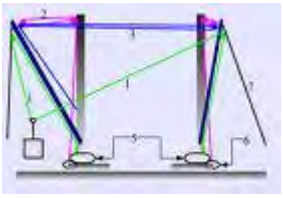
C. Writing skills

C.1 *Answer the following questions:*

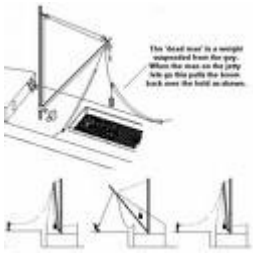
1. What is the cargo-handling equipment determined by?
2. What are bulk cargoes handled with?
3. How is oil moved on and off the ship?
4. What are the basic pieces of lifting gear for general cargo?
5. Which attachments are used with the lifting gear?
6. What are slings, books and lifting beams used for?
7. When do dockers use crowbars?
8. How are goods moved into and out of sheds, storages and warehouses?
9. What are fork lift trucks used for?
10. What equipment is used for hand1ing containers and co-co trailers?

SUPPLEMENT: Port and Terminal Cargo Handling Equipment

SHIP'S GEAR

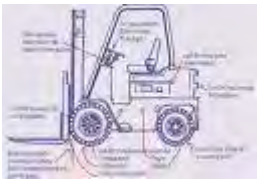


Union purchase (derrick)



Derrick work

TERMINAL EQUIPMENT

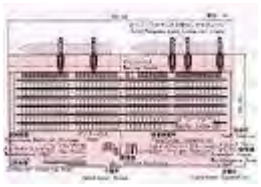


Fork-lift trucks

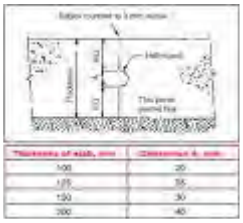
Mobile crane

CONTAINER TERMINALS

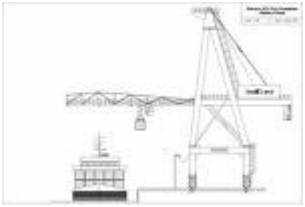

AUTOMATIC CONT.TERMINAL




FACILITIES AT CONT. TERMINAL

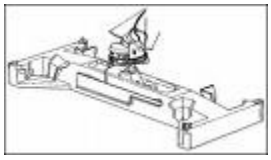

CONTAINER CRANES – PORTAINERS STACKING AREA


CONTAINER GANTRY STACKING CRANE STRADDLE CARRIER




CONTAINER GANTRY (PORTAINER)


TRANSTAINERS




SPREADERS


VAN CARRIER


STRADDLE CARRIER


SIDE LOADERS

ROLL-ON/ROLL-OFF EQUIPMENT

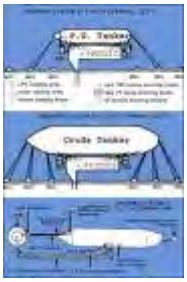

TUGMASTER RO-RO TRAILER

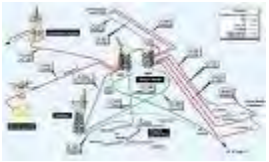
BULK CARGO TERMINALS



BULK CARGO TERMINAL GRAIN TERMINAL CATERPILLAR/BULLDOZER

OIL TERMINALS



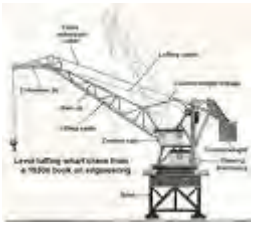
OIL TERMINAL

LNG & LPG TERMINALS



LPG TERMINAL LNG TERMINAL

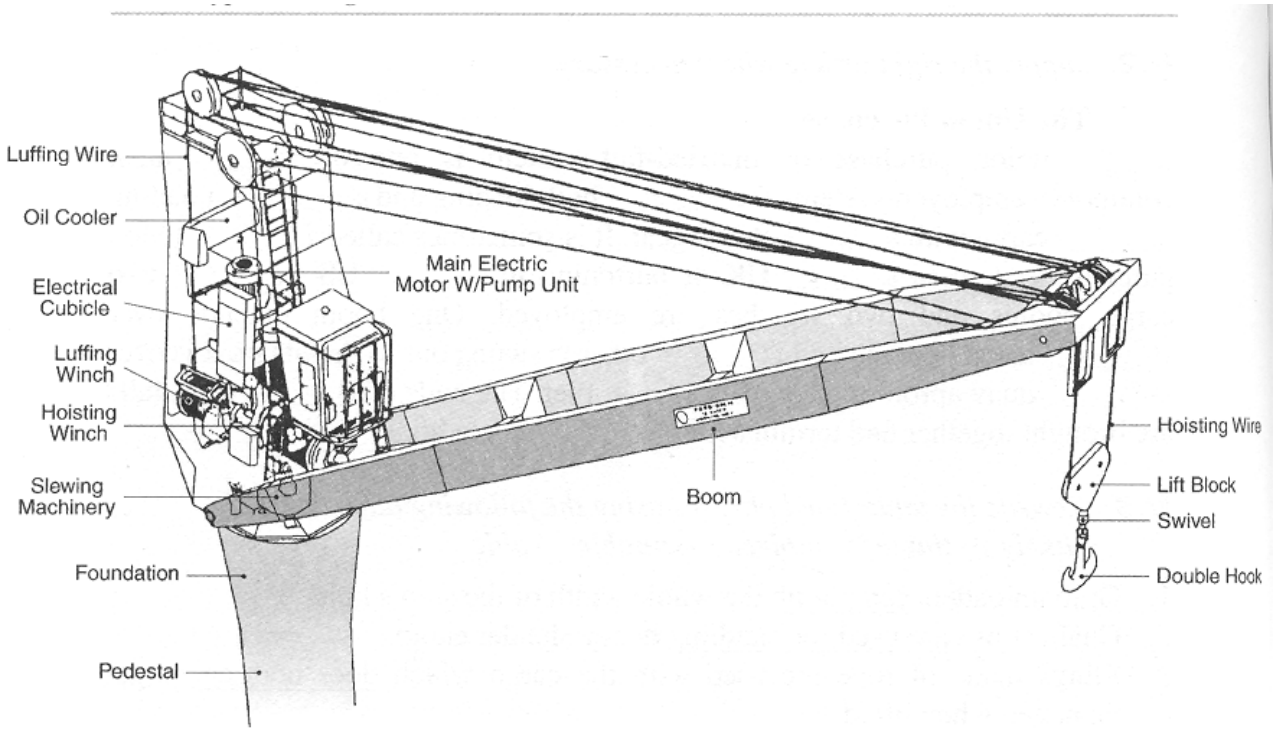
DOCKSIDE/QUAY/WHARF CRANES

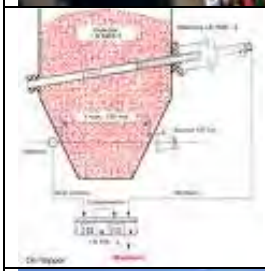
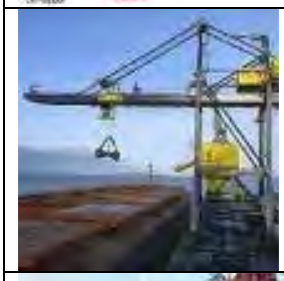


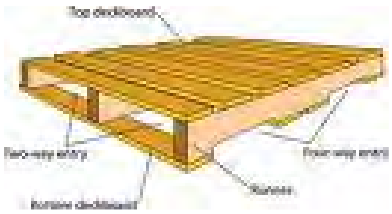
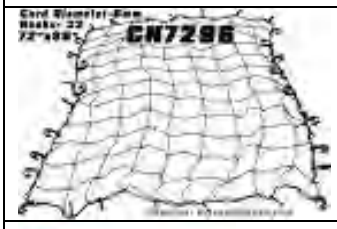


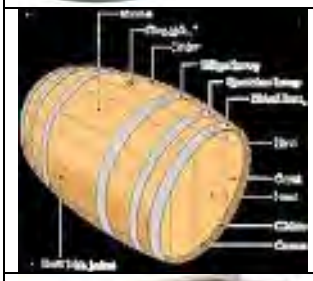
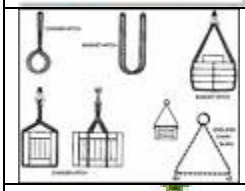


