An Empirical Assessment of the Operational Performance through Internal Benchmarking: A Case of a Global Logistics Firm

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Abstract: This article solves an operational performance measurement problem of a global logistics firm through an internal benchmarking tool. The intended impact is to enable logistics firms to form a deeper understanding of their own internal processes and metrics. The methodology of this in-depth action research involves a sequential approach with a series of interviews, questionnaire-based surveys, operations data collated through observations, and process mapping yielding real-world data. A series of statistical tests are conducted to analyse the collated data. Strategic priorities of the firm are integrated with the firm's operational performance to ascertain the effective performance by considering both the tangible and intangible measures. The outcomes inform both practitioners and academics how the firm could improve its freight forwarding business's profitability by ensuring that its operations meet the prioritised criteria. The "best practice" derived from internal benchmarking forms an intermediate step towards external benchmarking. The outcomes facilitate investigating the current business strategy, the Standard Operating Procedures (SOPs), and the scope of improving those.

Keywords: Freight forwarding industry; Operational performance; Internal benchmarking; Logistical strategies.

1. Introduction

This article contributes towards the development of an internal benchmarking tool to measure the effectiveness of the operational performance of each department of a global logistics firm. Today's companies are driven by the need to shorten business cycles and improve quality while simultaneously containing operating costs; hence, company management requires more than simply reports upon historic data. Rather, it needs to have better operating information and greater insight into what can support and sustain the organisation in the foreseeable future. As the logistics industry is endeavouring to develop real-time information systems (Ahmad, Mehmood 2016) to improve performance (Lu and Yang 2010), it is essential to benchmark the performance (Andersen and Jordan 1998) of logistics operations with the objective of identifying the best practices and their

implementation, together with formulating strategies, techniques, and technologies for enhanced organisational responsiveness and competitiveness (Gunasekaran 2002).

The objective of benchmarking is to identify and understand the best practices from the case of a global logistics firm. A "best practice" is, simply, the best way to execute a process; it is deemed one of today's most effective business strategies, currently delivering results for organisations of all sizes and in all industries. In particular, it has the potential to propel quantum improvement in internal auditing (Julien 1993). Therefore, benchmarking could introduce the notion of continuous improvement in a concrete and positive way in assessing operational performance. It can identify paths for innovation in a firm's processes, activities, and attitudes (Spendolini 1994).

This article contributes to the literature by pinpointing the gaps that have developed over time in the Standard Operating Procedures (SOP) and policies of a specific global firm's operations compared to today's industry requirements. Identification of the knowledge gaps and appropriate recommendations are used to improve the performance of the firm's operations. In particular, the priorities and requirements of the firm's shipping professionals are determined, and these are used to shape the firm's product offerings to thereby meet their customers' needs. The study's further implications relate to examining the firm's usage of its current business strategy and SOPs, and identifying the scope for improving the same.

The aim of the research is to understand what the studied global logistics firm could do to ensure profitability in the workings of its freight forwarding business, and to identify if the firm's operations meet performance metrics. A paradigm shift is reported in this article through implementing a novel, holistic, internal benchmarking tool within the firm by exploring the following research questions:

- How can the operational performance of the departments in a global logistics firm be assessed, measured, and improved, prioritising the requirements of shipping professionals in the industry?
- In what ways can an internal benchmarking tool contribute to better operational performance of the global logistics firm?

- In what ways does the firm's multi-domestic strategy have a major impact on the factors influencing the performance of its freight forwarding business?
- What operational and strategic recommendations can the devised internal benchmarking tool generate to enable the firm to achieve better operational performance?

To address these research questions, a set of objectives are framed. The first objective is to identify the priorities and requirements of shipping professionals in the firm's freight forwarding business in the UAE. The second objective is to derive the relative importance of the firm's stakeholders (both external and internal) through a weighted average framework, and to measure the critical factors/priorities earlier identified and rated by the organisation. The third objective is to provide an internal benchmarking tool for the firm and render, thereby, appropriate strategies for continuous improvement of their operational performance.

The article is organised as follows. Section 2 provides the operational details of the studied firm's freight forwarding departments. Section 3 then examines the study's theoretical foundations. The details regarding the research methodology are presented in Section 4, followed by the results and analyses in Section 5. Finally, in Section 6, the article concludes with recommendations of operational strategies, theoretical and practical implications, and the scope for further research.

2. Theoretical Background

Application of the benchmarking technique in logistics has grown extensively in the last three decades (Dattakumar and Jagadeesh 2003; Wong and Wong 2008). Benchmarking leads to achieving improved operational performance (Voss *et al*. 1997; Francis 2008). A literature review on performance measurement in supply chain and logistics management reveals that there have been relatively few attempts to systematically collate measures for assessing the performance of freight forwarding firms through internal benchmarking (Table 1).

Table 1: Literature on benchmarking and operational performance

Literature	**Description**
Chung *et al*. (2015)	Compared the operational efficiency of major cargo airports through a

	benchmarking tool to examine various aspects of operational efficiency.
Southard and Parente (2007)	Determined criteria for internal benchmarking and applied a qualitative benchmarking tool to internal processes.
Binder *et al*. (2006)	Proposed a benchmarking methodology and deployed it within a large and complex organisation to benchmark its "packing and filling" processes.
Salem (2010)	Determined benchmarking criteria for manufacturing organisations, assessing their key capabilities and prioritising them using an analytic hierarchy process.
Niemi and Huiskonen (2008)	A stepwise benchmarking process was conducted to identify the best logistical practices and to implement them utilising an internal benchmarking approach.
Amaral and Sousa (2009)	Developed a categorised list of barriers to internal benchmarking, validating them with the case of an internal benchmarking initiative.

Anderson and McAdam (2004) envisaged benchmarking as a possible means of achieving increased radical and innovative transformation in enterprises. Financial performance is no longer the key driver of benchmarking (Adebanjo *et al*. 2010). Every identified factor has to be measured and included in the benchmarking tool (Kablan and Dweiri 2003), whether a financial dimension or otherwise (Gunasekaran *et al*. 2001).

2.1 Internal benchmarking

"Benchmarking" is defined as the process of improving performance by continuously identifying, understanding, analysing, and adapting the best practices or processes inside and outside an organisation to gain and maintain up-to-date understanding of the appropriate performance levels and drivers behind success (Camp 1995; Zairi 1996; Kelessidis 2000). Benchmarking tools have been successfully utilised by Xerox, Nissan/Infiniti, ICI Fibers, Texaco, American Express, Kodak Rover, AT&T, Chevron, and 3M to enhance their business success (Wong and Wong 2008; Soni and Kodali 2010).

The process of benchmarking provides ideas to a company, enabling identification and implementation of the most effective solutions for realising breakthroughs in performance (Tutcher 1994). Benchmarking provides both motivation and learning in performance improvements, as benchmarking team in the company compares all of its internal practices with the best practices of the industry (Gunasekaran 2001; Hyland and Beckett 2002). Feedback from benchmarking usually

provides considerable scope for improvements and suggests ways to imitate strategies with the potential to achieve better operational performance.

Earlier studies of benchmarking in logistics have reported types of performance or practice, including achievable performance levels for comparison, setting performance targets, and possible benchmarking methods (van Hoek 2000). However, most of the prior research relates mainly to benchmarking schemes for companies whose logistics activities were not central to their operations. Hanman (1997) and Gunasekaran (2002) employed the leaders-laggers analysis to compare a firm's performance to best practice. Gilmour (1999) proposed a set of benchmark measures based on given collection of capabilities. Van Landeghem and Persoons (2001) proposed a causal model as a means to identify possible initiatives to bridge the performance gap between a company and the best-in-industry performers.

The majority of the research conducted in logistics benchmarking is focused on performance appraisal, integration, and information systems through external benchmarking tool (Southard and Parente 2007; Binder et al. 2006; Salem 2010; Suzuki 2015). However, these studies do not focus on the elements of enterprises' internal competencies, which thus represent a gap in the prior literature. Internal benchmarking provides the benefits of identifying, assessing, and transferring the practices from a high-performing logistics company to another similar organisation, using the best practices prevailing in logistics companies as an intermediate step towards external benchmarking (Soni and Kodali 2010).

There is a knowledge gap regarding the measurement of logistics performance using internal benchmarking, which should include financial and non-financial measures, including tangibles and intangibles, as reaffirmed by Gunasekaran (2002). The direction of addressing benchmarking is no longer process-oriented; rather, a holistic approach encompassing strategies where systems orientation is adopted (Yasin 2002). This indicates that internal-benchmarking in logistics performance is required to effect a paradigm shift in performance measurement techniques and applications. Therefore, it is appropriate that discourse and discussion regarding logistics performance should give adequate attention to benchmarking.

Overall, freight forwarding is essentially a logistical service-oriented sector. Although a number of cases and studies on internal benchmarking have reported on the manufacturing sector, many of their results are not clearly implementable as these studies fail to focus on the elements of enterprises' internal competencies. Further, there is a growing need to develop a methodology to guide benchmarking in supply chain collaboration (Simatupang and Sridharan 2004). This research aims to fill this knowledge gap by focusing specifically on the operations and performance measures most relevant to today's freight forwarding industry.

2.2 Performance measures for the logistics industry

One of the most important issues in the logistics benchmarking process is to define what performance measures are to be studied (Moffett *et al*. 2008). The correct metrics are critical elements to a company's performance (Wong and Wong 2008). A performance measure is construed as a metric to quantify the efficiency and effectiveness of operations (Neely and Gregory 1995). Even today, most organisations tend to benchmark based on "hard" rather than "soft" data (Cassell *et al*. 2001), ignoring non-financial measures, e.g. quality, reliability, customer satisfaction, human resources, and other criteria, including learning (Geanuracos 1994). It is, thus, imperative that performance measurement should be based on not only quantitative data but also qualitative data that help to improve performance at all managerial levels.

