

Determinants of Outsourcing Warehouse Operations in Sri Lankan Ceramic
Industry: A Case study

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ABSTRACT

The company selected for the case study King Ceramics is the dominant market leader in Sri Lankan tile industry with the expanding their business to 16 various countries worldwide. Having an efficient distribution network comprised of 60 showrooms and 11 warehouses are the attractive capabilities of King Ceramics. Currently, more than 50% of the total group revenue is generated by tiles and associate products. Warehouse operations are playing a pivotal role in the supply chain management process since they allow purchasers to obtain the most appropriate products at a reasonable price and at the place where the purchasers can accommodate easily. Existing conditions in King Ceramics, the purpose of this study is to cater the problem of “What are the factors influencing manufacturing companies to outsource warehousing facilities in Sri Lanka?”. Identifying the factors influencing the manufacturing companies to outsource warehousing facilities in Sri Lanka is designed as the primary objective of the research. Here, data collection is primarily based on a questionnaire.

Based on the analysis conducted referring to the gathered responses, cost associated with in-house warehousing operations, customer satisfaction and capability to focus on company core-competencies variables are identified as factors with a positive relationship with effective outsourcing of warehouse operations in Sri Lanka. However, the risk associated with outsourcing of warehouse operations has a negative relationship with the effective outsourcing of warehouse operations in Sri Lanka. Impact on customer satisfaction has the highest impact compared to the other three independent variables. The cost associated with in-house warehouse operations shown the second priority and the company’s capability of focusing on its core competencies is the third prioritized factor towards the effective implementation of outsourcing of warehouse operations. According to the research findings, risk related to in-house warehouse operations on the effective implementation of outsourced warehouse operations has shown the lowest level of impact. Therefore, as a manufacturing company, King Ceramics should focus on improving and streamlining its processes to develop a seamless flow in-between outsourced operations and in-house operations to deliver maximum satisfaction to customers and to have the maximum cost saving.

Keywords: Supply Chain Management, Outsourced warehouse

1. INTRODUCTION

1.1 Background of the Study

King Ceramic is the leader in Sri Lankan tile industry with the expansion to 16 countries worldwide. As a rapidly improving organization, King Ceramics is expanding its product portfolio into diverse strategic businesses. The rising organization has its base in tiles and related products, sanitary and bath-ware, aluminum packaging, plantations, financial services, etc.

The Vision of the group is “Grow in sectors where we see opportunities for sustained profitability and growth and our investment portfolio reflects this”. Through effective strategic acquisitions, Company has expanded its value over the years.

King Ceramics Export its products to. Several countries such as Japan, Singapore, New Zealand, Taiwan, Pakistan, Nepal, Oman, India, Australia, Canada, USA, Sweden, England, Netherlands, Maldives, and Seychelles.

The Financial highlights of the Company can be highlighted as below. The employee retention rate of the company is about 85% and investment in training is 15 million rupees. Profit per employee is around 500,000 rupees per annum. As a company, King Ceramics has earned several quality accreditations and operational excellence awards for overall performance. Under King Ceramics, there are two major tile brands. King Ceramics maintains a tile brand King Ceramic Tiles and associated Products.

King ceramic is incorporated in the year 1990 as tile manufacturing and sale as the core business of the organization. Innovation and excellent design are the differentiation points of King Ceramics tiles. Under the brand name of “King Ceramics”, Company originally creates plain and speckled tiles with either light transparent or matt finishing. Having an efficient distribution network comprised of 60 showrooms and 11 warehouses is one of the attractive capabilities of King Ceramics. Currently, more than 50% of the total group revenue is generated by tiles and associate products.

1.2 Research Problem

Outsourcing has become a global trend that has ensured efficiency and sustainability of the supply chain functions including warehousing. However, it is unclear that local companies have outsourced their warehouses with a proper study and evaluation or simply in pursuit of global trends without an underlying rationale. The drivers which contribute to determining the outsourcing potential of warehouse functions are not exclusively available. The extent to which each determinant affects warehousing functions is vague. This capacity may also vary with the competitive strategy of the company. Hence, it becomes a challenge for the companies to take strategic decisions logically to determine the requirement to outsource warehousing.

‘King Ceramics’ has three main production infrastructures as two for tile manufacturing and one for bath-ware while kitchen and accessories import. While observing King Ceramics tiles sales volumes, it shows a clear seasonal trend.

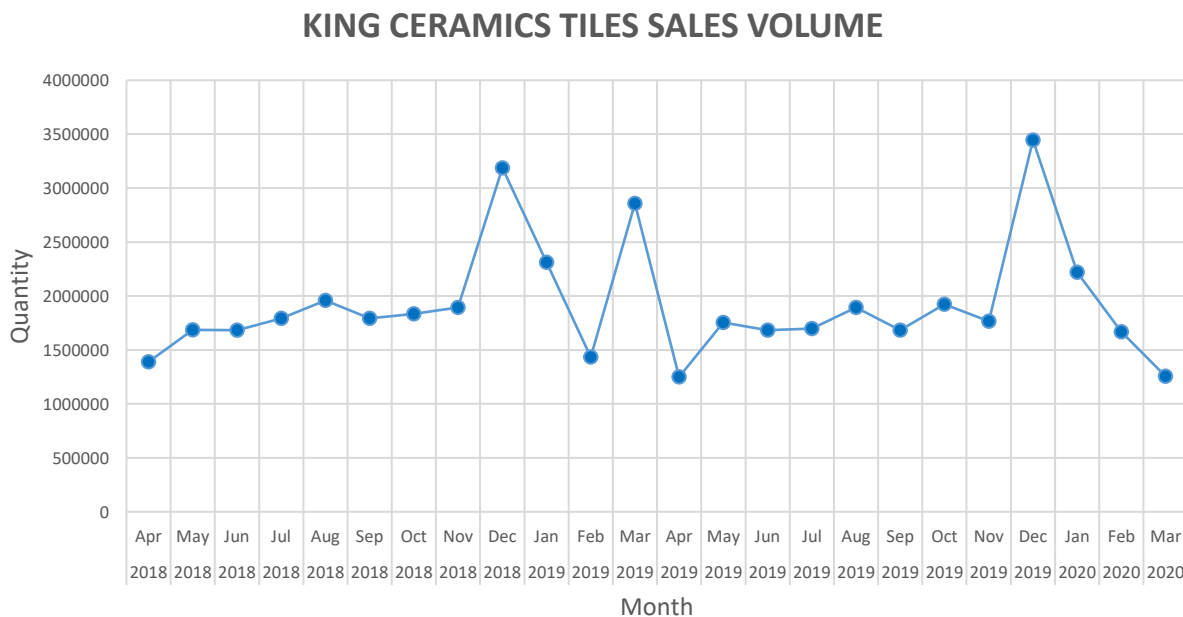


Figure 1-1: King Ceramic Tiles Sales Volume

Hence the production capacity remains the same, based on the month, the warehouse capacity requirement is dynamic. Besides, it shows an upward trend. Hence along the timeline, it is required to cater extra capacity than the current situation. Considering the above factors, the company must focus on warehousing solutions as they move forward.