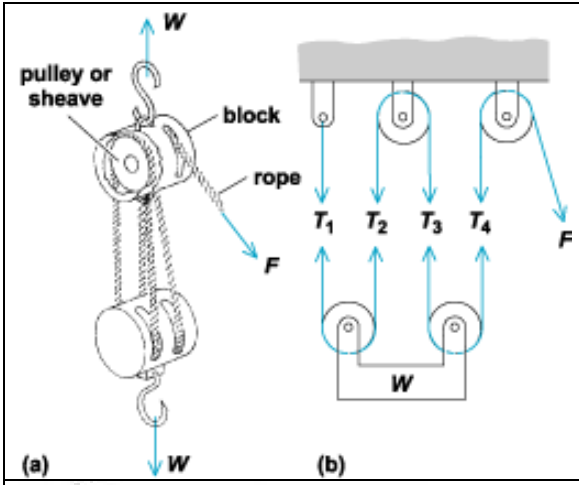
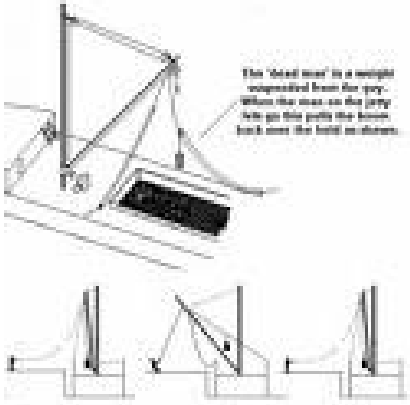
SHIP'S HEAVY MACHINERY

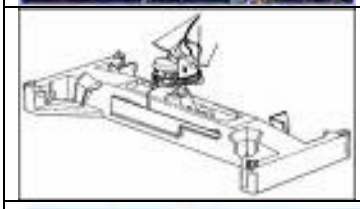
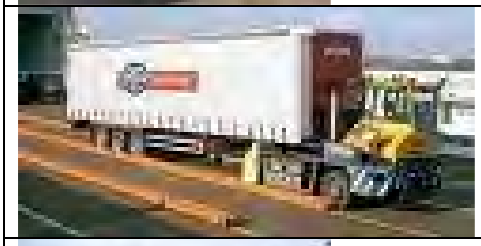


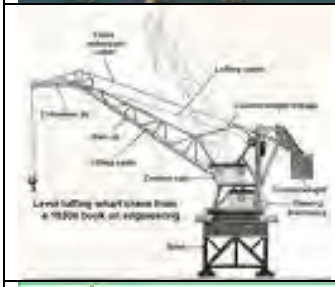
Supply the right term referring to the image in the left-hand column	
Equipment	**Name**
	
	
	
	
	

	
	
 Top deckboard Two-way entry Four-way entry Runners Bottom deckboard	
 CN7296	
	
	
	

 W pulley or sheave block rope F W (a) T_1 T_2 T_3 T_4 F W (b)	
	
	
	
	

REPAIRS IN MAINTEANACE

Repair

Repair means responding to the breakdown of equipment and undertaking work to correct the problem in order to return the equipment to a working condition.

Before equipment can be repaired, you need to be aware that there is a problem! Therefore, there should be a clearly understood **system for reporting faults and breakdowns** and equipment users should be encouraged to report faults and breakdowns as soon as possible. If there is no back-up equipment, a breakdown will mean that the service the equipment was providing will come to a halt.

Simple repairs can be done by the in-house or external **maintenance and repair team**. If the equipment is repaired where it is used, it is important that the team is trained to work safely and that they don't create hazards for staff.

More complex repairs will be carried out by **specialised maintenance personnel**. In all these situations, it is important to keep equipment users informed of how long their equipment will be unavailable.

Some items of equipment will be found to be damaged beyond repair. For others, spare parts may no longer be available as the equipment has become outdated. These will have reached the end of their lives and must be taken out of service (decommissioned or retired) and be replaced if the service they provide is to continue. Equipment that is being decommissioned should be disposed of safely and according to proper disposal procedures.

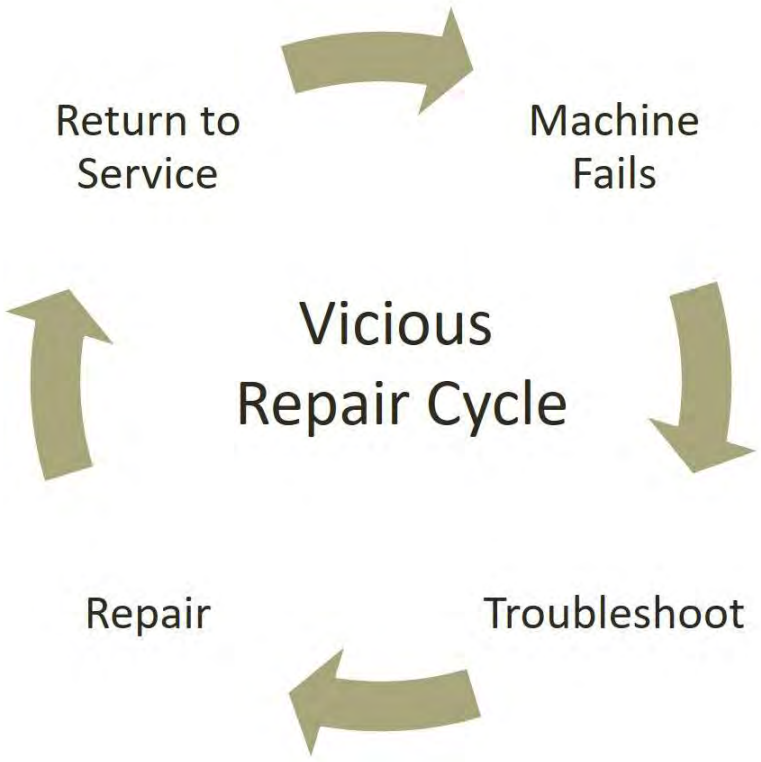
Remember to update your records accordingly.

Maintenance is one of the largest controllable operating costs in capital intensive industries. It isalso a critical business function that impacts on commercial risk, plant output, product quality,production cost, safety, and environmental performance. For these reasons, maintenance is regarded in best practice organisations not simply as a cost to be avoided, but together with reliability engineering, as a high leverage business function. It is considered a valuable business partner cont ributing to asset capability and continuous improvement in asset performance.

The dilemma that many of us face (and mostly not of our own doing), is that we are managers in organizations which barely have sufficient resources to keep the plant working, let alone find ways of improving reliability.
When this is the case, scarce maintenance resources are rationed and breakdowns consume resources first. Preventive maintenance suffers, which inevitably results in more breakdowns and the cycle continues.

In addition to lost productivity through unplanned maintenance, the "fix-it-quickly" mentality promotes "band aid maintenance", or temporary repairs, that often exacerbate the situation. Temporary repairs take additional labour to correct, or in the worst case, fail before correction. Often in an effort to control costs, personnel numbers are reduced and morale declines as the fewer remaining personnel almost give up in despair. With this, work standards drop. The vicious cycle feeds on itself and gradually organizations become almost entirely reactive.

This situation is depicted in Figure 1.



- **More repeat work**
- **Backlog grows**
- **PM is missed**
- **More preventable failures**
- **Resources taken by Breakdowns**
- **Band-Aid Maintenance**
- **Morale Declines**
- **Head / Budget Reduction**
- **Standards fall**

Figure 1 the Vicious Cycle of Maintenance

In such organizations, it seems that the level of plant availability drops to the stage where it stabilizes at a low level - a level where it is not breaking down because it is not running; i.e. it is being repaired!

For many, the obvious solution is to seek to increase personnel numbers. However, this approach is not often the best. In today's economic climate, the management culture is mostly focused on **cost reduction** and managers seeking only to increase staff numbers, rarely succeed.

Today many Asset Managers are embarking on an improvement program focusing on improving the maintenance processes and increasing the effectiveness or productivity of asset and human resources. Improving maintenance processes involves process re-engineering and increasing resource effectiveness in the following way:

· Removing all maintenance tasks that serve no purpose or are not cost effective.
· Eliminating any duplication of effort where different groups are performing the same
Preventive Maintenance (PM) to the same equipment.
· Moving to a mostly condition based maintenance philosophy.
· Adding maintenance tasks to manage economically preventable failure modes 1 that
historically have been run to failure.
· Spreading the workload around the technicians and operators.

The long-term vision is to adopt such process in a way that achieves this goal in a systematic way and which can remain as a 'living program' to capture the benefits of future learning and technical advances on a continuing basis.

An introduction to CRANES

What Is a Crane?