There have been relatively few attempts to systematically collate measures for evaluating the performance of freight forwarding organisations (Chung et al. 2015). Industry experts perceive that cost, quality, and efficiency are the most important criteria (Lockamy III and McCormack 2004; Wie 2014). Concurrent commitment to both quality and supply chain improvement has been found to have the greatest effect on performance (Tan 2001). Emphasis on the measurement of cost, time, quality, flexibility, and innovativeness is required (Shepherd and Gunter 2006). Customer service performance of ocean freight forwarding industries can be enhanced through the industries' innovation capability (Yang 2012).

A performance measurement system can be internally comparable if trade-offs among disparate performance criteria are made (Caplice and Sheffi 1995). However, on some levels, it is impossible to

assign measures neatly into just one of these criteria. The most common missing measures are flexibility and innovativeness. All categories and levels have at least one missing aspect. Only the joint usage of all the measurement categories can provide a possibility of properly monitoring logistics performance (Shepherd and Gunter 2006).

Although extensive research has been conducted to find the factors impacting the supply chain and transportation industry, there is a significant knowledge gap in pinpointing which of these factors impact the freight forwarding industry, specifically for air and sea shipping. The current research contributes to the literature by bridging the identified knowledge gaps in the SOPs, strategies, and policies developed over time in the studied global firm's operations compared to today's industry requirements. A critical examination of the literature suggests the following knowledge gaps which are addressed in this article:

- assessment of the operational performance of a freight forwarding firm by developing an internal benchmarking tool considering both tangible and intangible measures is missing;
- a holistic approach encompassing strategies and systems orientation in the development of an internal benchmarking tool is also missing;
- an approach to systematically collating measures for evaluating the performance of freight forwarding firms using the prevailing factors is unavailable;
- identification, assessment, and transfer of the best operational practices of a logistics company derived from internal benchmarking has not been reported; and
- scope for improving future operational strategies to ameliorate operational performance in the areas of internal coordination, use of technology, resource allocation, external coordination/communication, and software upgradation has not been reported.

3. Operations of the Target Global Logistics Firm

The global logistics firm is a part of world-leading transportation and logistics corporation Deutsche Bahn AG. The firm offers integrated freight forwarding services from a single source. The firm's seamless transportation chains across all carriers – including freight train, truck, ship, and airplane –

are combined with complex additional logistical services. It has a strong global presence in 140 countries.

The firm's reputation is premised upon performance and service, irrespective of the complexity of the logistics tasks and requirements. As it constantly seeks to act with increasing speed and flexibility on a global scale there is a need for continuous improvement. Locally, it operates in Dubai, UAE, and provides a complete range of international air and ocean freight forwarding services, together with integrated logistics services from its premises in Dubai and Abu Dhabi.

The firm currently employs a multi-domestic strategy for its operations, which has worked relatively well in the past. This strategy enables the firm to customise its products to meet the needs of each local market. The multi-domestic approach also ensures that the firm can quickly and quite effectively adapt to any changes in the marketplace. Hence, it has helped the firm to develop a variety of product offerings. The organisation's UAE division is further divided into air freight, ocean freight, sea-air freight, exhibition, contract logistics, and oil and gas.

This research aims to develop a deeper understanding of the firm's own internal processes, through which the current gaps in the firm's operations may be identified and sources of continuous improvement suggested. The internal benchmarking tool in this study measures and compares the performance of the following four of the firm's UAE operating departments:

- Ocean export;
- Ocean import;
- Air export; and
- Air import.

The operations of the firm's four freight forwarding departments are discussed in brief in the following sections to develop understanding of the firm's current operations. An overview of the export and import operations of the freight forwarding firm is illustrated in Fig. 1.

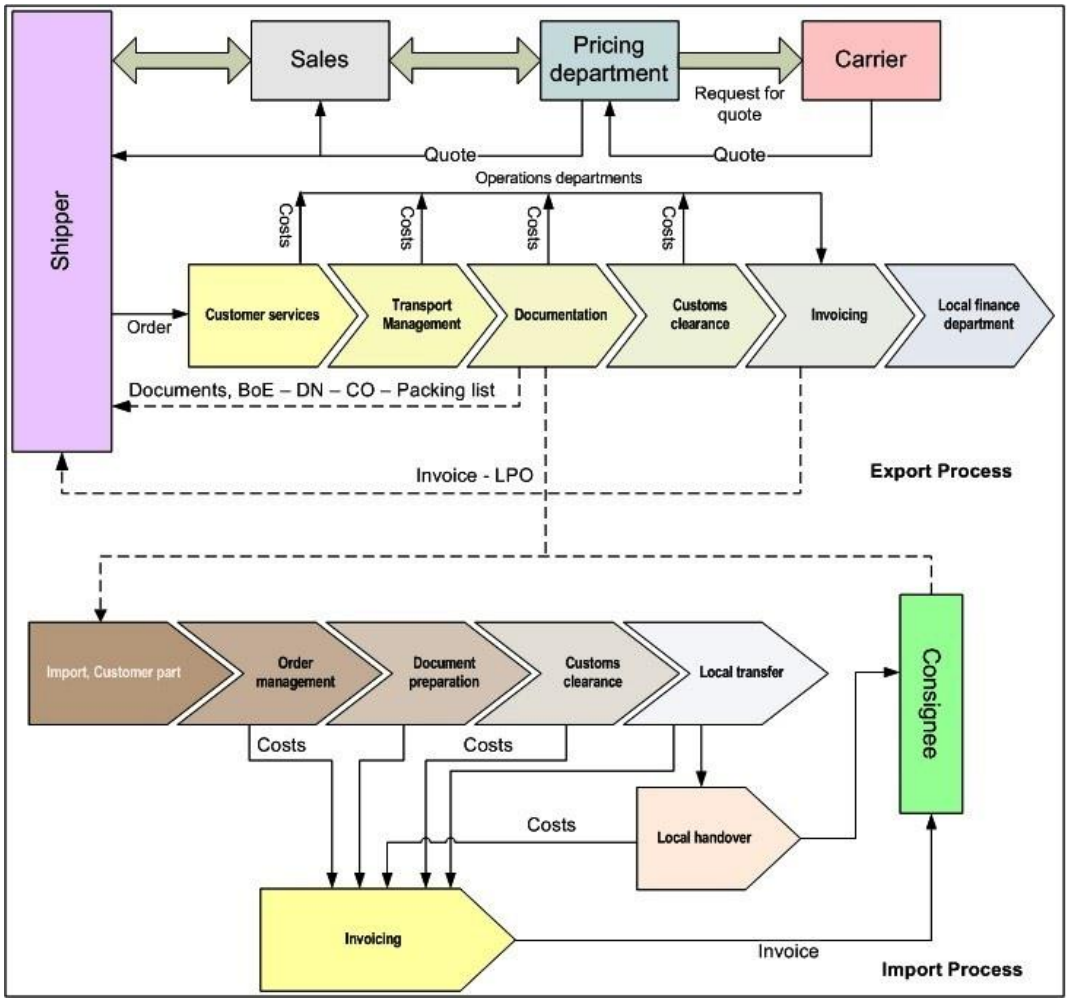


Fig. 1: Overview of the export and import operations of the freight forwarding firm

(DN – delivery note, LPO – local purchase order, CO – country of origin, BoE – bill of entry)

3.1 The ocean freight division

In the UAE region, the firm's ocean freight operations division comprises import and export sub-departments, each manned by a team of 34 employees. The teams are further divided into sub-teams working on Full Container Loads (FCL), less than full container loads (LCL), and the hub team (HUB), the latter being responsible for consolidating the LCLs into a single container. These departments collaborate to provide the following core operations (Table 2).

3.2 The air freight division

The firm's air freight in the UAE offers a variety of operations, as depicted in Table 2. Broadly, air freight is classified into two departments, viz. air exports and air imports and all of these operations are provided by these two departments.

3.3 Service scheduling approach

The usage of scheduling approaches, Make to Order (MTO) or Design to Order (DTO), necessitates a massive emphasis on strong internal and external communication (Wang and Rosenshine 1983). Conversely, a multi-domestic strategy places less emphasis on extensive communication in terms of information sharing between counterparts as compared to a transnational strategy (Segal-Horn and Faulkner, 1999). Later in this research, it is explored whether this strategy has a major impact on the factors influencing performance in the freight forwarding industry.

Table 2. Operations of the firm's freight division

	Operations	**Description of the ocean freight division's operations**
Ocean freight	FIRMcomplete	A solution for full-container requirements (FCL transport)
	FIRMcombine	Consolidation of container part loads (LCL transport)
	FIRMskybridge	Combines the advantages of air and sea freight: twice as fast as sea transport; half the price of air transport
	FIRMicm	Integrated Cargo Management: shipment organisation and control from purchase order through to delivery
	FIRMbeverages	A comprehensive logistics solution for transporting wines and other spirits
	FIRMrecyclables	A special solution for transporting recyclable paper, plastic, metal, and timber
	FIRMperishables	A special sea freight solution for perishable consumer goods
Air freight	FIRMjetcargo	A fast and flawless service for airport-to-airport transport. There are three standard service packages for fixed periods, in addition to charter options to suit individual requirements.
	FIRMjetxpress	A premium product for door-to-door transport. There are no size or weight restrictions, and the service includes customs clearance.
	FIRMskybridge	Combines the advantages of air and sea freight: twice as fast as sea transport; half the price of air transport.
	FIRMicm	Integrated cargo management: organisation and monitoring of shipments from order entry to delivery
	FIRMflightops	This links the central hubs of every continent several times each week using the firm's own services.

4. Materials and Method

To develop an internal benchmarking tool for measuring the performance of the studied departments, the factors driving the target global logistics firm are identified. Prioritisation of the firm's operations narrows down these factors to those most relevant factors. A quantitative approach supported by

statistical techniques is employed to facilitate systematic empirical investigation. This study examines the quantified data, condensing the results collected from the target population sample to measure the incidence of various views and opinions within the chosen sample. Further, analysis of the data obtained from the firm is performed based on the identified parameters.