1.3 Research Gap

The main research gap identified is the absence of previous studies in determining the criteria and extent to which each criterion affects the outsourcing decision of a certain supply chain function. Moreover, the research question is the “What are the factors influencing manufacturing companies to outsource warehousing facilities in Sri Lanka?” Further, the research is expected to conduct with managerial and non-managerial members representing King Ceramics Sri Lanka referring to tile products.

1.4 Significance of the Study

The research is expected to carry out to fulfill master’s in business administration in Supply Chain Management. Through this research, it is expected to submit a report to King Ceramics Sri Lanka based on findings regarding factors influencing manufacturing companies to outsource warehousing facilities in Sri Lanka. Through this research, King Ceramics Sri Lanka will be able to capture the factors and their contribution rates on the outsourcing warehouse operations. Besides, the company can enhance positive factors and decreasing negative factors for their management purposes.

Furthermore, this will directly impact the Logistics sector in Sri Lanka and it will highly be benefited to the Sri Lankan economic growth and GDP growth at the industry level.

1.5 Research Objectives

The main objective of the study is;

- Identifying the factors influencing the manufacturing companies to outsource warehousing facilities in Sri Lanka

In addition to the main objective following secondary objectives are established;

- Identifying determinants influencing manufacturing companies to outsource warehousing facilities in Sri Lanka
- Prioritizing influencing determinants of manufacturing companies to outsource warehousing facilities in Sri Lanka
- Identifying the impact level of contributing determinants of manufacturing companies to outsource warehousing facilities in Sri Lanka

1.6 Limitation of the Research

This study is limited to the area of outsourcing warehousing operations. Defining the study area as tile manufacturing and storing itself is a limitation of the study. There are several other supply chain operations available, such as transportation, procurement, demand planning, etc. By considering Sri Lanka as the area is a geographical limitation of the study.

1.7 Chapter Summary

Chapter one describes the background of the study including the introduction of the case study and the company selected etc. Moreover, the scope of the study, objectives and significance of the study is further described in this chapter

2. LITERATURE REVIEW

The literature review chapter is organized in such a way that it provides a comprehensive overview, beginning with an explanation of the concepts of in-house warehousing and outsourcing. Because the study's goal is to better understand the elements that influence outsourcing 'King Ceramics' warehouse to a third-party logistics provider, it's crucial to first grasp the theoretical perspective on outsourcing decisions. Typical primary explanations can be discovered by collecting and analyzing such literature. This can be utilized later to see whether there are any other reasons to choose a 3PL provider other cost savings, and to apply those reasons to this study. Theoretical frameworks are the next step in the research process, and they contain literature that explains the warehouse's role and various operations within it, all of which are linked to areas that could be improved in the future. This provides clear signs of what elements should be considered and how actions should be developed, which is useful for examining improvement areas related to the second part of the study. This may provide some insight into how the many influences and activities are linked, as well as a better understanding of how changes in one component of the system affect the other warehouses may be impacted by another. The last section of the literature review talks about different warehousing expenses and how they are organized and interconnected, and this segment of the structure is connected to the primary part of the review, which expects to analyze the expenses of two particular situations.

2.1 Warehousing Operations in Supply Chain Management

Supply chain management has been an extremely fundamental worry for all associations as they make progress toward better quality and higher consumer loyalty (Chopra & Meindle, 2001). The overall performance of the supply chain performance depends on the effectiveness of the supply chain process. Manufacturing companies are defining as any business that converts raw materials into finished or semi-finished products using machines, tools, and labor (Briens & Williams, 2004). Manufacturing is an essential sector in any of the countries in the world, whilst it makes a significant amount contribution to the economic development.

Warehouse operations are playing a pivotal role in the supply chain management process since they allow purchasers to obtain the most appropriate products at a reasonable price and at the place

where the purchasers can accommodate easily (Faber et al., 2013). Due to amplified prominence on minimizing lead time, continuous variations in client demand and broader product varieties, the standing of the gravity on warehouse processes has amplified, since the capability to stock multiple pupillages and to pick and gather a wide range of customer orders (Rouwenhorst et al., 2000; Baker and Canessa, 2009; Hubner et al., 2016). Subsequently, warehouse operations are seemed a liability due to the amount of investment and operation expenditures required (Bartholdi and Hackman, 2010). Based on the study conducted by De Koster et al. (2007) and Baker and Canessa (2009), warehouse functions correspond to the quarter of total logistics cost in the supply chain. Therefore, companies continuously try to reduce costs and increase proficiency in warehouse functions, by reducing portfolio and enhancing stock turnover (De Koster et al., 2007).

Since multiple warehouses are utilized as the last assembly point in the supply chain, Faber (2013) proved that the warehouse may be used efficiently in different scenarios based on the product type. The researchers went on to say that the goal was to improve the efficiency of warehouse operations while lowering the associated costs.

2.2 Outsourcing of Warehouse Operations

Petersen (1999) announced the significance of utilizing the ideal procedure for the stockroom, advancing exercises that are associated with course arranging, stockpiling, transportation, bundling, and so forth. The issue that can be happened is the absence of limit because of the interest changes and furthermore as per Al-Gwaiz (2016), it might prompt a requirement for limit ventures to address. There are different answers for these sorts of difficulties; to address those organizations need to set up an elective that is coordinated to their setting to accomplish the ideal level.

As per Azzi (2010), an expansion in the intricacy in production network the board prompted numerous providers/makers re-appropriating segments of the dissemination to specialists inside the space, for example, outsider coordinations suppliers. The scientists further express that there is an expanding wonder because of zeroing in on cost factors and request vulnerability, where different organizations have recognized that the significance of further developing the coordinations execution successfully, which frequently prompts the quandary of in-house or re-appropriating. Anderson (1998), investigated that a portion of the significant advantages of re-appropriating are reducing expenses and empowering the purchasing organization to zero in on

center skills. Van Weele (2014), clarified that few advantages are associated with reevaluating while at the same time calling attention to that there can be some danger happened because of that. The specialists further clarified that reliance of the sort of arrangement was utilized and the degree of exercises that are re-appropriated. A portion of the dangers referenced are generally identified with the absence of impact, helpless correspondence, high reliance and helpless coordination, affecting the all-out viable exhibition. This cycle requires both target evaluations of inside execution and limit, which is trailed by a quest for solid accomplices that can convey responsive and valuable administrations.