- A crane is a mechanism that uses a collection of simple machines to both raise and lower objects, and also move them horizontally. They are always equipped with at least a winder; cables, ropes or chains; and sheaves. Both sheaves and the winder are a form of pulley.

Lifting

- Cranes can use a combination of simple machines to gain mechanical advantage and lift objects. The first is the lever, used in the balance-style crane. The crane's beam is balanced at the fulcrum, allowing it to lift heavier objects with a smaller amount of force. The second is a jib-style crane, which uses pulleys to achieve mechanical advantage (but note that all cranes use pulleys--in this case, the pulleys are the main source of mechanical advantage). The third way a crane can lifts objects is by use of a hydraulic cylinder, either directly or in powering a balance or jib

Hydraulic Cranes

Hydraulic cranes come in a wide variety of styles and models, each one with a specific purpose. This article will provide you with a brief introduction to these fascinating machines.

Hydraulic cranes are heavy equipment used primarily for lifting. There are two basic necessities of their design: they must be able to lift a certain amount of weight and they must be able to do so while remaining stable. While cranes have been used throughout the centuries these days they feature a more technical design and there are several different types available. Each type of crane has its own strong points and weaknesses and as such is best suited towards certain types of applications. It is important to understand things when purchasing them so you have a good chance of making the right choice.

In order to lift such heavy loads, hydraulic cranes make use of three important parts, the lever, the pulley, and the hydraulic cylinder. The lever is basically a horizontal beam that acts as the fulcrum. When a heavy object is loaded onto the smaller end it may be lifted using a relatively small amount of force that is applied to the opposite end and in the opposite direction. Next there is the pulley, also known as a jib, which is a tilted strut that supports a pulley block. This fixed block has cable wrapped around it several times which is either pulled by hand or a machine. This way a force equal to the weight of the load is able to be created by using a mechanical advantage. Finally there is the hydraulic cylinder which lifts the load either directly or indirectly.

There are several different types of hydraulic cranes, and knowing the differences between them can help you to choose the best one for you.

• The railroad crane – is largely used for maintenance work on railroads, as such it has flanged wheels so it may travel upon the tracks. There are simple ones that may be mounted onto a rail car, or more complicated models that must be custom designed.

• The tower crane – is a modern balance crane that can be either fixed on the ground or attached to buildings or other structures. They are typically chosen for their height and lifting capacity and are an essential part of constructing tall buildings.

• The self-erecting crane – is a special type of tower crane that can actually lift itself from the ground which allows the next segment of crane to be placed. Thus they can be assembled easily without outside help.

• The telescopic crane – uses a number of tubes fitted one inside the other in its boom. A hydraulic system extends and compresses these tubes so that the overall length of the boom may be altered. These are best for short term rescue or construction jobs.

• The manual crane – is not in use as much since newer hydraulic cranes models which use electricity are available. However they are still sometimes used when power would not be possible or cost effective.

MOBILE CRANES

(a) Truck mounted

(b) Crawler mounted

(c) Rail mounted locomotive

(d) Floating cranes

(e) Sky cranes

Mobile crane (power driven) includes all type of traveling jib cranes, such as truck mounted, crawler mounted, and locomotive crane on rails. Mobile cranes are hoisting devices mounted on rubber tyred trucks, rollers or railroad wheels. Most of these cranes are full-rotating. Their mountings make them a distinctive group.

- Truck, crawler and locomotive cranes have now been highly developed for industrial use and they all have many possibilities of services to any plant or terminal that has heavy handling to do.
- The choice of crane, whether a truck, caterpillar or locomotive crane is a matter of determining the equipment which will perform the work most economically.
- Where greater flexibility of movement is needed, where clearance between buildings is sight, where there is free and dependable ground and where it is necessary to "walk close to the hob", a crawler or truck crane should be considered.
- A valuable characteristic of truck, crawler and locomotive cranes is the different ways in which a standard model can be put to use by the mere change of attachments, such as electromagnets or buckets for handling of bulk materials.
- Performances factors in which various cranes differ include lifting capacity, radius of operation, hoisting speed, speed of travel and speed of rotation of the boom.
- Lifting capacity of models usually purchased for industrial use ranges from 5 to 30 tonnes.

The radius of operation depends, of course, on the length of the boom. Auto-lift models with booms up to 18 m long are standard. Boom up to 30 m long are used on special work.

The group of trackless cranes is made up mainly of pillar cranes mounted on trucks, automobiles or tractors and intended for traveling on dirt, gravel and asphalt roads.

EQUIPMENT SAFETY CHECKLIST

This checklist can be adapted for use to assist in the identification of potentially hazardous equipment.

Faculty/Dept _____ Location of machine_____

Machine_____ Manufacturer_____

Inspection Team_____ Date of Inspection_____

Information, Instruction and Safe Use

1.	Are there written instructions covering:			
	a) any unusual hazards or complicated features?	Y	N	N/A
	b) where appropriate, emergency shutdown?	Y	N	N/A
2.	a) Has instruction in readily comprehensible form (written or verbal) on **all** hazards been passed on to **all** those who use the equipment?	Y	N	N/A
	b) Have any written instructions provided by the manufacturer been passed on to users?	Y	N	N/A
3.	a) Have **all** users of the equipment been given adequate training in correct use, risks and precautions?	Y	N	N/A
	b) Are young persons (under 18s) given additional training and instruction?	Y	N	N/A
	c) Is a training record kept which verifies this?	Y	N	N/A
4.	Is the equipment being used in accordance with the manufacturer's instructions?	Y	N	N/A
5.	If it has been adapted, is the adaptation suitable and safe?	Y	N	N/A
6.	Is the equipment used in an appropriate environment? (e.g. ventilation, damp, flammable conditions)	Y	N	N/A
7.	Does the location allow the equipment to be used safely? (consider space around moving parts and possible distractions to the operator)	Y	N	N/A
8.	If the equipment may be moved, is the weight known?	Y	N	N/A
9.	a) Are the start and stop controls clearly marked?	Y	N	N/A
	b) Are other operating controls, and the contents of any containers, clearly marked?	Y	N	N/A
10.	Are there clear warning notices or markings (e.g. to wear PPE, restriction on use, list of authorised users) where appropriate?	Y	N	N/A
11.	Does any work equipment provided after 5th December 1998 conform with Community requirements (CE marked)?	Y	N	N/A

Maintenance and Inspection

12.	Is the equipment tested at appropriate intervals:			
	a) for electrical safety? Interval: _____ (refer to the Electricity at Work Regulations 1989)	Y	N	N/A
	b) for any safety devices? Interval: _____	Y	N	N/A
13.	Does the safety of the work equipment rely on correct installation/re-installation (e.g. mobile scaffolds)?	Y	N	N/A
14.	Could deterioration of the equipment lead to an unsafe condition?	Y	N	N/A
15.	a) Is the equipment inspected at regular intervals?	Y	N	N/A
	b) Are the inspections recorded?	Y	N	N/A
	c) Is there a register of persons competent to carry out these inspections?	Y	N	N/A
16.	**If** inadequate maintenance could cause the equipment, guards or other protection to fail in a dangerous way, is there a system of planned preventative maintenance, including where appropriate the periodic replacement or refurbishing of items before they reach the end of their useful life?	Y	N	N/A
17.	a) Have clear maintenance instructions been given to those responsible for maintaining the equipment?	Y	N	N/A
	b) Have all maintenance operations been assessed for risk?	Y	N	N/A
	c) Is a register or other maintenance record kept?	Y	N	N/A

Specific Hazards

18.	Is protection adequate in relation to:			
	a) items falling from the equipment?	Y	N	N/A
	b) items being ejected?	Y	N	N/A
	c) overturning?	Y	N	N/A
	d) collapse?	Y	N	N/A
	e) overheating or fire?	Y	N	N/A
	f) disintegration?	Y	N	N/A
	g) explosion?	Y	N	N/A
19.	Is the equipment made stable where appropriate by bolting, clamping or tying?	Y	N	N/A
20.	Is there sufficient general and (where necessary) local lighting?	Y	N	N/A
21.	a) Is there protection against contact with hot or very cold temperature, so far as appropriate?	Y	N	N/A

	b) If the possibility of such contact is unavoidable has appropriate instruction and training been given?	Y	N	N/A
22.	In the case of pressurised equipment, is there a written scheme of examination? (This must be provided by 1.7.94 – Pressure Systems and Transportable Gas Containers Regulations 1989).	Y	N	N/A
23.	If gas fumes or dust is released when the equipment is used, is there:			
	a) local exhaust ventilation, tested annually?	Y	N	N/A
	b) a COSHH specific assessment?	Y	N	N/A