A multiple method approach (Fig. 2) is adopted in this empirical action research, including a series of interviews, questionnaire-based surveys, and data collected by observation of the processes. These yield real-world data to measure the performance of the firm's various departments, which influence the formation of the internal benchmarking tool and ultimately serve to measure internal performance.

To meet the first objective, only qualitative data is used, by administering the questionnaire. A mixture of both quantitative and qualitative data is used to address the second objective. A factor analysis is performed on the qualitative data to investigate the variable relationships. Every identified factor is measured and included in the benchmarking tool, irrespective of its financial and non-financial dimensions. The inclusion of these factors is further justified by the addition of varied weightage given to each factor as per the firm's vision, management, and employees.

4.1 Instrument development

A questionnaire was developed to identify the current trends in the freight forwarding industry by identifying the priorities provided to the factors affecting their business. A second questionnaire was developed to analyse the results of the first questionnaire, as it is necessary to understand the relative weightage to be applied to the factors previously identified.

4.2 Data collection procedure

The data were collected from the respondents over two separate intervals. The first questionnaire was administered at the beginning of the research, while the second questionnaire was administered towards the end of the study, approximately six months after the first questionnaire was administered. Printed survey forms were used, together with online data collection procedures, such as *Google Forms*. The latter were used as most of the external stakeholders could not be contacted offline. Additional data was collected using observations and interviews over the span of six months. The respondents include several members from the firm's operations departments, including management.

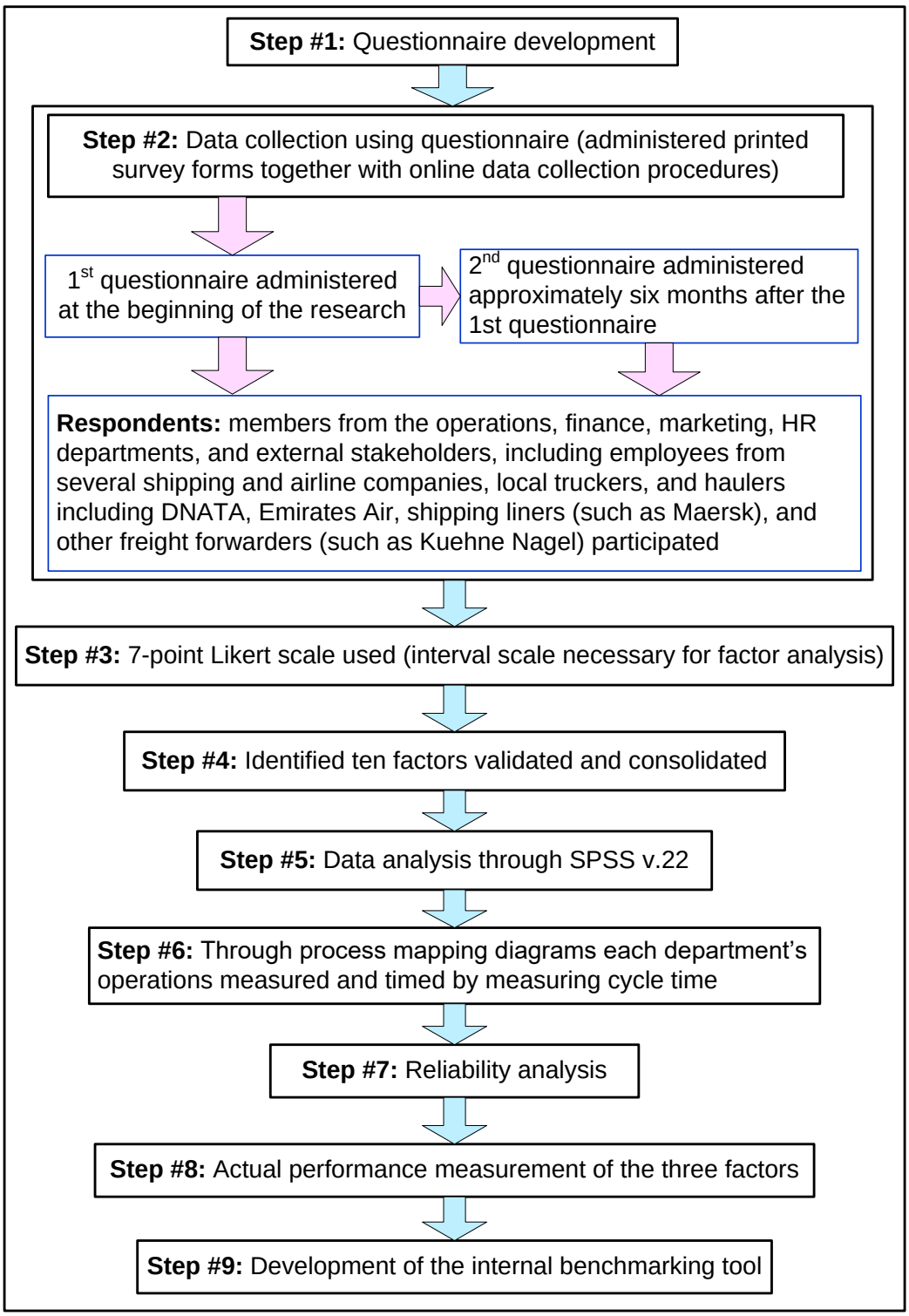


Fig. 2: The research methodology

4.3 Sample criteria and design

A total sample size of 155 respondents was selected, including members from the operations, finance, marketing, and HR departments, and external stakeholders, including employees from several shipping and airline companies, local truckers, and haulers. Respondents from numerous companies

participated in the survey, including DNATA, Emirates Air, shipping liners (such as Maersk), and other freight forwarders (such as Kuehne Nagel). The employees of these companies were selected based on the following criteria:

- working in the logistics department of any firm based in the UAE;
- possessing a sound knowledge of the functioning of the freight forwarding industry in the UAE; and
- having practical experience in logistics, specifically transportation.

As required by the second research objective, it is necessary to ensure that the respondents (i.e. internal stakeholders) are employees of the UAE division of the studied global logistics firm. These respondents include members from the core management, employees from operations, and representatives from all supporting departments.

4.4 Profile of the respondents

Ten attributes for the freight forwarding industry were identified from secondary data available in the literature. The survey questionnaires containing these factors were distributed among 155 freight forwarding and logistics professionals who have worked in the UAE. People from top management, operations, finance/HR, and marketing/customer services departments were the respondents who participated in this research.

4.5 Scale development and data analysis

A 7-point Likert scale was used, as an interval scale is necessary for factor analysis. The questionnaire was divided into two sections. In section one, the respondents are asked to provide their views on the extent to which each of the identified factors (i.e. indicators of firm's performance) impacts freight forwarding business today. This was to identify which of the factors are currently the most important in the freight forwarding business. A factor analysis on these factors was then performed to identify the most relevant factors.

The ten factors identified through the literature were validated and consolidated by interviewing several of the firm's operations experts, possessing years of experience in the freight forwarding industry. The following factors were identified:

- Cost (Gunasekaran 2001; Toni and Tonchia 2001);
- Quality of service (Tan 2001);
- Quality of data (Schönsleben 2004);
- Resource utilisation (Chan and Qi 2003);
- Efficiency of SOP (Neely and Gregory 1995);
- Flexibility (Beamon 1999);
- Transparency (Chan and Qi 2003);
- Innovativeness (Chan and Qi 2003);
- Consistency of service (Tan 2001); and
- On-time delivery (Schönsleben 2004).

These factors are the inputs to the factor analysis, for which they were re-named: cst, servqual, servdata, util, eff_of_sop, flex, transparency, innovation, constncy, and on_time respectively.

The collected data were analysed using descriptive statistics, reliability analysis, and factor analysis to identify the key factors impacting the decisions of freight forwarders in the UAE today. The data was analysed using SPSS v.22.

4.6 Application of relevant weights

As this research aims to develop deliverables for a specific organisation, it is important that every result should be aligned with the target firm's vision, mission, and objectives (Desmidt, 2016). The firm's current approach does not provide the weights that should be assigned to the identified factors. Thus, a weighted average approach was applied to the results of the second questionnaire, which was administered to the same set of respondents. The intention was to analyse and identify which of the above factors should be given greater priority as compared to the others illustrated in the process mapping diagram (Fig. 3).

Fig. 3: Process mapping with cycle time and steps for the ocean freight exports department

4.7 Application of relevant sub-weights

The pool of respondents – comprising employees, management, and external stakeholders – were asked to report their priorities. Each of them responded with respect to their individual priorities. An addendum to the second question was thus added only for the firm's UAE top management, who were asked the following question: "*Which of the above respondents are to be given higher priority*?". This

process aimed to assign priorities to each respondent and thus prioritise consistently with the top managements' perspectives and, hence, fulfil the firm's vision.

4.8 Measurement of operational costs

To develop the benchmarking tool, live data from the production environment was taken with regard to the above factors and integrated with the designated weights to assess the actual performance of the studied departments. It is relatively easier to measure the rolling cost of operations for each of the studied departments as each quarter's financial summary is meticulously maintained by the finance department. These costs include all the variable costs for quarter 3 of 2015, which range from staff salaries to machine maintenance, even down to capturing the money spent on stationery.

4.9 Measurement of processes' efficiency

Most organisations today are compelled to measure their financial performance every quarter; some even move beyond this by building tools to measure conformity with service-level agreements (SLAs) and efficiency. However, very few organisations measure the efficiency of their defined SOPs. Understandably, the measurement of SOPs is an arduous and time-consuming undertaking. The measurement of the efficiency of SOPs, service consistency, and time of delivery are crucial for internal benchmarking.