It was perceived that the market is straightforwardly influenced by cost, whilst Amiri (2006), gave that adequate proof with regards to the prompts tradeoffs among expenses and execution. Providers with stockrooms need to see how to take into account the issue of limit extensions while keeping the presentation at a steady level (Al-Gwaiz-2016). These two consolidated add to a reasonable requirement for cost assessments between various alternatives accessible. This is additionally settled by Longo (2011), who pronounced that the significance for the administration to consider questions with respect to stockroom size and limit, format, inward and outside transportation, material taking care of schedules, execution, stockpiling techniques and functional procedures performed by workers. Thusly, the greatest possible level of significance is to consider different choices in regards to the expense, likely advantages and dangers to have the option to choose the right kind of methodology and design for a specific organization.

At the point when organizations consider the choice of playing out specific exercises in-house contrasted with re-appropriating the activities to other outer organizations, it is typically the expense as a deciding variable in the dynamic interaction (Bigelow and Argyres-2008). These choose-or-buy choices place a premium on the safety and security of keeping it in-house, while preserving control within the organization. The outer organizations that are working inside a specific subject matter would probably play out every movement in a lot less expensive, albeit a deficiency of control may have followed (Vallespir and Kleinhans-2001). Since the movement is the outside organization's center skill, benefits from economies of scale and spotlight on further developing that separated cycle can be accomplished. further, it is fundamental to consider all subtleties when settling on choices on with a settle on or-purchase choice. Ecological effect, social obligations, loss of control and zeroing in on center ability are largely deciding components that are weighed against the expense (Andersson-1998; Gimenez-2012).

In the Sri Lankan setting, there are a few specialist co-ops like DHL, Advantis 3PL additionally, Abans. The vast majority of the worldwide organizations, for example, Unilever, Hayleys Consumer, P&G and GSK have obtained warehousing elements of their production network proposing to improve their expense and guaranteeing maintainability in the channels. The rethinking cycles of the Sri Lankan business area have extended from basic administrations like cleaning, security administrations to complex administrations, for example, IT, Logistics measures, and so forth

As indicated by Mason (2003), generally, practically all inventories are put away at makers' distribution centers for comfort and transportation cost decrease. Nonetheless, as of late there has been a major pattern that makers center around their center exercises by reevaluating a portion of the warehousing capacities to outsiders. Extra benefits expected for distribution center rethinking are cost decrease in material stockpiling and dealing with and upgraded consumer loyalty. Accordingly, a sensible tradeoff between the two warehousing choices possessed warehousing and distribution center reevaluating should be made.

Rethinking is clarified by Van Weele (2014) as the change from driving certain activities inside the organization to employing a 3PL supplier to deal with them all things being equal. The creator further notices that there are 4 unique elements of re-appropriating, specifically:

- The exercises have been led inside the organization yet are presently either halfway or altogether took care of by an outer provider
- Some resources, individuals and information are moved to the outside organization
- An association is set up over the long run between the two gatherings
- The purchasing organization would be presented to new expenses and dangers, associated with the association

2.3 Types of Service Providers in the Context

Services can be provided to the clients apart from the external or third party companies, whereas the logistics services are mostly focused by several companies.

- **Third-Party Logistics Providers:** These suppliers represent considerable authority in the coordination's capacities depicted previously. Generally called 3PLs, these kinds of organizations are well known in the private area as arrangement suppliers to firms keen on re-appropriating a few or all parts of their production network the board capacities. They put resources into actual foundation just as data benefits that make up their contributions more complex and particular than what can be given by different associations in-house.
- **Non-Asset-Based 3PLs:** Providers offer coordination's arrangements without having the responsibility for assets, in particular stockrooms and trucks. They will in general work comparably to cargo forwarders by haggling and contracting warehousing and transportation while offering data administrations identified with item taking care of.
- **Fourth Party Logistics Providers (4PLs):** These lead coordination's accomplices go about as store network integrator that gathers and deals with the assets, abilities, and innovation of its association with those of corresponding specialist co-ops to convey an extensive store network arrangement. These accomplices work as the essential director of other 3PL accomplices for a customer. They give a solitary interface to the customer and are the essential inventory network the executive's supplier, regardless of whether numerous gatherings perform explicit viewpoints.

The marvel has expanded quickly during the decade with associations rethinking various exercises and administrations to work on the complete exhibition of the association. Reevaluating has moved from just re-appropriating single exercises to re-appropriating whole organization capacities. Ordinarily, organizations decide to rethink exercises associated with data innovation, showcasing, buying, creation, coordinations, and so on (Extend 2007; Lisle-2003; Van Weele-2014).

Coordinations re-appropriating has been portrayed by Deepen (2007) as the use of a 3PL supplier for all or portions of a specific organization's coordinations activity. Ziolkiewicz (2011) depicts that numerous associations are implemented to adjust to unstable conditions and should have the option to rapidly adjust to remain serious. Then again Deepen (2007) contends that numerous

associations don't consider coordinations to be a center capability and are consequently able to re-appropriate such exercises to a 3PL organization. The provider could further develop their present coordinations design and execution while the organization can zero in on different regions all things being equal. The creator further says that consider encompassing elements, prior to making any decisions in regards to what exercises to reevaluate and what organization is generally reasonable to accomplice up with.

Marasco (2008) says that a theme frequently identified with rethinking is 3PL which can be seen in various manners relying upon the degree of utilization. Further, this implies that the 3PL capacity can contrast from just administration of straightforward undertakings to dealing with complex coordinations arrangements. Develop (2007) contends that 3PL suppliers these days can give explicitly tweaked answers for the clients particularly in the coordinations of the organization. The most specific and detailed information shared by 3PL providers is used to provide clients with new freedoms that would be difficult to achieve on their own. Transportation, stock, and warehousing are the activities that 3PL suppliers are mainly concerned with, according to Hertz and Alfredsson (2003).

Then again, according to Harrington (1998), there is consistently a danger of not accomplishing objectives set up between the two gatherings. The responses to a disappointment can fluctuate where a few organizations decide to bring back the exercises while others decide to chip away at the blemishes. Organizations might have various assumptions and hazard appraisals set up, which lead to various advantages and dangers relying upon every particular case. There are still some regularly referenced reasons and issues behind rethinking that will be additionally examined.

Solakivi (2013) but contends that reevaluating coordinations might prompt decreased advancement for the purchasing organization. Since there is less strain to further develop the inward coordinations cycles of the association the limit enhancements might decrease. The creators further contend that re-appropriating may hurt different regions too, prompting a general negative pattern for execution upgrades.

2.4 The Reasons to Outsourcing Warehouse Operations

Rising client requests and expanded creation volumes and diminishing client interest while remaining creation limit in the equivalent might prompt an absence of limit with regards to warehousing. According to Chopra and Meindl (2012), the key justification for 3PL suppliers' success is their economies of scale advantage. For instance, bigger measures of stock can be taken care of by 3PL without having clog in the distribution center.