Dangerous Parts of Machinery

24.	Are all dangerous parts of machinery adequately guarded?	Y	N	N/A
25.	Are all guards sound and in good working order?	Y	N	N/A
26.	Do guards permit an adequate view of the operation where this is necessary?	Y	N	N/A
27.	Is it difficult to bypass or disable guards?	Y	N	N/A
28.	Can the machinery only be started when a specific labelled start device is used? (N.B. the normal cycle of automated machinery is exempt from this requirement.)	Y	N	N/A
29.	Is it **impossible** to start the machine just by resetting a safety device?	Y	N	N/A
30.	Is there a readily accessible stop device which stops the machinery in a safe way?	Y	N	N/A
31.	Where appropriate (i.e. where in a foreseeable emergency it could help), is there a prominent, easily accessible emergency stop device?	Y	N	N/A
32.	Can controls be operated safely and easily?	Y	N	N/A
33.	Is there any system of work which ensures that nobody is in a dangerous position when machinery is about to be started?	Y	N	N/A
34.	Does the start device need to be activated to start the machine if:			
	a) the power fails?	Y	N	N/A
	b) a control or safety device fails to trip out?	Y	N	N/A
35.	If the power is isolated, does the machinery come to rest safely without the possibility of access to dangerous parts?	Y	N	N/A
36.	Can the equipment be securely isolated from power, to prevent inadvertent reconnection:			
	a) by removing a plug from a socket which is easily visible to the person at risk?	Y	N	N/A
	b) by locking it off?	Y	N	N/A

Woodworking Machinery

37.	*Is suitable "limited cutter projection tooling" used where necessary?*	Y	N	N/A
38.	a) *Has the machine been assessed for the need to fit braking devices?*	Y	N	N/A
	b) *If braking devices are required, have they been fitted?*	Y	N	N/A
39.	*Is the safe working speed or the minimum saw blade diameter displayed?*	Y	N	N/A
40.	a) *Are anti-kickback devices fitted to planing machines?*	Y	N	N/A
	b) *If not, are suitable notices displayed?*	Y	N	N/A

Mobile Work Equipment

41.	Are there clear and concise instructions forbidding the carriage of persons on mobile work equipment, unless the work equipment has been proved to be suitable?	Y	N	N/A
42.	Has the equipment been assessed to ensure that all tasks can be carried out safely? (Consider seat belts, falling object protection, etc.)	Y	N	N/A
43.	Is the work equipment fitted with Roll-Over Protection where necessary?	Y	N	N/A
44.	Is the drive shaft between the work equipment and any accessory adequately protected against seizure and accidental contact with the ground?	Y	N	N/A

Power Presses

45.	a) Is there a system for thorough examination in place?	Y	N	N/A
	b) Are all examination reports retained and available for inspection (2 years from date of examination)?	Y	N	N/A
46.	a) Is there a system in place whereby a nominated competent person carries out the inspection of guards and protection devices as required by Regulation 33?	Y	N	N/A
	b) Is the current certificate of inspection displayed by the power press, and superseded certificates held for six months?	Y	N	N/A

Lifting Equipment

47.	Is the work equipment classified as "lifting equipment"?	Y	N	N/A
48.	If "yes", has an assessment under LOLER 98 been completed?	Y	N	N/A
	(Refer to Lifting Operations & Lifting Equipment Workbook for guidance.)			