Therefore, each of the department's operations was measured and timed. This necessitated measurement of the cycle time in terms of the time taken to process one standard package or container. This is reflected in the process mapping diagrams for the ocean (Fig. 3) and air freight exports and imports departments (Fig. A1, Fig. A2, Fig. A3).

4.10 Measurement of service quality

Perceived service quality includes the quality of data, quality of service, and the consistency or reliability of the service offered. The firm uses a tool, known as "Events", which measures the data quality, data consistency, and data reliability. Quality scores for the benchmarking tool have to incorporate additional data, such as each department's inclination towards assigning additional

processes to maintain reliability in the sent data. The integration of these data along with the data received from the 'Events' tool assists the assessment of each department's inclination towards quality maintenance during the study period.

Once the methodology was finalised and established, data were collated from the firm and the obtained results were analysed. This was undertaken to assess the operational performance of the departments, based on the relevant factors impacting the freight forwarding industry, which would assist in developing the benchmarking tool and suggest future operational strategies.

5. Results and Analysis

5.1 Reliability analysis

Factor analysis is a widely utilised statistical technique (Beavers et al. 2013). The technique continually refines and compares solutions through a cyclical process until the most meaningful solution is reached (Tabachnick & Fidell, 2001). Factor analysis was used in this research to reduce the number of variables, establish underlying relationships between the measured variables and constructs, and provide construct reliability and validity. This was done using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test (Table 3). These tests measure the strength of relationships among the variables. In the KMO test, an α value of 0.5 and above indicates a good reliability for the scale (Cerny and Kaiser 1977; Kaiser 1974). The KMO test result, $\alpha = 0.849$, indicates that the scale has good reliability. This confirms that the sample is adequate for the study. The Bartlett's test confirmed that the test of sphericity is significant (0.000), i.e. the significance level is small enough to reject the null hypothesis. This means that the correlation matrix (Table 4) is not an identity matrix.

Table 3: KMO test and Bartlett's test for sample adequacy

Kaiser-Meyer-Olkin measure of sampling adequacy		0.849
Bartlett's test of sphericity	Approx. Chi-square	1137.903
	df	45
	Sig.	0.000

Table 4: Correlation matrix table

	cst	**servqual**	**servdata**	**util**	**eff_of_sop**	**flex**	**transparency**	**innovation**	**constncy**	**on_time**
cst	1.000	0.268	0.288	0.502	0.211	0.341	0.285	0.282	0.296	0.262
servqual	0.268	1.000	0.791	0.252	0.278	0.446	0.377	0.507	0.764	0.354
servdata	0.288	0.791	1.000	0.401	0.364	0.468	0.465	0.502	0.750	0.417
util	0.502	0.252	0.401	1.000	0.448	0.465	0.394	0.378	0.279	0.456
eff_of_sop	0.211	0.278	0.364	0.448	1.000	0.753	0.755	0.613	0.206	0.818
flex	0.341	0.446	0.468	0.465	0.753	1.000	0.813	0.561	0.399	0.831

transparency	0.285	0.377	0.465	0.394	0.755	0.813	1.000	0.616	0.341	0.836
innovation	0.282	0.507	0.502	0.378	0.613	0.561	0.616	1.000	0.416	0.510
constncy	0.296	0.764	0.750	0.279	0.206	0.399	0.341	0.416	1.000	0.306
on_time	0.262	0.354	0.417	0.456	0.818	0.831	0.836	0.510	0.306	1.000

It is observed that the cost, service quality, service data, utility, efficiency of SOP, flexibility, transparency, innovation, consistency, and on-time delivery variables are highly correlated amongst themselves. The correlations across cost and service quality, cost and service data, cost and efficiency of SOP, cost and transparency, cost and innovation, cost and consistency, and cost and on-time delivery is comparatively small.

The table of communalities (Table 5) indicates how much of the variance in the variables is accounted for by the extracted factors. The "Extraction" value is the proportion of variance that each variable has in common with other variables. For example, it is revealed that 86.7% of the variance in "service quality" is accounted for, while 57.7% of the variance in "innovation" is accounted for. A communality value of more than 0.5 (Costello and Osborne 2005; Beavers et al. 2013) is considered necessary for further analysis. Therefore, all of the variables can be analysed further.

Table 5: Communalities

	Initial	**Extraction**
cst	1.000	0.813
servqual	1.000	0.867
servdata	1.000	0.833
util	1.000	0.726
eff_of_sop	1.000	0.848
flex	1.000	0.825
transparency	1.000	0.843
innovation	1.000	0.577
constncy	1.000	0.833
on_time	1.000	0.864

Extraction method: Principal component analysis

5.2 Exploratory factor analysis

Exploratory factor analysis is used to determine the correlation among different variables. This analysis focuses on grouping the variables based on strong correlations (Levine, 2015). In total, a useable sample size of 155 questionnaires each containing 10 factors suggests that the study has exceeded the minimum requirement for case-to-item ratio. This is consistent with the findings of Mundfrom et al. (2005). As observed from Table 6, three factors (i.e. components) can be extracted

from the data where all the factor loadings that permit assignment of an item to a specific factor exceed 0.291.

Table 6: Component scores and coefficient matrix

	Component		
	1	2	3
cst	-0.163	-0.060	0.713
servqual	-0.075	0.405	-0.106
servdata	-0.058	0.353	-0.028
util	-0.032	-0.102	0.566
eff_of_sop	0.311	-0.120	-0.071
flex	0.239	-0.030	-0.010
transparency	0.278	-0.043	-0.088
innovation	0.138	0.097	-0.051
constncy	-0.119	0.401	-0.027
on_time	0.291	-0.086	-0.056

Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser normalisation.

The first factor includes two items, viz. efficiency of SOP and on-time delivery, and explains 37.51% of the variance. This factor could be termed “efficiency of processes”. The second factor, termed “perceived quality”, encompasses quality of service, quality of data, and consistency, and explains 27.2% of the variance. The third factor, termed “cost effectiveness”, includes cost and resource utilisation, and explains 15.57% of the variance. These three factors together explain 80.30% of the variance (Table 7). It can be seen that, starting from factor 4 onwards, the factors have an eigenvalue of less than 1; therefore, only first three factors were retained for further analysis. Through the aforementioned analysis the three factors broadly realised comprise:

- efficiency of processes;
- perceived quality; and
- cost effectiveness.

Table 7: Total variance table

Component	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.322	53.217	53.217	5.322	53.217	53.217	3.752	37.516	37.516
2	1.657	16.568	69.786	1.657	16.568	69.786	2.722	27.216	64.732
3	1.052	10.522	80.308	1.052	10.522	80.308	1.558	15.576	80.308

4	0.523	5.230	85.538						
5	0.502	5.021	90.559						
6	0.247	2.467	93.026						
7	0.224	2.245	95.271						
8	0.210	2.104	97.376						
9	0.151	1.507	98.883						
10	0.112	1.117	100.000						

5.3 Application of weights

This section provides insight into the parameters on which the performance of each of the defined departments could be measured. Though the parameters are rudimentary, they define the core premise of the workings of the logistics industry today. Each of the parameters identified are conflicting in nature-. Therefore, assignment of equal weightage to all of these parameters would be an incorrect approach. In developing the internal benchmarking tool for the firm, its vision, objectives, and mission must be considered by attributing appropriate weight to each factor.

The administration of the second questionnaire revealed the propensities of each department toward each of the factors and sub-factors (Table 8). Figures reveal the firm's upper management's inclination toward the priority to be given to each of the respondents, and the propensity of external stakeholders and the firm's operations department, marketing/customer services/sales department, HR/finance department, and top management respectively toward the factors. With the factors and weights thus identified, it is possible to measure the actual parameters considering the management's priorities. The results are detailed in Tables 8 and 9.

Table 8: Factor priority matrix table

Top management priority		**Efficiency of processes**		**Perceived quality**		**Cost effectiveness**	
		Efficiency of SOP	Maintenance of low cycle times	Maintenance of good quality of data	Maintenance in consistency in service delivery	Maintenance of lower cost of operations	Efficient use of manpower
25%	External stakeholders	16%	10%	23%	19%	19%	13%
25%	Operations Department	17%	11%	24%	16%	20%	12%
9%	HR/Finance Department	14%	12%	25%	17%	20%	12%
29%	Top Management	15%	9%	21%	20%	23%	12%
12%	Marketing/ Customer services	14%	12%	24%	16%	20%	14%
100%	**Total weightage**						

Table 9: Application of weights to factors table

	Efficiency of processes	**Perceived quality**	**Cost effectiveness**

	Efficiency of SOP	Maintenance of low cycle times	Maintenance of good quality of data	Maintenance in consistency in service delivery	Maintenance of lower cost of operations	Efficient use of Manpower	Total priority
External stakeholders	4.00%	2.50%	5.75%	4.75%	4.75%	3.25%	25.00%
Operations department	4.25%	2.75%	6.00%	4.00%	5.00%	3.00%	25.00%
HR/Finance department	1.26%	1.08%	2.25%	1.53%	1.80%	1.08%	9.00%
Top management	4.35%	2.61%	6.09%	5.80%	6.67%	3.48%	29.00%
Marketing/ Customer services	1.68%	1.44%	2.88%	1.92%	2.40%	1.68%	12.00%
Sub Total	15.54%	10.38%	22.97%	18.00%	20.62%	12.49%	
Factor weightage	**25.92%**		**40.97%**		**33.11%**		**100.00%**

5.4 Actual performance measurement of efficiency of processes

The first factor encompasses efficiency of SOP and on-time delivery. To build the internal benchmarking tool, the individual performance of each department was measured for these factors. Thus, the SOPs of each department were thoroughly studied for a period of seven months, using the same led to identifying the cycle time of each department. The cycle time is the time taken by each department to process and ship one standard package. The cycle time (Table 10) of each department is found from each department's process maps.