Extend (2007) clarifies that the changing requests experienced in warehousing exercises might be the significant justification for reevaluating. Chopra and Meindl (2012) contends that it is hard to appraise workers needed in warehousing because of the highs and lows that are associated with both occasional requests and explicit exercises like for example merchandise receipts.

Many organizations choose to re-purpose activities to a 3PL provider since it allows them to focus on their core competency (Andersson-1998; Chopra and Meindl-2012; Heikkilä and Cordon-2002; Lisle-2003; Van Weele-2014; Ziolkiewicz-2011). Upgrades can be made inside these areas while the 3PL manages the non-center activities by concentrating assets on the organization's primary value-adding activities. The exercises are regularly moved to master 3PL suppliers of the business and are in this way dealt with more proficiently than taking care of the actual organization. Ziolkiewicz (2011) upholds this contention yet examines hazard sharing and expanded information, limit, and assets as fundamental drivers too. One more constructive outcome of reevaluating can be recognized as the likelihood to procure more with regards to various cycles and have nearer admittance to new business sectors through the 3PL (Heikkilä and Cordon-2002; Van Weele-2014). The provider might have associations with new potential clients in different business sectors as opposed to the assembling association, which might be utilized as the initial step to development.

As Barney (1991) recommends asset based view clarifies the exceptional assets firm possesses like capital resources, capacities and cycles which empower the firm to acquire an upper hand. Accordingly it becomes essential to survey these novel factors firm has to discrete the rethinking choice (Holcomb and Hitt, 2007).

Information or abilities of the workers, specialized frameworks, administrative frameworks, standards and qualities are the critical wellsprings of information for a firm according to the information based view (Leonard Barton, 1992a). Accordingly before the appraisal of the

practicality of reevaluating a particular capacity of the inventory network, it is needed to assess the danger and the potential related with reaching the inward information base to an outside outsider.

To begin the reevaluating choice, it is needed to diagram the drivers that influence the store network re-appropriating. In light of the in advance of cited three speculations Kroes and Ghosh (2010) define nineteen unmistakable drivers to assess rethinking.

These nineteen drivers are ordered into five areas specifically, cost-related re-appropriating drivers, adaptability related rethinking drivers, Innovativeness related reevaluating drivers, quality-related re-appropriating drivers, time-related re-appropriating drivers.

Rao and Young (2006) in their review diagrams five critical factors as associating drivers for the rethinking choice to be specific, the centrality of the coordinations capacities to center capability; hazard risk and control; working expense/administration tradeoffs; data and correspondences frameworks; market connections.

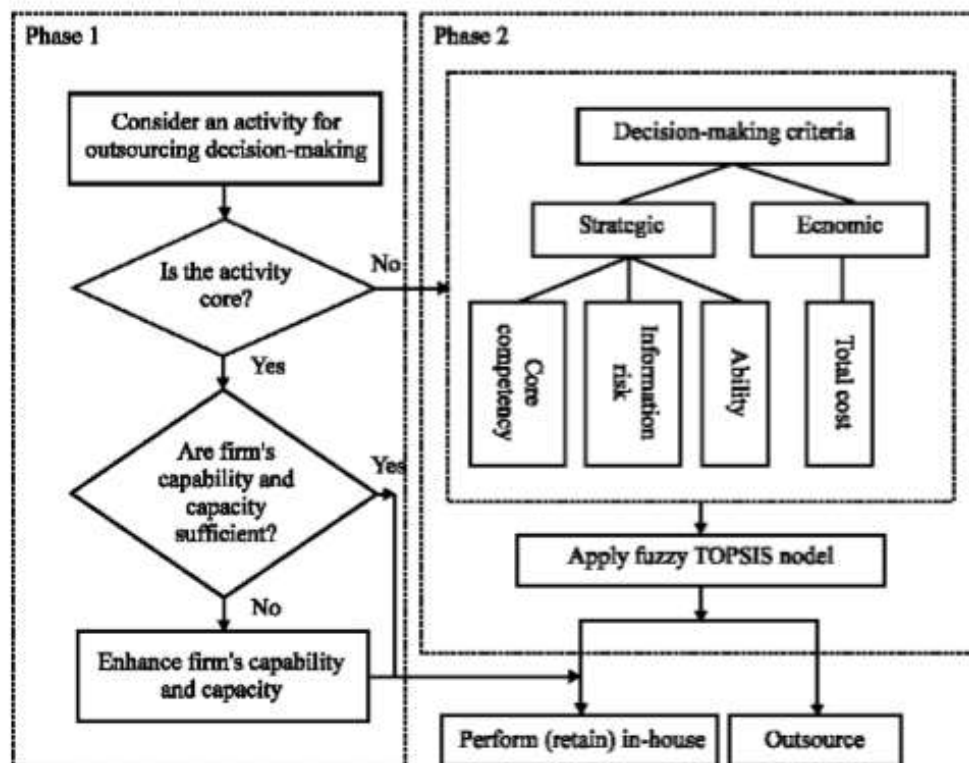


Figure 2-1: Outsourcing Decision Model - Cheshmberah M. (2010)

The model has proposed two decision-making criteria as Strategic and Economic. Core competency, information risk ability is the strategic decision criteria and the total cost is the economic decision criteria.

Based on the assessments by Yushan Xu, the transaction cost perspective can be used as a decision model in outsourcing warehousing functions. Dimensions in asset specificity and sunk costs are used as decision criteria in making the sourcing decision. Another decision model that can be used for outsourcing is the core competency perspective.

2.5 Chapter Summary

This chapter identified the relevant functions, types of services and methods needed in outsourcing warehouse operations while mentioning reasons to outsource is clearly described. Four different features were identified in the outsourcing process by paying attention to the suppliers, knowledge sharing, identification of new trends such as cost and risk. Moreover, several services were incorporated such as third-party logistics providers, non-asset-based 3PLs, 4PLs. Further, there were several reasons were identified through literature namely demand fluctuation, production increment, etc.

Although different research points to a different set of decision criteria for making the sourcing decision, some criteria may be termed as the subset of others. Through a more detailed analysis, it is possible to select the set of available decision criteria and formulate an ideal set of criteria that are not mutually exclusive.

Based on the referred works of literature, capability to focus on core competencies of the company, associated costs with in-house warehousing, customer satisfaction related to outsourced warehouses and risk associated with outsourcing warehouse operations are selected for further evaluation to study effective outsourcing of warehouse operations.

3. RESEARCH METHODOLOGY

The procedure deployed to gather data and info for constructing business judgments. The methodology consists of published research, interviews, surveys, additional research techniques, and may include both present and historical information.

