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Empirical Evidence on Failure Factors of Warehouse Productivity in Malaysian Logistic Service Sector

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ABSTRACT

Warehousing is a crucial industry for trade-dependent nations like Malaysia. According to the World Bank Logistic Performance Index (LPI) 2016, Malaysia was ranked number 32 out of 160 countries in 2016, as against number 25 in 2014, despite a high level of warehouse activity during that year. The decrease in ranking was due to low warehouse productivity in Malaysia. Therefore, the objective of this paper is to consider ten parameters to assess the failure factors of warehouse productivity in the Malaysian logistics service sector, by applying a fuzzy analytic hierarchy process method. The findings highlighted the top three failure factors that influence the levels of warehouse productivity in the Malaysian logistics service sector as being 'labour productivity', 'warehouse utilisation' and 'inventory space utilisation'. This study contributes to the empowerment of warehouse productivity in the industry, in alignment with Malaysia's aspirational 2020 economic target. Consequently, this study provides new knowledge on warehouse productivity issues that will benefit decision makers in the warehouse industry. This research may enable decision makers to recognise problematic factors when planning their warehouse productivity improvement strategy, which may contribute to fulfilling government targets and empowering the national economy.

1. Introduction

Malaysia is a successful developing country, and is progressing towards becoming a developed nation in its own mould. Malaysia exhibits effective management for successful development and economic progress. To overcome certain weaknesses and shortcomings, Malaysia has initiated several development policies and plans for the maritime and logistic sectors, known as the Economic Transformation Programme (ETP) 2010-

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2020, the Eleventh Malaysia Plan (EMP) 2016-2020, the Logistics and Trade Facilitation Master Plan 2015-2020, and the Malaysian Shipping Master Plan (MSMP) 2017-2022. These policies and plans include an emphasis on transportation and storage activities, with guidelines, to help achieve the country's high economic aspirations.

According to the Malaysian Productivity Corporation (2015), productivity in the transportation and storage services grew by 10.1% to RM 50,683 per employee in 2014 from RM 46,051 per employee in the previous year. Despite its large employment base, the warehousing and support activities industry showed a particularly impressive improvement in labour cost competitiveness, with productivity growing by 10.7%, while labour cost per employee growing at 4.5%, and unit labour cost dropping by 5.4%. In fact, the warehousing and support activities industry recorded the highest growth level, an indication that the industry is expanding and modernising.

Consequently, the warehousing industry is becoming the key role player in the logistics service sector. However, in the Eleventh Malaysia Plan, 2016-2020, the country aspires to be the most preferred logistics gateway in Asia, and to be among the top ten in the World Bank's Logistic Performance Index (LPI) by the year 2020. However, the Malaysian Productivity Corporation (2017) has claimed that the warehouse industry is less inclined to adopt innovation and improvements that will increase efficiency and productivity than other industries. Thus, the problem investigated in this study is the lack of productivity performance in warehouse operations, which acts as an obstacle to achieving Malaysia's high development ambitions by the year 2020. The purpose of this study is to identify the failure factors affecting warehousing productivity performance. Through this study, the factors that contribute to the failure in warehouse productivity are identified, classified and analysed by using the Fuzzy AHP method.

2. Literature Review

A warehouse is more than just a place where inventory is stored. The aims of warehouse management are to increase productivity and accuracy, and reduce and control the cost of inventory and shipping while providing good customer service (Richards, 2011). Meanwhile, warehousing is primarily for receiving, storing, picking and shipping goods (Hatton, 1990 and Dawe, 1995) and requires labour, capital (land, storage, and handling equipment) and information systems, all of which are expensive (Bartholdi et al., 2011). This paper only investigates warehouse activities.

Traditionally, warehouse performance is measured using a host of single factor performance and productivity metrics, where the single factor productivity metric is a ratio of system output quantity to resource input quantity (McGinnis et al., 2002). In other words, productivity can be defined as the level of asset utilisation (Frazelle 2002), or, how well resources are combined and used to accomplish specific, desirable results (Neely et al. 1995). Based on the literature survey, Staudt et al. (2015) described ten warehouse productivity indicators ,which are: (i) Labour Productivity (De Marco and Giulio, 2011), (ii) Throughput (Mentzer and Konrad, 1991; Kiefer and Novack, 1999), (iii) Shipping Productivity (Mentzer and Konrad, 1991; Kiefer and Novack, 1999), (iv) Transport Utilisation (O' Neill, Scavarda, and Zhenhua, 2008; Matopoulos and Bourlakis, 2010), (v) Warehouse Utilisation (Rimiene, 2008; Johnson and McGinnis,2011), (vi) Inventory Space Utilisation (Ramaa, Subramanya, and Rangaswamy, 2012), (vii) Outbound Space Utilisation (Johnson, Chen, and McGinnis, 2010), (viii) Picking Productivity (Kiefer and Novack, 1999; Manikas and Terry, 2010), (ix) Receiving Productivity (Mentzer and Konrad,1991) and (x) Turnover (Johnson and Mc.Ginnis, 2011; Yang and Chen, 2012). These parameters are summarised in Table 1, in the form of definitions and challenges.

Table 1
Critical review of warehousing productivity performance indicators and its challenges

Indicator	Definitions	Challenges	Citations
Labour Productivity	Ratio of the total number of items managed to the amount of item-handling working hours	-Less job satisfaction, less communication level among employees and management and lack of training consistency	Muhammad Ehsan, Rizwan Kaiser and Yasin (2011)
Throughput	Items/hour leaving the warehouse	- Mistake in order picking process and bad inventory management	Anderjic, Bojovic and Kilibarda (2013)
Shipping Productivity	Total number of products shipped per time period	-The delayed performance of putway in cross-docking (Michael, 2015) - late completion of an operation can delay the departure of a vessel (Alan, 1998)	Michael (2015) and Alan (1998)
Transport Productivity	Vehicle fill rate	- 25 to 30% of vehicles are driving around empty due to sub-optimization of backhauls or because vehicles are ending up in the wrong place.	Matopoulos and Bourlakis (2010)
Warehouse Utilization	The average amount of warehouse capacity used over a specific amount of time	- A too small value of orders per hour - A too small value of items per hour	Liviu, Ana-Maria, and Emil (2009)
Inventory Space Utilization	Rate of space occupied by storage	- Only 59.83% of the surface allocated to the storing of goods	Liviu, Ana-Maria, and Emil (2009)
Outbound Space Utilization	Utilization of the area inside the warehouse used for retrieving, order picking, packing and shipping	- Excessive division of the space	Liviu, Ana-Maria, and Emil (2009)
Picking Productivity	Total number of products picked per labour hours in picking activity	- Shortage/excess or articles mix-up that cannot be detected in warehouse	Andrejic, Kilibarda, and Popovic (2015)
Receiving Productivity	Number of vehicles unloaded per labour hour	-Inefficiency of RF equipment	Amer and Jamie (2007)
Turnover	Ration between the cost of goods sold and the average inventory	- Lower inventory turnover will longer the expiry date and inventory holding costs	World Health (2014)

The transportation and storage sub-sector is the backbone of the Malaysian and global economy, facilitating international trade, enabling economic activities, and linking producers and consumers with markets, goods, materials and services. The continued development of the transportation and storage services sub-sector will be a key factor in the successful growth of Malaysia's various economic corridors. The classification of the transportation and storage services sub-sector comprises land transport, water transport, air transport, warehousing, and support activities. Warehousing is therefore a part of a sophisticated