Summary

Action to be taken, in order of priority	Action completed (signature)	Date

Date by which action is to be taken: _____

Date for review (maximum interval 5 years): _____

Lead Inspector

Name: _____ Signature: _____ Date: _____

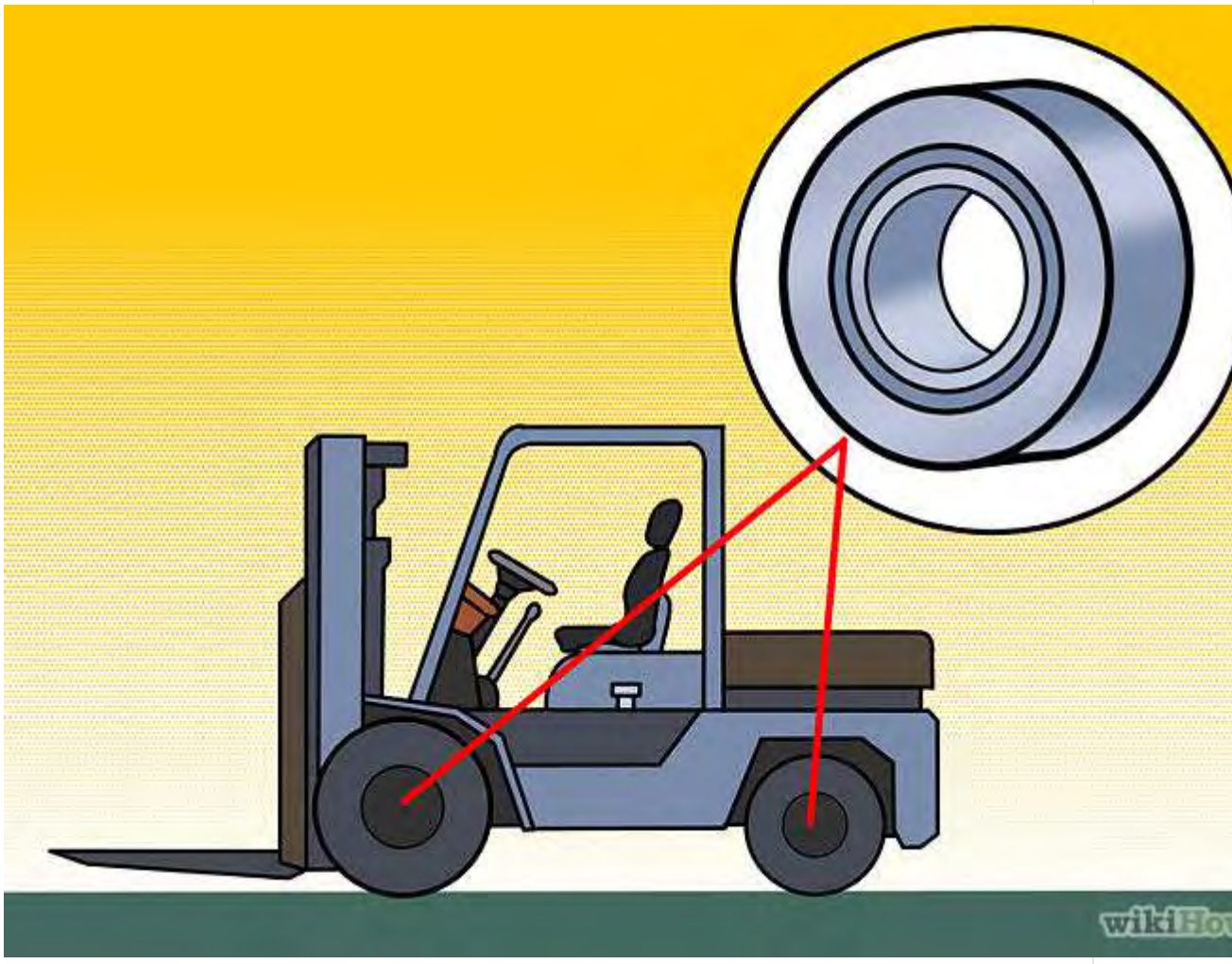
Manager Responsible for Action

Name: _____ Signature: _____ Date: _____

How to Maintain a Forklift

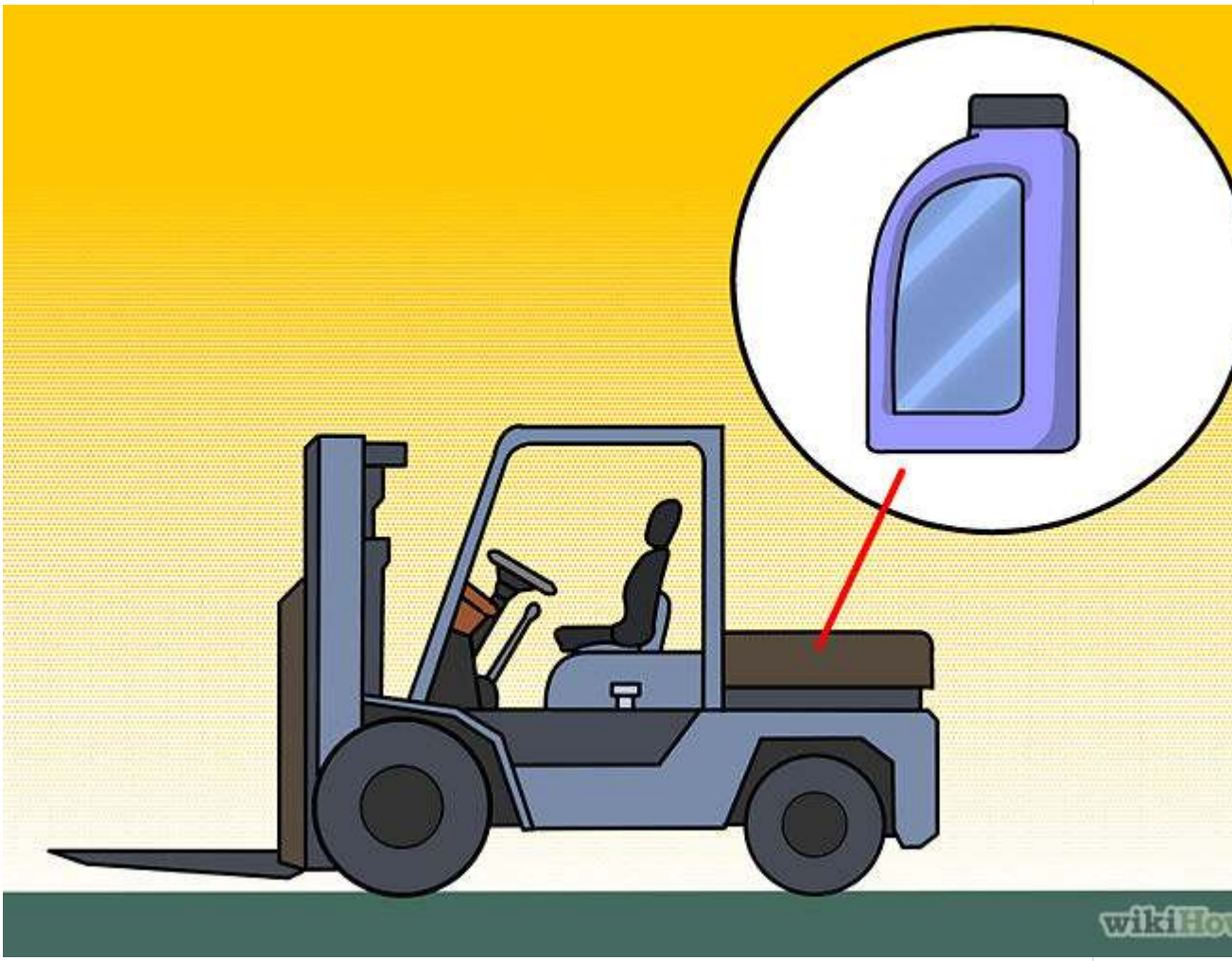
Forklifts are the ideal equipment for moving heavy loads in an industrial setting. As with every machine, the various mechanical parts of a forklift also tend to wear out with continuous use. This wearing out process is especially critical with the moving parts, thus necessitating the need for a stringent forklift maintenance program.

Outlined below are a few points to help you create your own forklift maintenance program.

1. 

1

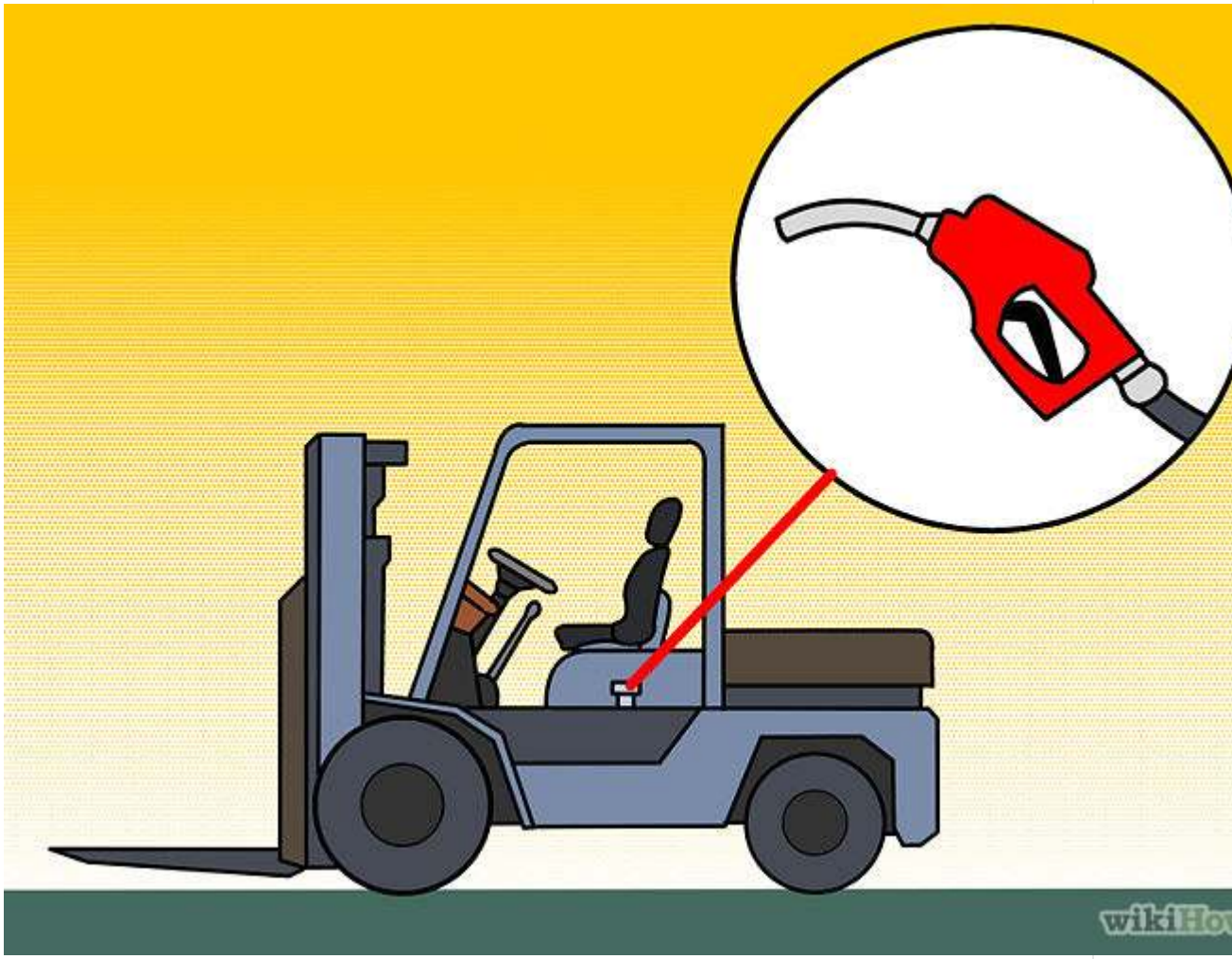
Keep all moving parts well lubricated. Most moving joints, or parts, of the forklift are greased. This is done to prevent the harmful effects of friction. Ensure that all these fittings are greased on a regular basis, making sure to remove all worn out ball bearings.