3.1 Conceptual Framework

Here, it is identified the research variables and clarified the relationships among the variables are dispensed by the conceptual framework. These are the identified independent and dependent variables of the research.

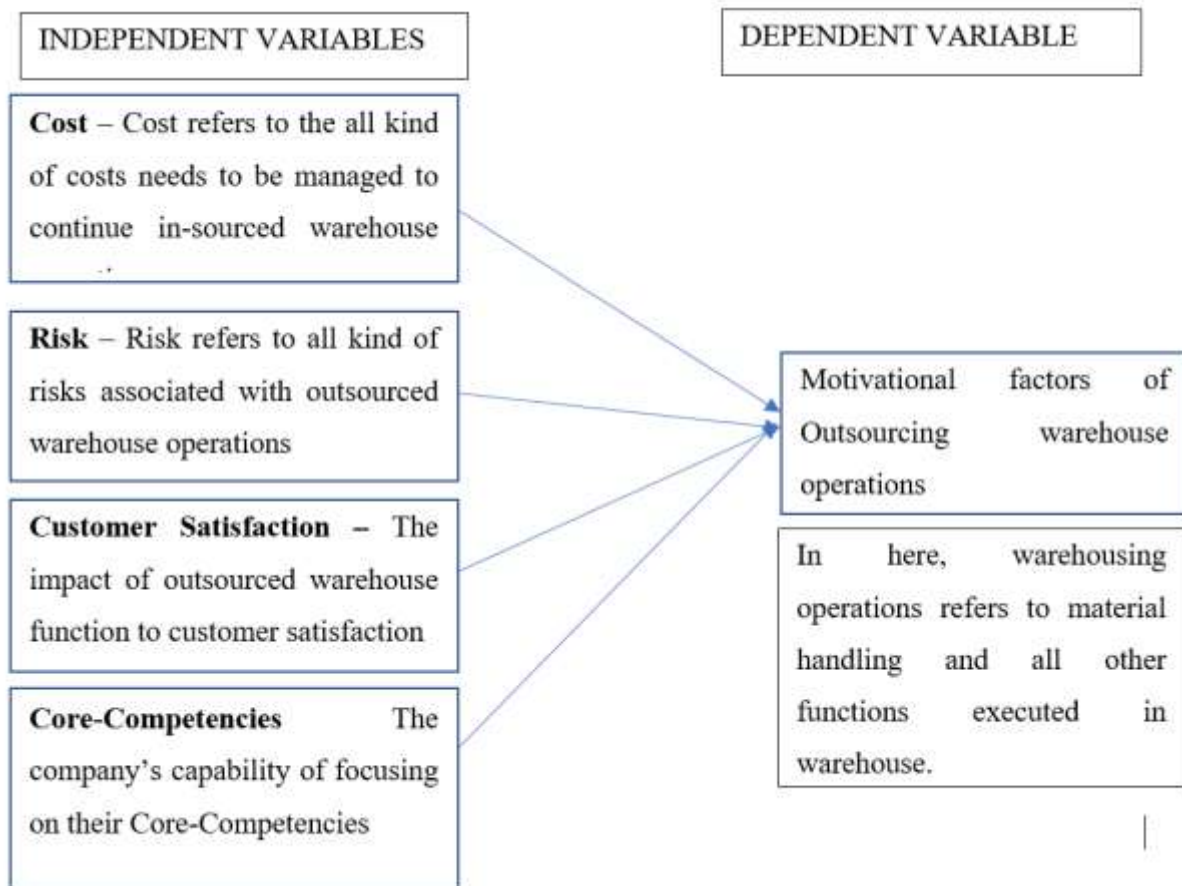


Figure 3-1: Conceptual Framework of the Study

3.2 Test Criteria – Hypothesis Analysis

It is established hypothesis analysis before conduct the analysis. Here, the null hypothesis (H_0) is established in a way there is no impact on outsourcing decision of warehouse operation by the independent variable. The alternative hypothesis (H_1) is defined as there is a positive relationship vice versa. The hypothesis establishes criteria for the cost is defined as follows;

- $H_{0(COST)}$: Cost of in-house warehouse operations has no Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{a(COST)}$: The cost of in-house warehouse operations has a Positive Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{0(RISK)}$:Risk associated with outsourced warehouse operations has no Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{a(RISK)}$: Risk associated with outsourced warehouse operations has negative Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{0(Customer\ Satisfaction)}$:Customer Satisfaction associated with outsourced warehouse operations has no Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{a(Customer\ Satisfaction)}$: Customer Satisfaction associated with outsourced warehouse operations has a positive Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{0(Core\ Competencies)}$:Capability to focus on core-competencies has no Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company
- $H_{a(Core\ Competencies)}$: Capability to focus on core-competencies has a positive Impact on the outsourcing decision of warehouse operations in a Sri Lankan manufacturing company

By repeating the same process, the impact of risk associated, customer satisfaction and the capability to focus on core competencies on the outsourcing decision of warehouse operations were established.

3.3 Operationalization

The operationalization is defined in such a way that measurement is done by the Likert scale by using different measures for different indicators. Table 3-1 is shown that the definition of each attribute descriptively.

Table 3-1: Operationalization of the Study

Independent Variable	Indicators	Measures	Question No
Cost (in-house warehousing)	Employee Cost	Employee requirement of In-House warehouse	2.1.1
	Material Handling cost	Capability to minimize material handling	2.1.2
	Facility Costs	Utility bill costs	2.1.3
	Opportunity Cost	The cost associated with outsourcing warehousing facility	2.1.4
Risk (outsourced warehousing)	Information risk	sensitive info sharing risk	2.2.1
	Skills risk	Unavailability of skilled labor	2.2.2
	supply risk	On-time finished goods delivery risk	2.2.3
	Knowledge sharing risk	Unique product and process info sharing risk	2.2.4
Customer Satisfaction	On-time deliveries	On-time deliveries based on customer demand	2.3.1
	Order cancellations	Order cancellations after acceptance	2.3.2
	Recommendation	Customer recommendations on service excellence	2.3.3
	Product portfolio	Wide range of product availability	2.3.4

Core Competencies	Time management	Per product time consumption from raw material to finished status	2.4.1
	Resource Utilization	Minimization of per product wastage cost	2.4.2
	Innovations	Capacity for innovations	2.4.3
	Production enhancement	Capacity expansion capability	2.4.4
Effectiveness of Outsourcing Warehouse Operations	Operational Excellence	Minimization of operational issues	2.5.1
	Service quality	Continuous and smooth services via outlets	2.5.2
	Availability	Right product at Right time at Right quantity etc.	2.5.3
	Managerial Satisfaction	Overall satisfaction on supply chain operations	2.5.4

3.4 Research Approach

The research was carried out as a quantitative analysis while the final objective of the research is to identify and prioritize factors motivating for the outsourcing decision of warehouse operations concerning manufacturing companies in Sri Lanka.