Table 10: Departmental cycle time

Department	Time spent on inbound communication	Time spent on recording and sorting	Time spent on outbound communication	Time spent on new document creation	Total cycle time (min/file)	Percentage contribution
Ocean Export	35 min/file	64.2 min/file	43 min/file	33 min/file	175.2	0.2916
Ocean Import	23 min/file	52 min/file	40 min/file	24 min/file	139	0.2314
Air Export	22 min/file	55.5 min/file	42 min/file	33 min/file	152.5	0.2539
Air Import	23 min/file	51.5 min/file	36 min/file	24 min/file	134.5	0.2239

5.5 Actual performance measurement of perceived quality

The second factor encompasses quality of service, quality of data, and consistency, which together comprise customer quality perception. As the studied firm under had earlier identified the importance of this factor, it has already implemented software for measuring the quality of data, data availability, and consistency. Aside from company-specific sensitive information, the top-level management allowed extraction of the Events scores for each department. The scores for the studied period are illustrated in Table 11.

Table 11: Quality (events scores)

Department	June 2015	July 2015	August 2015	Cumulative Score	Percentage Contribution

Ocean Export	99.93%	99.73%	99.19%	99.94%	0.2529
Ocean Import	99.94%	98.47%	99.12%	99.17%	0.2509
Air Export	99.13%	99.35%	96.43%	98.30%	0.2488
Air Import	97.32%	97.43%	98.43%	97.72%	0.2473

5.6 Actual performance measurement of cost effectiveness

The third factor comprised cost and resource utilisation. Understandably, the firm's top-level management was reluctant to share confidential financial information. Therefore, for the sake of comparison, ratios of the cumulative operating costs were identified (Table 12). These costs include everything from staff salaries to vehicle maintenance, and are segregated departmentally. The costs span the entire studied period.

Table 12: The firm's observed cost scores

Department	Ratio of cumulative operating costs
Ocean Export	0.1137
Ocean Import	0.3045
Air Export	0.1706
Air Import	0.4112

5.7 The internal benchmarking tool

All the above findings were carefully selected and analysed to realise the third objective: formulating the actual performance measurement of each of the departments. The observed data collected through all of the above techniques is consolidated below.

Table 13: Observed scores for the logistics firm's operations

Department	Cycle time	Perceived quality	Cost
Ocean Export	0.316681072	0.252929416	0.113714
Ocean Import	0.240276577	0.25098069	0.304539
Air Export	0.266724287	0.248778883	0.170571
Air Import	0.176318064	0.247311012	0.411176

The first observation is that the cycle time is the inverse of the studied factor, i.e. efficiency of processes (Table 13). Thus, the higher the cycle time value, the less efficient is the department's SOP. Similarly, cost and cost effectiveness are opposites, in the sense that if the conserved costs for the

department are high, then it is not efficient in using its resources appropriately. Hence, the said factors have been inverted and the normalised values are found in Table 13.

The actual internal benchmarking performance of the firm's operations is not only based on observed values but also on the parameters set by the freight forwarders. Relevant weights were assigned with respect to the top-level management's priority over the rest of the stakeholders. The weights are highlighted in blue in Table 9. These weights are integrated with the normalised performance measures obtained from Table 13, resulting in the operational performance measurement through internal benchmarking (Table 14).

Table 14: Operational performance through the internal benchmarking tool

Department	Efficiency of processes	Perceived quality	Cost effectiveness	Cumulative Score
Ocean Export	**25.92% * 0.236113423**	**40.97% * 0.252929416**	**33.11% * 0.295428664**	**0.262642212**
Ocean Import	**25.92% * 0.256201099**	**40.97% * 0.25098069**	**33.11% * 0.2318204**	**0.245989848**
Air Export	**25.92% * 0.248709839**	**40.97% * 0.248778883**	**33.11% * 0.27647633**	**0.257931611**
Air Import	**25.92% * 0.258698185**	**40.97% * 0.247311012**	**33.11% * 0.196274605**	**0.233364413**

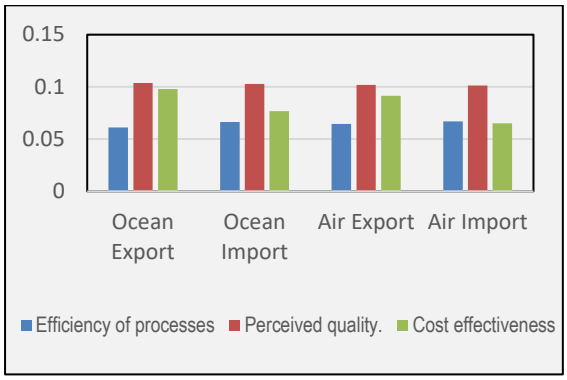
6. Discussion

The operational performance measurement results are illustrated in Table 14. From Table 14, it is interpreted that ocean exports is the firm's best-performing department; it therefore becomes the benchmark for all of the other departments. Overall, it is concluded that the firm's exports sub-division is performing relatively well compared to the imports sub-division. On further analysis of the observed data, it was concluded that the exports departments have significantly higher scores due to the following reasons:

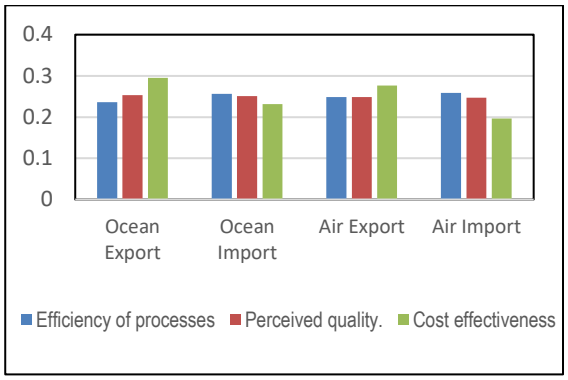
- consistent maintenance of high data quality scores, and
- operating under significantly lower costs compared to the imports departments.

As quality and efficiency in utilising finances have been given higher weightage in the internal benchmarking tool, viz. 40.97% and 33.11% respectively, the results are skewed toward them. Fig. 4(a) indicates that the imports departments' SOP efficiency is significantly better than that of the exports departments. The exact figures in terms of dollar values could not be provided in this article to

protect the firm's confidentiality. However, the weighted the average ratios of each department's costs provide a representative comparison of the spending of each of the studied departments. Fig. 4(b) explores a non-weighted score comparison of the factors for each department, which does not consider the benchmarking tool. A close comparison of Figs. 4(a) and 4(b) reveals that inclusion of the strategic priorities of the firm's vision, objectives, and mission results in targeting different operational performance measures in Fig. 4(a), intended to benefit the firm's strategic goals.



(a) Score comparison obtained from the internal benchmarking tool



(b) Non-weighted score comparison

Fig. 4: Score comparison with and without internal benchmarking tool

6.1 Practical implications

The implementation of the internal benchmarking tool to enhance the operational performance of this worldwide freight forwarding giant explores a number of practical implications in regard to operational strategies. These contribute to the five main pillars of the studied global logistics firm: internal coordination, use of technology in the departments, resource allocation, external coordination and communication, and software upgradation.

(a) Internal coordination:

The results reveal that the air exports department scores excellent points as their SOPs are very efficient. They have excellent external collaboration with their suppliers, with better tools for data processing, such as the M2 text generator used by the air freight customs division. This tool significantly reduces the amount of time spent on data entry tasks. However, this knowhow is not shared across the organisation. If this tool were introduced in the ocean freight division, it would significantly improve that division's SOPs. The failure to share process improvements across the departments accounts for a huge opportunity loss. There are several communication gaps within and between the studied departments.

(b) Technology:

During the process mapping stage, it was noted that the worldwide freight forwarding giant employs a multi-domestic approach, especially in terms of information gathering and storage. Each of their local offices has an individual set of databases. Information between the firm's regional offices is seldom shared. For example, if there is a shipment between the firm's regional offices based in Dubai and Italy, it is triggered by the Italy office. The possibility of the shipper/consignee information being stored in the Italy database is quite high, as the shipment is triggered from there. However, the sharing of this information is limited since the local databases are not completely integrated. The firm's Dubai office would have to re-create the shipper/consignee information by gathering and entering all the details about the Italian shipper/consignee in their local database. This activity is time-consuming, especially as the firm's operations in Dubai do not have the authority to create/update any user in the database.

(c) Resource allocation:

The firm's multi-domestic strategy dictates that the current resource allocation structure is substantially influenced by external demand patterns, in terms of the number and types of contracts won by the firm's sales teams for that fiscal year. Demand patterns for ocean freight generally consist of few shipments to varied destinations, and the number of new customers (shipper and consignees) are significantly higher than for air freight, for which the bulk of the shipment orders come in the form of several long-term contracts. Hence, the operational department's job allocation structure for each of these departments has been formulated to ensure that each of the departments performs highly on local responsiveness, in tandem with the multi-domestic strategy.

The air freight departments have arranged for their employees to service specific clients, resulting in client service with greater efficiency, lower throughput times, and flexibility. The service is less formalised as compared with other departments as the number of steps needed to process these shipments is significantly reduced in terms of complexity and time.

The complexity in handling an ocean shipment is far greater in comparison with air freight due to the higher levels of standardisation in the current pool-based resource allocation system. As demand is seasonal and the number of new shipments is higher than the air freight, a pool-based resource allocation structure gives far more efficient results, especially as it ensures that all the employees have practical experience regarding every job. The number of idle employees is significantly smaller in the ocean freight compared to air freight division.

(d) External coordination/communication:

There are several variations in export vs import processes due to differences in their customs and process requirements. The major difference between ocean and air freight operations lies in the viable urgency from customers in the processing of air shipments. Hence, the customer's requirements, the documents, and the material often arrive only a few hours before, or often just in time for, departure. This fact has shaped the firm's air freight division to make its operations more agile compared to its ocean operations. For example, the ocean import department employs a pigeon-hole for efficient sorting of the shipments, whereas in the air import department, a dedicated employee sorts and assigns the jobs instantaneously.