2

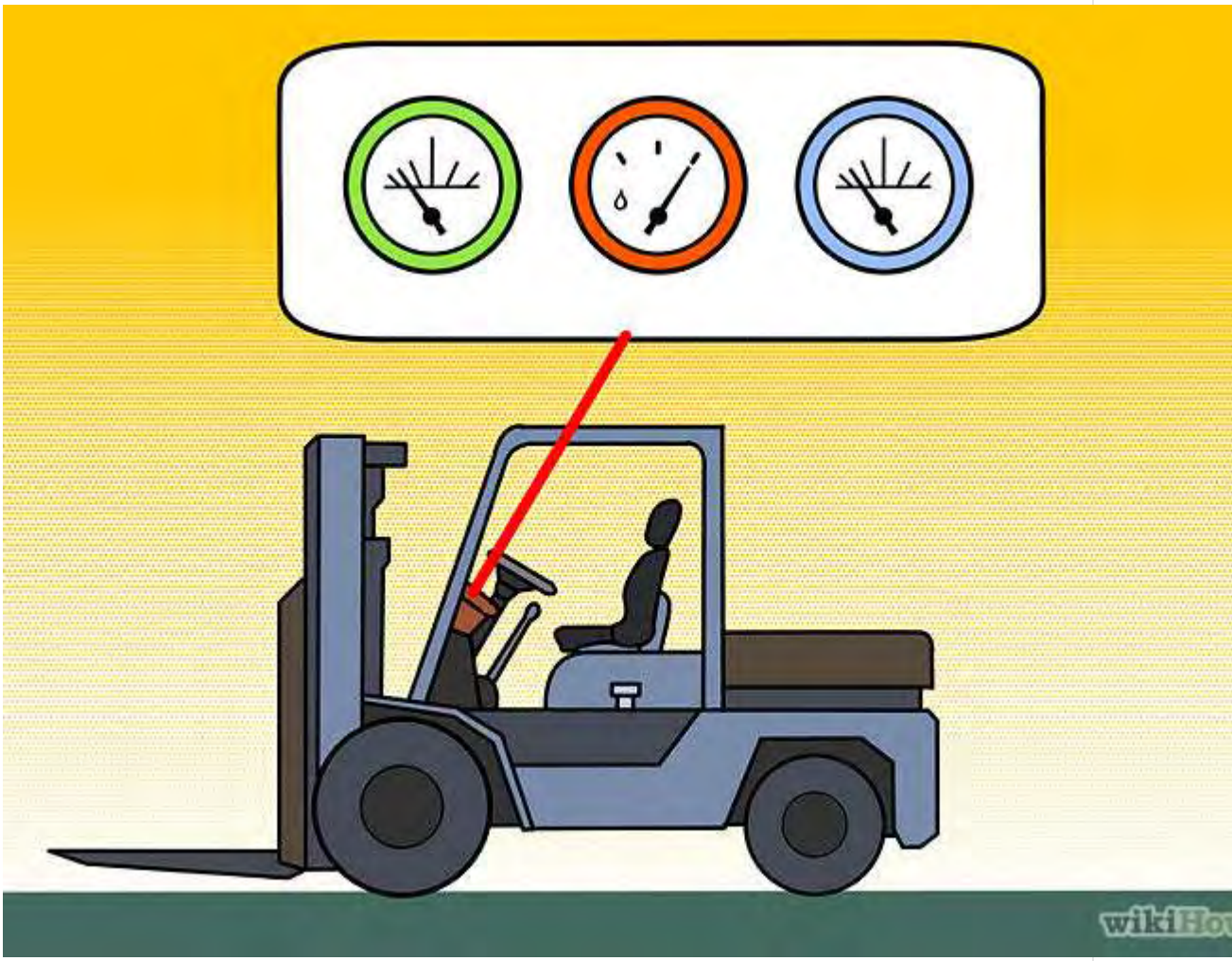
Check fluid levels regularly. There are various fluids that help the engine and other working parts of the forklift to run efficiently. These include the transmission and

hydraulic fluids, coolants, as well as motor oil. Check these fluids regularly, albeit depending on how often the forklift is being used. Daily checks are necessary if the forklift is used on a daily basis.

2. 

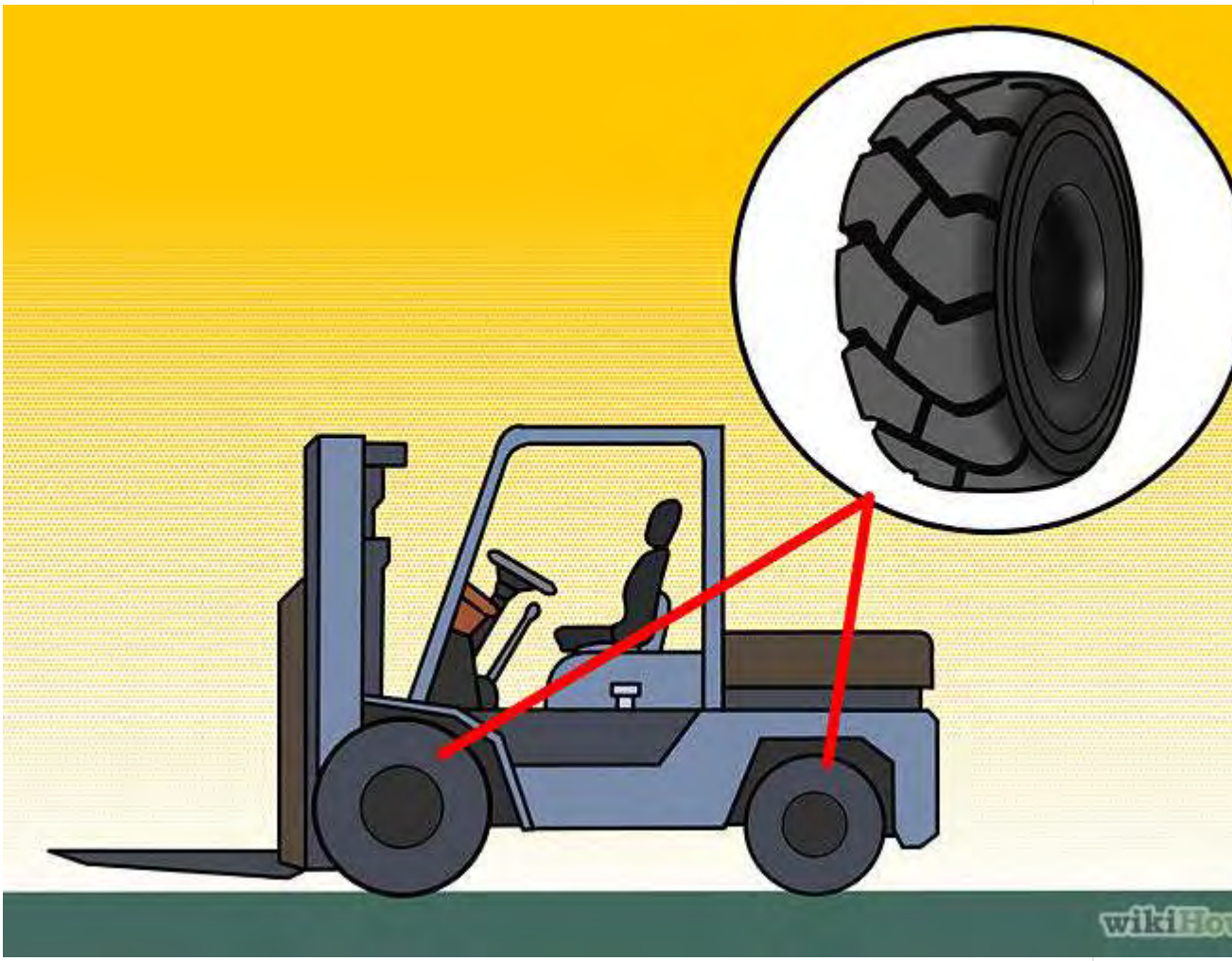
3

Keep your forklift charged or fueled. Forklifts may be powered by battery, liquid propane (L.P.) gas, diesel fuel or gasoline. If your machine uses a battery, then make sure to ensure that the battery is fully charged always. Also, make sure the tank is always full, if your forklift uses gas or fuel.

3. 

4

Keep Forklift Gauges Functioning Properly. Gauges and lights found on the instrument panel of the forklift give an indication when some part is malfunctioning. Therefore, attention must be paid to these instruments and the appropriate measurements taken, when they indicate any faults. Doing so will forestall more expensive repairs.

4. 