The research approach is deductive research approach and the related industry research is studied and hypotheses and observations are determined based on them. Then tests for the correctness of such observations or hypotheses. Moreover, through works of literature, the requirement of identifying factors motivating outsourcing of warehouse operations in Sri Lanka is identified.

Finding and assessing measures of the variables stated in the research challenge can be done using a variety of methodologies and approaches. The research design can be categorized in different ways. Among the above categories, this research has proceeded as a casual design. It is because the casual research design is defined the relationship between the dependent variable and

independent variables and it is the most famous primary data collection method in studies. The primary goal of this research is to identify the factors influencing manufacturing companies to outsource warehousing facilities in Sri Lanka.

Variables are defined as quantifiable representative features which may transform from person to person or even within one person over time. The variables can be divided into two categories as independent and dependent variables.

Dependent Variables

The dependent variable of the research is the Effectiveness of Outsourcing Warehouse Operations for tile manufacturing companies in Sri Lanka. The indicators of this dependent variable are Operational Excellence, Service quality, Availability and Managerial Satisfaction.

Independent Variables

These variables are stable and unaffected by the other variables which are trying to measure and direct effect on the dependent variable. In this study, cost, risk, core competencies and customer satisfaction were used as the independent variables.

3.5 Identification of the Statistics in the Analysis

Population

The population of the research is manufacturing companies in Sri Lanka who use warehousing facilities or are expecting to have warehousing facilities. Here, irrespective of the way of capturing product type, all manufacturing companies are considered as the population.

Sample

A sample is a descriptive subsection of the population in the structure of research. It is impractical to study the whole population in the study area. Here, no specific geographical area is selected for the analysis. But the research is expected to carry out with King Ceramics tile and associated product manufacturing companies. Hence, staff related to the supply chain and other operations are considered. Two tile manufacturing factories and managerial staff are considered.

As the sample is too small or too large, it can lead to inaccuracies. For this research, the convenience sampling method is expected to use. The main reason is that the population is larger

than the sample size. Therefore, a sample of 100 individuals was randomly selected out of King Ceramics staff who are directly or indirectly related to tile manufacturing.

3.6 Questionnaire Data Collection

It works by recognizing the format of the survey mechanism and the question planning process used to collect primary data from staff. This questionnaire is distributed through Internet-based surveys and direct interviews. It has three parts and is presented in Annex-1.

Section 1 – Screening

In this section, it is checked whether the respondents fall into the expected respondent category.

Section 2 – Determinant Identification & Measurement

It is included the 4 factors that effecting to outsourcing warehouse operations in manufacturing companies in Sri Lanka and would be identified the sensible reaction of the staff using the Likert Scale type of questions.

Section 3 – Demographic data collection

In this section, it has been identified the emotional level details of respondents using Nominal Scale Method questions

3.7 Analysis Criteria

Data gather round from the Questionnaires will be studied in few steps by considering the purpose of this research to be contented effectively. SPSS 25.0 (Statistical Packages for Social Sciences) is used for the analysis of the facts which are selected. The method is used to characterize the essential elements of the data in a study and to provide brief summaries about the sample and the measures.

The hypothesis test determines if the three summarized elements are independent or dependent on the fourth. Dependent factors are those that have a significant value less than 0.05. If the significance value is less than 0.05, the Null hypothesis is rejected, implying that factors are not independent of the i^{th} factor, and the alternative hypothesis is accepted, implying that factors are dependent on the i^{th} factor. Validity refers to how well the implement the theoretical reliability of

the mechanism while the reliability addresses the comprehensive consistency of a research study's measure. Cronbach's Alpha is a statistical reliability test that uses numerous Likert Scale questionnaires to assess the statistical reliability of source data.

$$\alpha = \frac{N \cdot \bar{C}}{\bar{V} + [(N - 1) \cdot \bar{C}]}$$

N= Number of Items

C= The Average Inter-Item Covariance among the Items

V= The Average Variance. These are the rules for value of the Cronbach's alpha.

Table 3-2: Value of the Cronbach's Alpha

Cronbach's Alpha	Internal Consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Source: Retrieved from (Goforth, 2015)

It processes the proportion to which a mathematical model accounts for the variation of a given data set.

Reliability Analysis for Summarized Factors

Reliability analysis is determined by finding the amount of methodical difference in a scale, which can be completed by defining the relationship between the scores gained from different directions of the measure.

Descriptive Statistics for Summarized Factors

It is determined the short descriptive statistics that describe a particular data set, which can be either an image of the define and recognize the structures of an exact data set by providing short summaries about the sample and data measures.

Analyzing the Correlation of Summarized Factors

Correlation analysis is a statistical technique for determining the strength of a link between two dependent and independent variables.

Developing a Linear Regression Function for Summarized Factors

It is used to forecast the value of a dependent variable based on one or more independent variables. The objective is to accomplish a linear relationship in a mathematical method.

Developing Hypothesis for Summarized Factors

It is straight associated with a theory that comprises operationally defined variables whether in the testable procedure. Hypotheses let to define if the theory is truthful. There are two hypotheses which are the null hypothesis H_0 that assume the theory is not accurate and the alternative hypothesis H_1 that assume the theory is accurate.

3.8 Chapter Summary

The third chapter included the research design and sample design. Then, it prescribed the identification of variables to predict the effectiveness of outsourcing of warehouse operation. Moreover, the conceptual framework of the variables and design questionnaire is discussed in this chapter and also the data collection method and statistical approach of data analysis parts are described.

Moreover, it is identified the research variables and clarified the relationships among the variables which are dispensed by the conceptual framework. This study is expected to carry out in form of quantitative analysis. Also, the dependent variable of the research was selected as the effectiveness of outsourcing warehouse operations while independent variables are selected as cost, risk, core-competencies and customer satisfaction. Further, the analysis methods are described in this chapter

by indicating the type of test and the accepted parameter limit in the perspective of statistical performance level.

4. RESEARCH ANALYSIS

This chapter presents and discusses the results of the questionnaires of the respondents. This research study focuses on identifying the factors affecting to Outsourcing of Warehouse Operations in the Sri Lankan Manu Ceramic Industry based on King Ceramic Lanka PLC. The research objectives served as a framework for data collection.

4.1 Demographic Profile of the Respondents

Gender, income level and Occupation Level are summarized based on 100 respondents as below. According to Figure 4.1 data indicates that the majority of the respondents are males (81) and represent 80% of the total responses while there are 18 females, representing 20% of the sample.