Several other approaches to shorten the throughput time are employed in air freight as compared to ocean freight due to the aforementioned need for rapid turnaround. High supplier integration is another example. Through collaboration with most of its carriers, the air freight departments can now book airline tickets through their internal enterprise resource planning (ERP) tool, whereas the ocean freight departments must book through the shipping liner websites. This means that they do not have to wait a day to print the booking confirmation, thereby requiring less manpower from both the firm and the airliner. This software integration also means that the firm's air exports department can print the original airway bill on their own printers, whereas the ocean exports department must spend hours of manpower and incur costs by sending a runner every day to the carrier office to collect the original ocean master bill of lading (MBL).

(e) Software Upgradation:

While studying the internal SOPs of each department, the bottleneck processes were identified as steps 11 and 12: in essence, every department spent considerable time on cost booking and invoicing. Although these processes are essential to daily operations, the software interfaces are not user-friendly. Therefore, there is scope of significantly improve SOP efficiency with even module specific upgrades focused on easing the entry of data onto the database.

6.2 Theoretical implications for logistics industry

Through implementation of the internal benchmarking tool the following set of theoretical implications are observed to improve operational performance in a logistics firm:

- An improved means of internal communication and knowhow should be consistently maintained, not only within the logistics firm's division but also across all of its offices globally. There should be a strategic shift toward a transnational movement from the currently

followed multi-domestic strategy. Substantial emphasis should be focused on internal and external collaboration to improve operational performance.

- If the firm employs a transnational strategy, the time spent and data capacity required to store duplicate information could be eliminated, as a single global database is able to store all of the firm's records.
- The demand patterns for ocean and air freight departments are substantially seasonal. Therefore, it is recommended that the firm should employ a mix of multi-domestic and localised strategies for job allocation, leading to an improved operational performance. As the numbers and sizes of shipments vary often, emphasis should be placed upon continuous improvement, as envisaged in Coulter et al. (2000) and MacKerron et al. (2003), in terms of the existing job allocation method employed.
- The acquired wisdom from air freight operations regarding external coordination/communication can be implemented within ocean freight. High supplier collaboration and many other benefits would also facilitate shorter processing times, thus increasing also the overall operational efficiency and performance of the ocean departments.
- An upgrade of the software can facilitate lowering communication barriers within and across the organisation, thereby improving operational performance.

The "best practice" derived from internal benchmarking is an intermediate step towards external benchmarking. These best practices can be transferred to other departments of the firm. Therefore, the benchmarking tool enables departments to integrate to some extent by sharing the operations processes of common strategies. The firm's multi-domestic strategy, coupled with its local strategies, strengthens its operations in terms of responsiveness. Thus, an appropriate performance measurement seeks to thoroughly investigate the firm's operations through process mapping, which in turn facilitates assessing the performances of disparate functional entities. Consideration of both the tangible and intangible measures benefits the firm in assessing the current operational situation. This is consistent with the study of Karia and Wong (2013). The firm's strategic priorities must be integrated with its operational performance to ascertain the effective performance of the firm. This is consistent with those reported in earlier studies on benchmarking and performance (Coulter et al. 2000; Meybodi 2009).

7. Conclusions

This article reports a paradigm shift by designing and implementing a novel and holistic internal benchmarking tool to assess, measure and improve operational performance of the departments in a global logistics firm. Several knowledge gaps are identified from a critical examination of the literature. The four research questions enumerated in section 1 have been answered through the outcomes of this pragmatic research. The outcomes of this research, through an in-depth action research and a series of statistical tests, enable the global logistics firm to form a deeper understanding of their own internal processes and metrics, and contribute to better operational performance. The outcomes derived from the internal benchmarking tool provide the "best practice" which forms an intermediate step towards external benchmarking. The implementation of the internal benchmarking tool explores several operational and strategic recommendations for the studied global logistics firm to achieve better operational performance. Further, several theoretical implications are derived to improve the operational performance of the logistics firm. It is found that the firm's multi-domestic and localised strategies have a major impact on the factors influencing the performance of its freight forwarding business. The research outcomes facilitate investigating the current business strategies, the SOPs, and the scope of improving those.

The main purpose of developing the internal benchmarking tool was not to discover the best-performing department among the four studied but rather to find the reasons why it is performing better than the others and, simultaneously, to examine if its process improvements could be disseminated across the firm's various other departments. The lessons of this study's internal benchmark are clear. The global logistics firm's exports departments generally fared better than its imports departments due to the following reasons. One of the main reasons for the lower costs and higher perceived quality of the exports departments is attributable to the employees. The number of employees in the exports departments, especially ocean exports, is far lower than the employee number in the imports departments, resulting in lower personnel costs. The export departments' employees have been working in the firm for more than seven years and they are solely responsible for the excellent quality scores and increased inter-departmental communication. This implies that a smaller team of more experienced employees is preferable to the import departments' strategy of engaging a high number of less-experienced employees.

Although the imports departments were not identified as the benchmark, they did achieve higher scores regarding efficiency of processes in comparison with the exports departments. The SOP for the

import departments, especially air imports, has been constantly updated by the firm over time to ensure fulfilment of large incoming orders. Consequently, there have been dozens of software upgradations to the existing systems, with the sole purpose of integrating them with those of the major suppliers, including Emirates, Etihad, and other carriers. This implies that further improvement of SOPs could be achieved though further software integration with the major suppliers, as this would save time in both coordination and external communication. Another interesting observation is that only the air imports department actually owns a fleet of trucks. This increases the efficiency of the internal processes and greatly helps to reduce the time spent on external communication, compared to the other departments that continue to rely on external haulers to transport packages from and to the ports. However, faster haulage and SOP efficiency have high intrinsic costs, as the cost of operations for the air imports department increases by the addition of vehicle maintenance and drivers' payroll expenses. The firm has to decide whether this trade-off justifies the required costs.

7.1 Scope for future research

The internal benchmarking tool can facilitate careful examination to identify any scope to reduce waste (Tseng et al. 2014) from operational processes. This will lead to achieving lean operations. Adequate thrust can be provided to innovation capabilities of the firm (Yang 2012), which is currently a weakness within such firms. Through logistics process innovation, lean approaches (Panwar et al. 2015; Filho et al. 2016; Bevilacqua et al. 2017; Colicchia et al. 2017; Negrão et al. 2017; Panwar et al. 2018) can be devised and implemented. This area provides significant scope for further research through the internal benchmarking tool.

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References

Adebanjo, D., A. Abbas, R. Mann. 2010. An investigation of the adoption and implementation of benchmarking. *International Journal of Operations & Production Management* 30(11): 1140-1169.

Ahmad, N., R. Mehmood. 2016. Enterprise systems and performance of future city logistics. *Production Planning & Control* 27(6): 500-513.

Amaral, P., R. Sousa. 2009. Barriers to internal benchmarking initiatives: an empirical investigation. *Benchmarking: An International Journal* 16(4): 523–542.

Andersen, B., P. Jordan. 1998. Setting up a performance benchmarking network. *Production Planning & Control* 9(1): 13-19.

Anderson, K., R. McAdam. 2004. A critique of benchmarking and performance measurement. *Benchmarking: An International Journal* 11(5): 465-483.

Beamon, B.M. 1999. Measuring supply chain performance. *International Journal of Operations & Production Management* 19(3): 275-292.

Beavers, A.S., J.W. Lounsbury, J.K. Richards, S.W. Huck, G.J. Skolits, S.L. Esquivel. 2013. Practical considerations for using exploratory factor analysis in educational research. *Practical Assessment, Research & Evaluation* 18(6): 1-13.

Bevilacqua, M., F.E. Ciarapica, I.D. Sanctis. 2017. Lean practices implementation and their relationships with operational responsiveness and company performance: an Italian study. *International Journal of Production Research* 55(3): 769-794.

Binder, M., B. Clegg, W. Egel-Hess. 2006. Achieving internal process benchmarking: guidance from BASF. *Benchmarking: An International Journal* 13(6): 662-687.

Cassell, C, S. Nadin, M.O. Gray. 2001. The use and effectiveness of benchmarking in SMEs. *Benchmarking: An International Journal* 8(3): 212-22.

Camp, R.C. 1995. *Business Process Benchmarking: Finding and Implementing Best Practices*, ASQC Quality Press, Michigan.

Caplice, C., Y. Sheffi, 1995. A Review and Evaluation of Logistics Performance Measurement Systems. *The International Journal of Logistics Management* 6(1): 61-74.

Cerny, C.A., H.F. Kaiser. 1977. A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate Behavioral Research* 12(1): 43-47.

Chan, F.T.S., H.J. Qi. 2003. An innovative performance measurement method for supply chain management. *Supply Chain Management: An International Journal* 83(4): 209-23.

Chung, T.W., W.C. Ahn, S.M. Jeon, V. van Thai. 2015. A Benchmarking of Operational Efficiency in Asia Pacific International Cargo Airports. *The Asian Journal of Shipping and Logistics* 31(1): 85-108.

Colicchia, C., A. Creazza, F. Dallari. 2017. Lean and green supply chain management through intermodal transport: insights from the fast moving consumer goods industry. *Production Planning & Control* 28(4): 321-334.

Costello, A.B., J.W. Osborne. 2005. Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation* 10(7): 1-9.

Coulter, J., N.S. Baschung, U.S. Bititci, 2000. Benchmarking for small- to medium-sized enterprises. *Production Planning & Control* 11(4): 400-408.

Dattakumar, R., R. Jagadeesh, 2003. A review of literature on benchmarking. *Benchmarking: An International Journal* 10(3): 176-209.