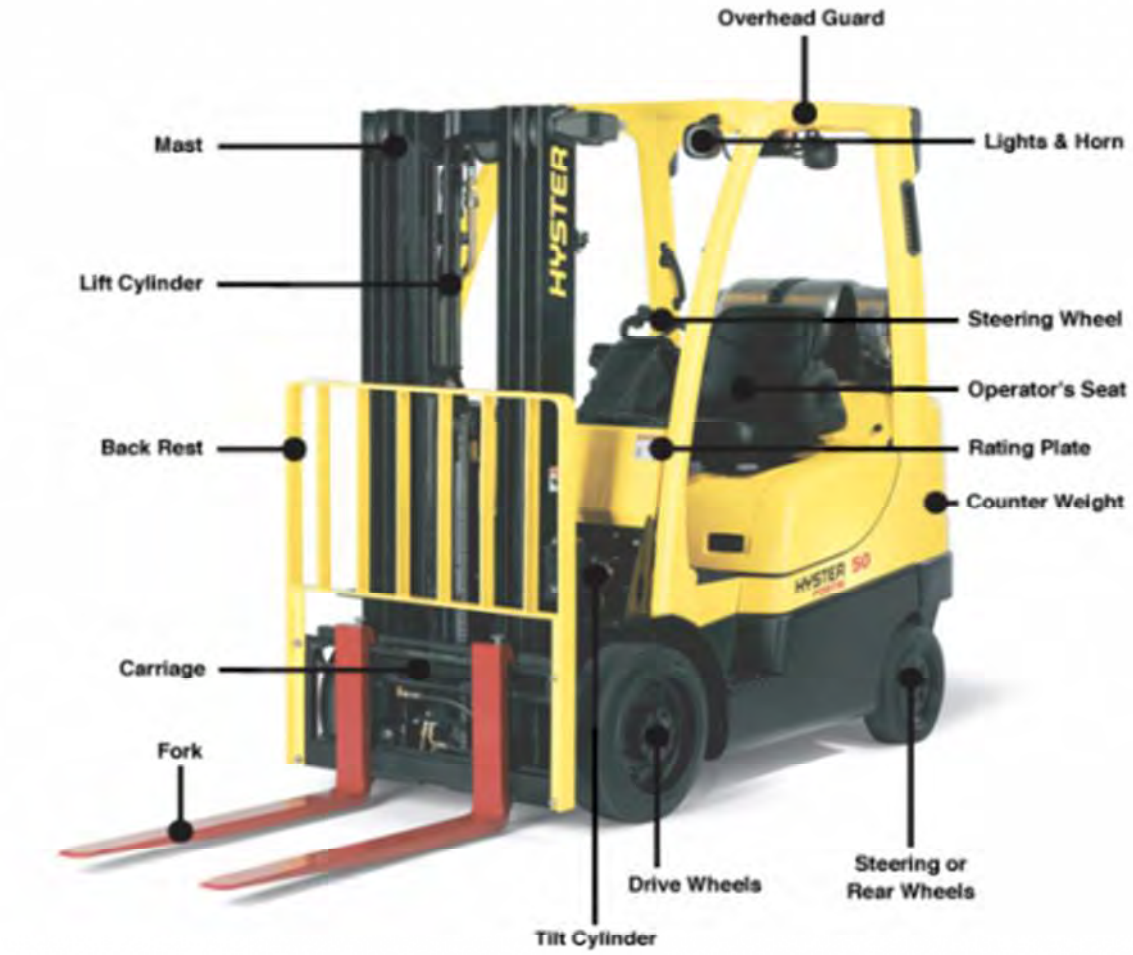
5

Keep Forklift Tires in Good Shape. In the process of forklift maintenance, another important aspect that should be checked daily is the tires. If the tires use air, ensure that the correct air pressure is maintained in them. In case the tires are solid rubber ones, make sure that there are not any gashes present. Failure with the tires could lead to an unbalanced ride, potentially leading to damage of the goods being carried.

FORKLIFTS

THE BASIC FEATURES OF A FORKLIFT.

Familiarize yourself with the picture below labelled with the important forklift features and also find a small description of them. We will now run through them individually.



- **Mast:** The mast is the vertical support that permits raising and lowering the load.
- **Carriage:** A support structure where the forks are attached or mounted.

- **Back Rest:** Attached to the carriage and prevents the load shifting backwards, it protects the mast cylinders hoses as well as preventing any goods falling through the mast and hitting the operator.
- **Fork (Tynes):** The cantilevered arms attached to the load carriages that engage the load.
- **Lift Cylinder:** Controls the amount by which the mast structure, forks and carriage may be raised or lowered in the vertical.
- **Overhead Guard:** A framework/roof, providing overhead protection for the operator from falling objects.
- **Tilt Cylinder:** Controls the amount by which the mast structure, forks and carriage may be tilted beyond the vertical position, forward or backward.
- **Rating Plate:** This is used to inform users of the maximum load a forklift can legally carry.
- **Counter Weight:** The weight installed by the manufacturer to give stability to the machine under load.

Since their introduction in the early decades of the 20th Century, lift trucks have increasingly played a powerful role in the recycling industry as well as more generally in materials handling. This article provides an overview of lift trucks, including their evolution, various types, and considerations for safe operation.

History of Lift Trucks

Powered industrial trucks, commonly called forklifts or lift trucks, first emerged in the late 19th Century. These were low lift trucks that raised platforms just a few inches high. Typically these were used for moving material within a shop, such as work-in-progress. High lift trucks first emerged in the late 1910s, and truck design improvements continued to take root. In the 1930s, tier trucks allowed the stacking of loads, allowing for greater storage efficiency.

Because of the tough economic times of the 1930s, however, labour was freely available while capital for investment was much harder to come by. This slowed the growth of forklift usage. Then in World War 2, the use of forklift trucks became a strategic part of the war effort. With manpower shortages resulting from wartime enlistment, the forklift and an operator (and increasingly female operators as the War progressed) could do the work of many men, dramatically increasing productivity. After the end of

World War ll, lift trucks emerged as a mainstay of material handling equipment.

There is a broad selection of lift trucks, designed to best meet the needs of various material handling applications. The seven major lift truck classifications in the U.S. include:

- Class I: Electric Motor Rider Trucks
- Class II: Electric Motor Narrow Aisle Trucks
- Class III: Electric Motor Hand Trucks or Hand/Rider Trucks
- Class IV: Internal Combustion Engine Trucks (Solid/Cushion Tires)
- Class V: Internal Combustion Engine Trucks (Pneumatic Tires)
- Class VI: Electric and Internal Combustion Engine Tractors
- Class VII: Rough Terrain Forklift Trucks

Load Capacity

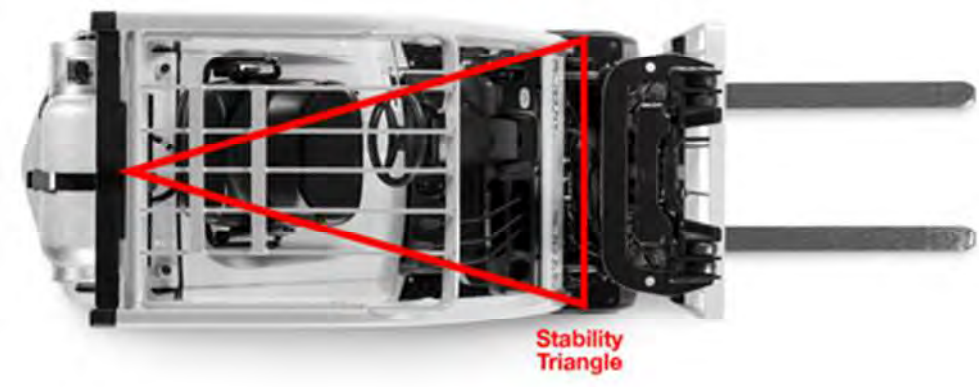
The maximum weight (materials) a forklift can carry at a given "load centre", with the mast held in a vertical position. The load rating is usually expressed in kilograms or pounds and the standard load centre in millimetres or inches. This will be presented on the rating plate which was shown in the forklift diagram in Part 1.

Load Centre

The load centre describes the distance from the face of the forks to the centre of gravity of the load. The centre of gravity of any object is the imaginary point about which the weight of the object is evenly distributed. Forklifts do not have a fixed centre of gravity, the centre of gravity moves as the machine performs certain tasks such as:

- Pick up or put down loads.
- As a load is lifted and lowered, the combined centre of gravity will also move up and down.
- As the mast is moved forward and back, the combined centre of gravity also moves forward and back.
- As the mast is tilted forward and back, the combined centre of gravity moves forward and back.

Stability Triangle



All forklifts regardless of size, weight or wheel quantity have a ‘stability triangle’. The stability triangle is the area under the forklift which it must keep its centre of gravity within for the truck to be stable. If the centre of gravity moves outside the stability triangle, the forklift will tip.

Maneuverability

Maneuverability is an extremely important topic that must be covered and understood when researching and learning about forklifts as it is typically overlooked until it is too late.

Tilting Angle:

The tilting angle is the maximum angle in which a mast can tilt forward and backward. The tilting angle varies when dealing with different forklifts, masts and attachments and is also limited at high mast to maintain truck stability. This is useful to know as depending on what materials you are carrying, you may require a higher tilt angle to ensure stable maneuverability and avoid any loss of loads.

Right Angle Stacking Aisle:

The right angle stacking aisle is the terminology to describe the amount of load a forklift can carry and turn to a 90 degree angle. When dealing with racking and loading your materials on to shelves this is the most important piece of information you need to know, as it will tell you the maximum load you can carry, it can also help by telling you the distance in which your shelving needs to be apart.