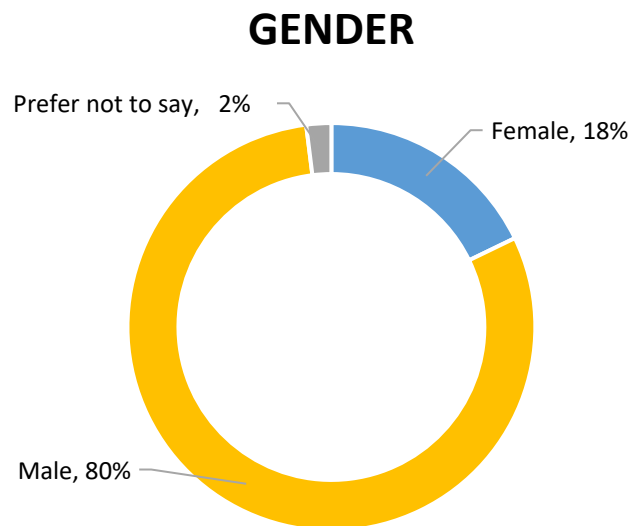


Figure 4-1: Gender Distribution

Moreover, the results indicated that the majority of the respondents fall into the LKR 50,000-100,000 /- income category which implies 44 responses and 43.6% of the total responses. Above LKR 10,000 /- income category is the second highest which is having 34 responses and represents 33.7% in the sample. out of a total of 101 respondents, 14 of them were not willing to inform their salary level and the percentage is 13.9%. In terms of income level, the selected sample follows a normal distribution with the mean range of LKR 50,001 –100,000 which is shown in Figure 4-2.

INCOME DISTRIBUTION

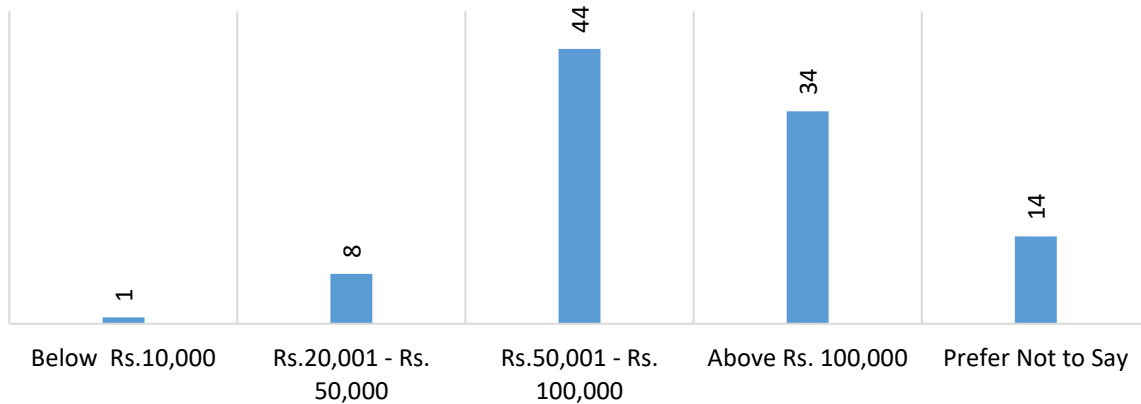
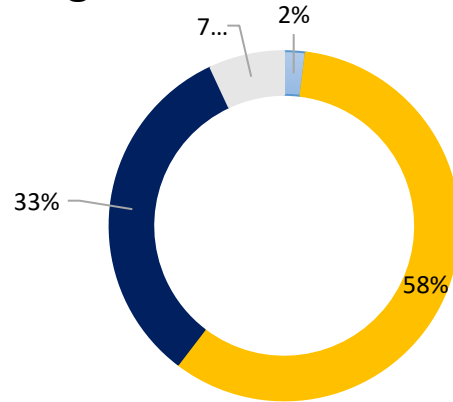


Figure 4-2: Income Distribution

The respondents in the selected sample fall into different organizational hierarchical levels as shown in Figure 4-3. Out of the total of 101 respondents, 58% of them belong to the executive level. 33% of respondents represent the middle-level management and 7% belong to the senior management level. 2 logistics consultants of the company also contributed to the survey. Moreover, Table 4-1 is described the responders' departments and positions in detail to support the data reliability.

Organizational Hierarchical Level



■ Consultant ■ Executive ■ Mid level Management ■ Senior level Management

Figure 4-3: Organizational Heirachail Level of the Respondents

Table 4-1: Distribution of Responders Position and Department

Department	Consultant	Executive	Mid-level Management	Senior level Management	Grand Total
Export		1		1	2
Factory		1		1	2
Finance		8	3	1	12
Information systems		1	1		2
Information Technology		5	6		11
Logistics	2	18	10	1	31
Marketing		12	4	1	17
Operations		12	8	2	22
Projects		1	1		2

Grand Total	2	59	33	7	101
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The highest number of respondents belong to the Logistics division. As a percentage, it was 30.69% of the total number of respondents and there are respondents belongs to 9 different divisions in the organization. Moreover, out of 101 respondents, 63 of them are aware of warehouse operations and 38% of them are aware of warehouse operations up to a certain level.

4.2 Statistical Analysis

4.2.1 Normality Test and reliability

Cronbach's alpha is a measure of internal consistency that describes how closely a group of items is related. The presence of a "high" alpha value does not imply that the measure is one-dimensional. According to reliability analysis, the study analyzed the internal consistency between the selected items. Therefore, Cronbach's Alpha values will identify whether the respective variables can be created or not.

To test the normality of each variable frequency distribution concerning each independent variable and dependent variable the normal distribution is plotted and it was identified that all the variables are reliable in that sense.

Table 4-2 is presented the variables' reliability measures using SPSS and it was shown that all the variables have shown good reliability to use in statistical analysis. Moreover, Figure 4-4 presented the normality of each variable in a graphical view.

Table 4-2: Reliability Measures of the Test

Variable	Cronbach's Alpha
Outsourcing Effectiveness	0.970
Risk Outsourced warehouse	0.704
Customer Satisfaction	0.696
Core Competencies	0.828
Cost In House warehouse	0.748

Moreover, Table 4-3 is illustrated the descriptive statistics of each variable.