Desmidt, S. 2016. The relevance of mission statements: Analysing the antecedents of perceived message quality and its relationship to employee mission engagement. *Public Management Review* 18(6): 894-917.

Filho, M.G., G.M.D. Ganga, A. Gunasekaran. 2016. Lean manufacturing in Brazilian small and medium enterprises: implementation and effect on performance. *International Journal of Production Research* 54(24): 7523-7545.

Francis, J. 2008. Benchmarking: Get the gain. *Supply Chain Management Review.* April, 22-29.

Geanuracos, J. 1994. The global performance game. New York: Crossborder.

Gilmour, P. 1999. Benchmarking supply chain operations. *International Journal of Physical Distribution & Logistics Management* 29(4): 283-90.

Gunasekaran, A., C. Patel, E. Tirtiroglu. 2001. Performance measurement and metrics in a supply chain environment. *International Journal of Operations & Production Management* 20(1): 71-87.

Gunasekaran, A. 2001. Benchmarking in supply chain management. *Benchmarking: An International Journal* 8(4): 1.

Gunasekaran, A. 2002. Benchmarking in logistics. *Benchmarking: An International Journal* 9(4): 1.

Hanman, S. 1997. Benchmarking your firm's performance with best practice. *International Journal of Logistics Management* 8(2): 1-18.

Hyland, P., R. Beckett. 2002. Learning to compete: the value of internal benchmarking. *Benchmarking: An International Journal* 9(3): 293-304.

Julien, F.W. 1993. The power of benchmarking. *The Internal Auditor* 50(4): 22.

Kablan, M., F. Dweiri, 2003. A mathematical model for maximizing the overall benchmarking effectiveness without exceeding the available amounts of resources. *Production Planning & Control*, 14(1): 76-81.

Kaiser, H. 1974. An index of factor simplicity. *Psychometrika* 39: 31–36.

Karia, N., C.Y. Wong. 2013. The impact of logistics resources on the performance of Malaysian logistics service providers. *Production Planning & Control* 24(7): 589-606.

Kelessidis, V. 2000. Benchmarking. INNOREGIO: dissemination of innovation management and knowledge techniques. Report produced for the EC-funded project, Thessaloniki Technology Park, 1-33.

Levine, T.R. 2015. Confirmatory Factor Analysis. In: *The International Encyclopedia of Interpersonal Communication*, John Wiley & Sons, Inc., 1–5.

Lockamy, A. III, K. McCormack. 2004. Linking SCOR planning practices to supply chain performance: An exploratory study. *International Journal of Operations & Production Management* 24(12): 1192-1218.

Lu, C.-S., C.-C. Yang. 2010. Logistics service capabilities and firm performance of international distribution center operators. *The Service Industries Journal* 30(2): 281-298.

MacKerron, G.C., R. Masson, M. McGlynn. 2003. Self assessment: Use at operational level to promote continuous improvement. *Production Planning & Control* 14(1): 82-89.

Meybodi, M.Z. 2009. Benchmarking performance measures in traditional and just-in-time companies. *Benchmarking: An International Journal* 16(1): 88–102.

Moffett, S., K. Gillespie, R. McAdam. 2008. Benchmarking and performance measurement: a statistical analysis. *Benchmarking: An International Journal*, 15(4): 368-81.

Mundfrom, D.J., D.G. Shaw, T.L. Ke. 2005. Minimum sample size recommendations for conducting factor analyses. *International Journal of Testing*, 5(2): 159-168.

Neely, A.D., K. Gregory. 1995. Performance measurement system design. *International Journal of Operations & Production Management* 15(5): 80-116.

Negrão, L.L.L., M.G. Filho, G. Marodin. 2017. Lean practices and their effect on performance: A literature review. *Production Planning & Control* 28(1): 33-56.

Niemi, P., J. Huiskonen. 2008. An approach to improving logistical performance with cross-unit benchmarking. *Benchmarking: An International Journal* 15(5): 618–629.

Panwar, A., R. Jain, A.P.S. Rathore, B. Nepal, A.C. Lyons. 2018. The impact of lean practices on operational performance – an empirical investigation of Indian process industries. *Production Planning & Control* 29(2): 158-169.

Panwar, A., B.P. Nepal, R. Jain, A.P.S. Rathore. 2015. On the adoption of lean manufacturing principles in process industries. *Production Planning & Control* 26(7): 564-587.

Salem, M.S.M. 2010. An application of the Analytic Hierarchy Process to determine benchmarking criteria for manufacturing organisations. *International Journal of Trade, Economics and Finance* 1(1): 93-102.

Schönsleben, P. 2004. *Integral logistics management: planning & control of comprehensive supply chains*, Boca Raton, FL, CRC Press.

Segal-Horn, S. and D. Faulkner. 1999. *The dynamics of international strategy*. London, International Thomson Business Press.

Shepherd, C, H. Günter. 2006. Measuring supply chain performance: current research and future directions", *International Journal of Productivity and Performance Management* 55(3/4): 242-258.

Simatupang, T., R. Sridharan. 2004. Benchmarking supply chain collaboration. *Benchmarking: An International Journal* 11(1): 9-30.

Soni, G., R. Kodali. 2010. Internal benchmarking for assessment of supply chain performance. *Benchmarking: An International Journal* 17(1): 44-76.

Southard, P.B., D.H. Parente. 2007. A model for internal benchmarking: when and how?. *Benchmarking: An International Journal* 14(2): 161-171.

Suzuki, S. 2015. SCM logistics scorecard: A simplified benchmarking tool for supply chain operational performance. *Proceedings of the IEEE International Conference on Industrial Engineering and Engineering Management*. 290-294.

Spendolini, M. 1994. *The Benchmarking Book,* Amacom Books, ISBN: 978-0814450772.

Tabachnick, B., L. Fidell. 2001. *Using multivariate statistics*. Needham Heights: Allyn & Bacon.

Tutcher, G. 1994. How successful companies improve through internal benchmarking. *Managing Service Quality* 4(2): 44-46.

Tan, K. 2001. A framework of supply chain management literature. *European Journal of Purchasing & Supply Management* 7(1): 39-48.

Tseng, M.-L., K.-H. Tan, M. Lim, R.-J. Lin, Y. Geng. 2014. Benchmarking eco-efficiency in green supply chain practices in uncertainty. *Production Planning & Control* 25(13-14): 1079-1090.

Toni, A., S. Tonchia. 2001. Performance measurement systems – models, characteristics and measures. *International Journal of Operations & Production Management* 21(1/2): 46-70.

van Hoek, R. 2000. Logistics and the extended enterprise: Benchmarks and best practices for the manufacturing professional. *Supply Chain Management: An International Journal* 5(2): 110-110.

van Landeghem, R., L. Persoons. 2001. Benchmarking of logistical operations based on causal model. *International Journal of Operations & Production Management* 21(1/2): 254-267.

Voss, C.A., Åhlström, P., K. Blackmon. 1997. Benchmarking and operational performance: some empirical results. *International Journal of Operations & Production Management* 17(10): 1046-1058.

Wang, M., M. Rosenshine. 1983. Scheduling for a combination of made-to-stock and made-to-order jobs in a job shop. *International Journal of Production Research* 21(5): 607-616.

Wie, W. 2014. Performance measurement of manufacturing supply chain. Thesis submitted for the Degree of Master of Applied Science of Quality Systems Engineering at Concordia University, Montreal, Quebec, Canada, pp. 10-69.

Wong, W.P., K.Y. Wong. 2008. A review on benchmarking of supply chain performance measures. *Benchmarking: An International Journal* 15(1): 25-51.

Yang, C.-C. 2012. Assessing the moderating effect of innovation capability on the relationship between logistics service capability and firm performance for ocean freight forwarders. *International Journal of Logistics Research and Applications* 15(1): 53-69.

Yasin, M.M. 2002. The theory and practice of benchmarking: then and now. *Benchmarking: An International Journal* 9(3): 217-43.

Zairi, M. 1996. *Benchmarking for Best Practices*, Butterworth-Heinemann, Oxford.