Gradeability:

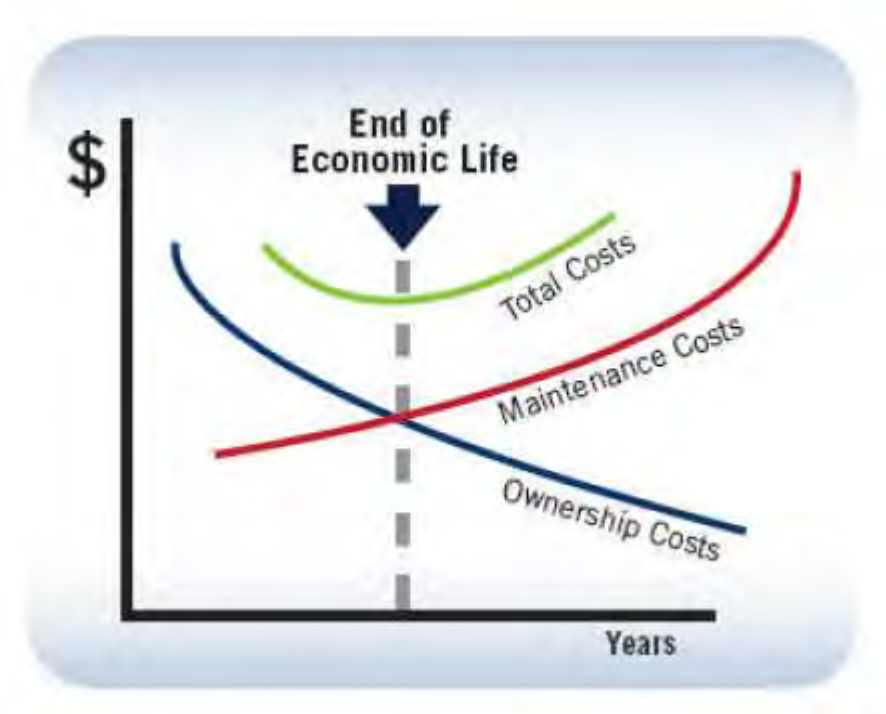
The angle of a ramp/slop a forklift can travel up/down on. An important factor to take in to consideration is whether you forklift is carrying a load or not which will affect the gradeability.

Tyre maintenance is commonly overlooked and it is often confusing when it comes to knowing when to replace forklift tyres. Today we will determine when a forklift's tyres need to be replaced and the importance of knowing when to replace them.

Forklifts need to be regularly serviced; there is no substitute for good maintenance. It ensures forklifts can perform at optimum levels; it can detect and rectify minor problems before they affect productivity, and will prolong a forklifts life. This week's blog will look at the importance of maintenance and will provide maintenance schedules and tips.

If you are in the market for a forklift part, ensuring you purchase the correct one is important in guaranteeing the productivity of your business. This blog will highlight important tips you will need to consider when purchasing

forklift parts as well as the different benefits of new and used parts, which you can use as a reference when choosing between the two.



When running an efficient operation, it's important to keep in mind the right time to replace older, less efficient forklifts. This can reduce your maintenance costs, improve your productivity and most importantly, save money and maximize your return on investment.

These pictures will explore the benefits of maintaining and replacing forklifts at the optimal time in order to maximise their efficiency and in turn increase your return on investment.

There are various types of forklift tyres but the most common are solid or pneumatic. Each tyre has a different tread, compound and ply rating which help to ensure the tyre used will best suit the application. By keeping your forklift tyres in good shape, you will reduce the stress and wear on the transmission as well as the forklift driver. Safety is also significantly improved, along with fuel efficiency.

Make Your Battery Last" is a two part series to educate you on the basics of forklift battery maintenance. In part one, we will discuss charging and maintaining a forklift battery and then continue through to part two, covering cleaning and safety with a quick summary to finish off.

Forklift Truck Maintenance

Forklift

Forklifts are an integral part of the distribution, warehousing and industrial industries. This equipment is intended to endure heavy use during many years of service. To maximize the effective lifespan of the equipment and eliminate costly down time, a proper service routine and schedule is essential.

Forklift Maintenance Checklist

How to Maintain a Forklift

Standard Maintenance

Propane and gas forklifts will require regular oil changes and engine filter changes. Unlike an automobile, a forklift's maintenance schedule is not based on the number of miles traveled. With a forklift, maintenance should be scheduled based on the number of hours of service. This requires daily hour meter readings to be recorded. Each model and style of forklift will have different requirements. Check the owner's manual to determine the manufacturer’s suggested maintenance schedule. On average a unit should be scheduled for maintenance every 200 hours of operational time. Keeping the oil and filters in good condition will help to increase the unit's motor life.

Hydraulics

Forklifts use a hydraulic system to raise and lower their loads. These systems have several major components that must be monitored closely. A hydraulic failure can result in not only costly material damage, but also personal harm to operators and others working in the area. Hydraulic hoses must be checked regularly for signs of cracking or excessive wear. If a problem is found, the forklift should be removed from service until repairs are completed. The hydraulic fluid levels need to be checked on a regular basis and the hydraulic filters should be changed based on the manufacturer's recommendations. Keeping the hydraulic system in good condition will help prevent down time, unsafe work conditions and will reduce wear and tear on many system components.

Tires

Depending on the terrain conditions where the forklift is being operated, forklift tires can have a very long lifespan. After a period of time the tires may begin to crack or separate from the rim. This must be monitored closely; in extreme cases it can adversely affect the forklift's overall stability. Very few in-house maintenance systems have the equipment necessary to remove and press on new tires. This will normally require an outside source to come in and perform the change-outs. To help reduce down time and increase the cost effectiveness of the change-out, all tires needing service should be replaced at one time, eliminating the need for multiple service calls.

How to Maintain a Forklift

A forklift is an industrial vehicle that has a pronged platform that can be raised and lowered. Forklifts are ideal for moving heavy loads. Whether you use one on your job or have one at home for occasional jobs, maintain it well and prolong its life.

-  Forklift Truck Maintenance

Instructions

1. Check the hydraulic fluid, motor oil and transmission fluid regularly in order to maintain a forklift properly. How often you check fluid levels will depend on how often the forklift is used. If used daily, then check daily. For occasional forklift use, weekly or monthly checks are sufficient.

2. Make sure that all grease fittings are greased regularly. On a forklift, this mainly includes all of the moving joints.

3. Keep the battery fully charged on an electric forklift. If your forklift runs on LP gas, make sure the tank stays full in order to maintain it efficiently.

4. Pay attention to the gauges and warning lights on the forklift. Any light or gauge that indicates a problem should be checked out immediately. Failure to do so could result in more costly repairs.

5.

Inspect controls regularly. If the controls feel slack or loose, the forklift could need hydraulic fluid or there could be a leak in one of the lines.

- 6

Look at the tires daily. Some forklift tires require air. Others are just solid pieces of rubber. If the forklift tires require air, make sure the air pressure in the tires is correct. If your tires are just solid rubber, check for gashes in the tire. This could cause an unstable ride and possibly damage whatever you are moving

The Importance of Training and Safe Operation

Operator training is a requirement in much of the world, and with good reason. It seems that almost daily there are reports of injuries or fatalities involving operators of lift trucks or pedestrians in their proximity. Data from the Bureau of Labor Standards (which always lags) indicated 54 forklift related fatalities in 2010 where the forklift was the primary injury source and another 56 where the forklift was the secondary source.

Training Requirement

OSHA requires employers to "develop and implement a training program based on the general principles of safe truck operation, the types of vehicle(s) being used in the workplace, the hazards of the workplace created by the use of the vehicle(s), and the general safety requirements of the OSHA standard." By the end of training, operators must demonstrate the ability to perform their job safely in their workplace evaluation. Training involves formal and practical components. OSHA requires refresher training every three years, as well as at any time that an operator demonstrates a deficiency in safe lift truck operation. **Safe Lift**

Truck Operation

Safe lift truck operation involves several steps, including:

- Pre-Operation (pre-operation inspection and operational inspection, removal from service and maintenance requirements)

- Traveling & Maneuvering (safe travel practices and seatbelt use, tipover, mount/dismount, stop/start, speed, turning, navigating inclines, parking, and visibility.)
- Workplace Considerations (Physical conditions, ramps and grades, uneven terrain, loading docks, pedestrians, narrow aisles, elevators, and enclosed or hazardous areas.)

Maintaining Operator Safety after Training

The reality is that operators who are injured or killed on the job are usually trained. This is why effective supervision is an important component of safety programs, and that operator engagement be maintained through the development of an effective workplace safety culture.