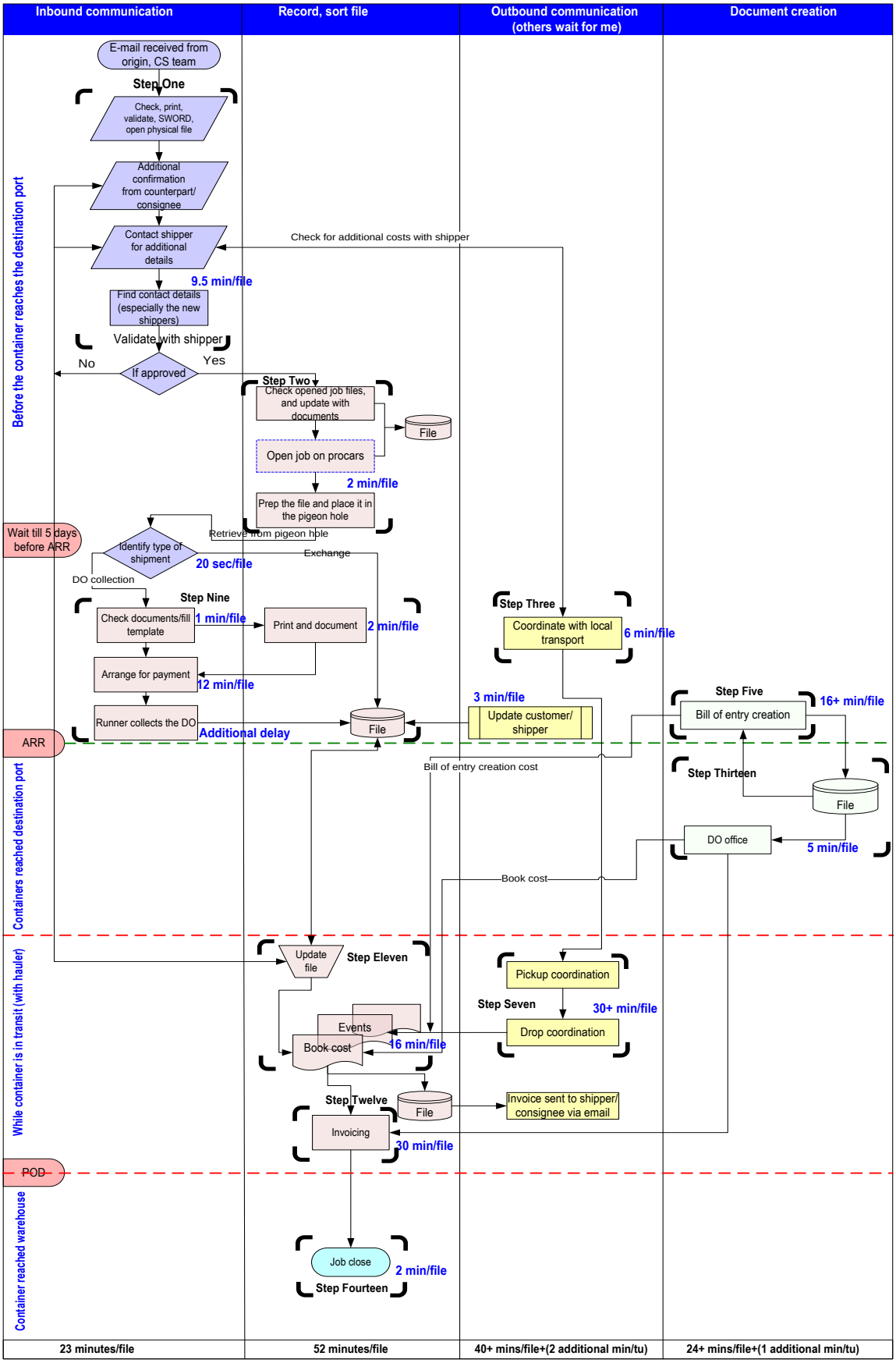

Fig. A1: Process mapping with cycle time and steps for the ocean freight imports department

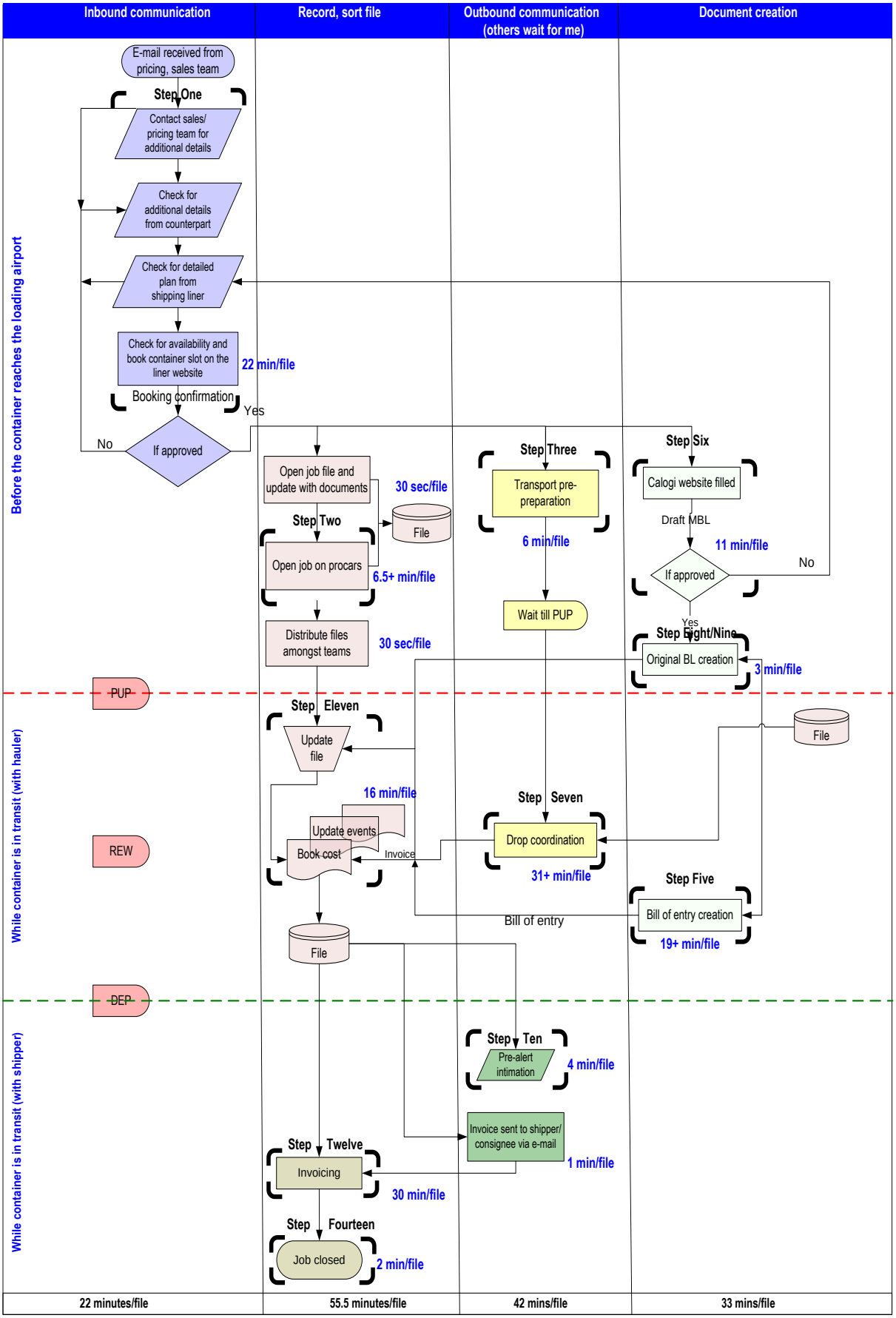

Fig. A2: Process mapping with cycle time and steps for the air freight exports department

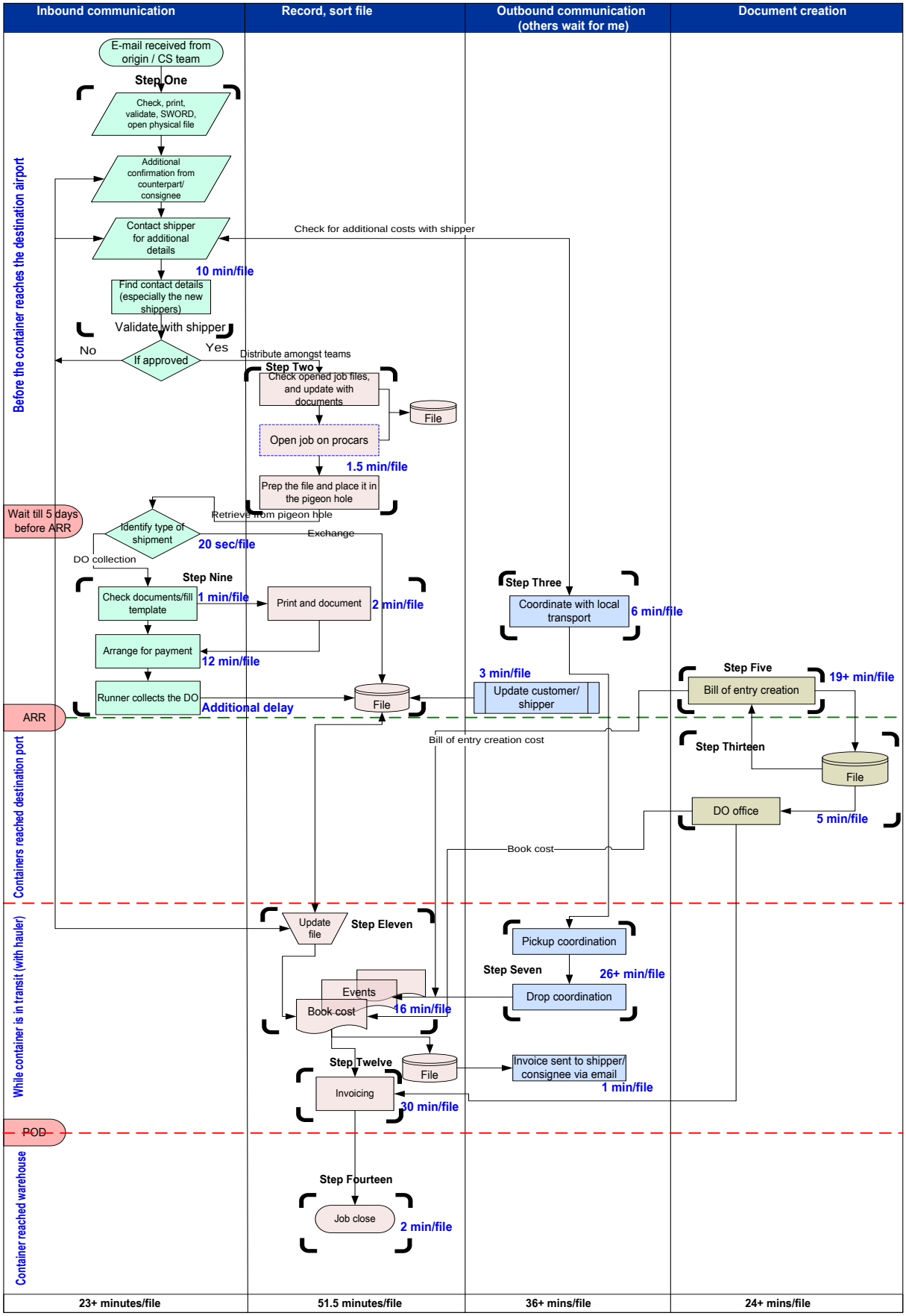

Fig. A3: Process mapping with cycle time and steps for the air freight imports department