Table 4-3: Descriptive Statistics of the Test

Variable	Mean	Standard Deviation
Outsourcing Effectiveness	2.841	0.638
Risk Outsourced warehouse	2.470	0.632
Customer Satisfaction	2.805	0.618
Core Competencies	2.743	0.817
Cost In House warehouse	2.489	0.640

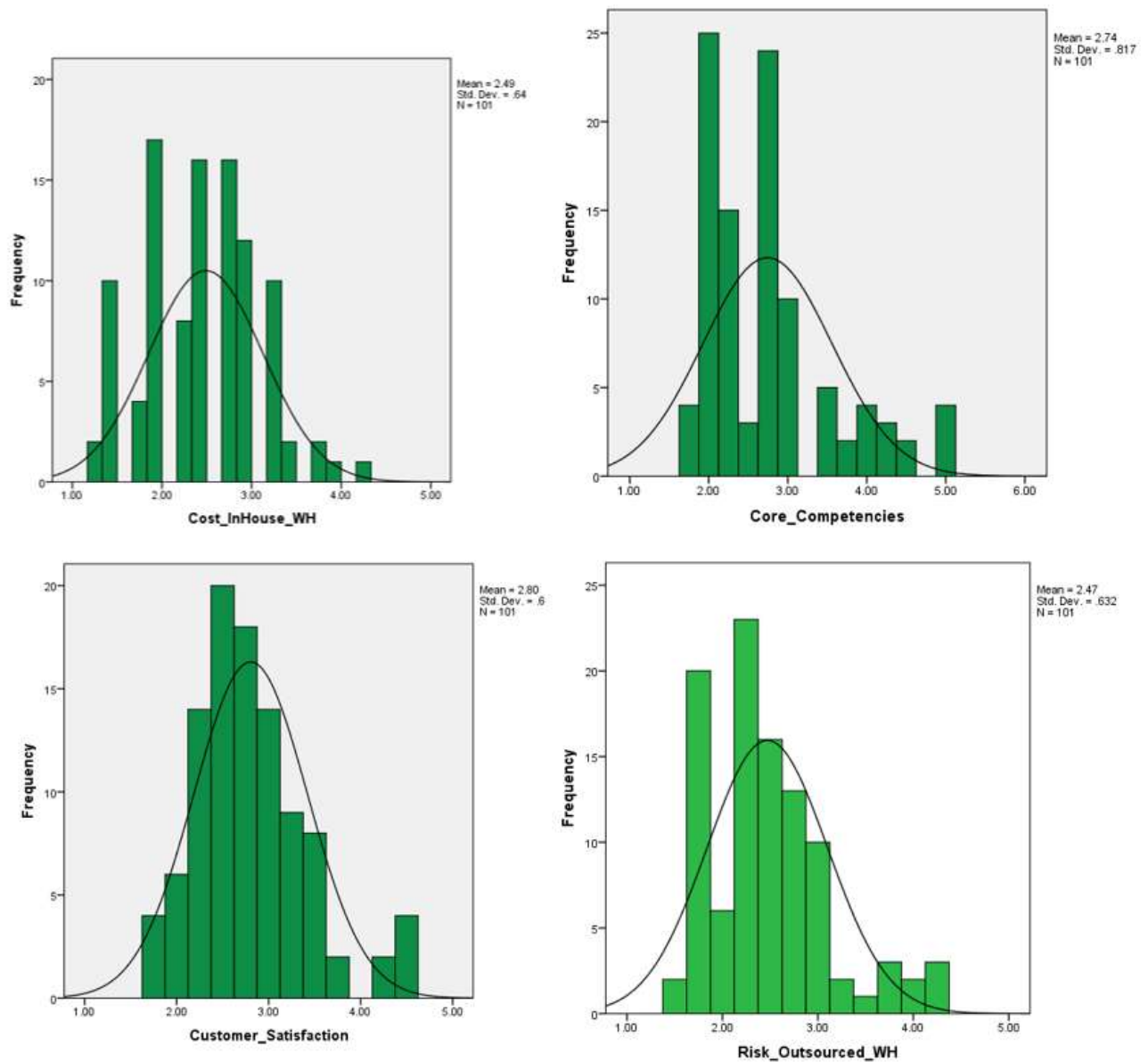


Figure 4-4: Normality of the Independent Variables

Based on the above histograms and normality curves, almost all independent variable data and dependent variable data are normally distributed.

Cronbach's alpha is a measure of inner consistency, or the degree to which a group of items is securely associated. Cronbach's Alpha value of 0.7 or above is required as a first step in determining the link between the dependent and independent variables. As a result, the variables listed above can be considered a group with internal consistency.

4.2.2. Linearity between Outsourcing Effectiveness Vs Independent Variables

To check the linear behavior of independent variables with the outsourcing effectiveness, correlation analysis was conducted and find the best-fitted relationship. The summary of the results was shown in Table 4-4.

Table 4-4: Summary of the Correlation Analysis

Variable	Correlation	Best Fit Relationship	Significance (p-value)	Impact
Cost In House Warehouse	0.12	$y=2.54+0.12x$	0.01	Positive
Risk Outsourced Warehouse	0.06	$y=2.99-0.06x$	0.02	Negative
Customer Satisfaction	0.42	$y=1.61+0.44x$	0.00	Positive
Core Competencies	0.24	$y=2.32+0.19x$	0.00	Positive

Based on the Pearson Correlation statistics, costs associated with in-house warehousing operations, customer satisfaction and capability to focus on core competencies of the company have a positive relationship. Risk related to outsourcing of warehouse operations has a negative relationship with effective outsourcing of warehousing operations. While considering the significance of each variable all four variables have a significant value which is acceptable. Hence, costs associated with in-house warehousing operations, customer satisfaction, capability to focus on core competencies of the company have a positive relationship and Risks related to outsourcing of warehouse operations have a direct relationship with effective outsourcing of warehouse operations.

4.2.3. Multiple Regression Model Development

However, the correlation values were low in independent variables except for Customer Satisfaction, which described the need for multi-variable regression analysis to forecast the effectiveness of outsourcing properly. To cater to that issue stepwise multiple linear regression analysis was conducted. In the analysis, backward elimination criteria were used in the stepwise regression analysis.

The linear regression model is in the form:

$$\text{Effective Outsourcing of Warehouse Operations} = a_0 + a_1 * \text{Cost for in-House Warehouse} + a_2 * \text{Customer Satisfaction} + a_3 * \text{Risk Outsourced Warehouse} + a_4 * \text{Capability to Focus on Company Core Competencies} + \varepsilon$$

Where $a_0, a_1, a_2, \dots, a_4$ are the regression coefficient

ε – Error Term

Customer satisfaction has the highest impact on the outsourcing decision and cost associated with in-house warehousing has the second impact. With compared to above two factors, capability to focus on core competencies impact on outsourcing decision at a minimum level.

In the multiple regression analysis, it is needed to check if there are highly independent variables are among them. To check that, a correlation matrix was developed as shown in Table 4-5 and it was found that there are no multicollinearity symptoms.

Table 4-5: Correlation Matrix of Independent Variables

Variable	Cost	Risk	Customer Satisfaction	Core-Competencies
Cost	1	-	-	-
Risk	0.07	1	-	-
Customer Satisfaction	0.16	-0.12	1	-
Core- Competencies	0.39	-0.01	0.59	1

The multiple regression analysis was carried out and the following regression model was obtained in the analysis.

$$\text{Effective Outsourcing of Warehouse Operations} = 1.524 + 0.068 * \text{Cost for in-House Warehouse} + 0.447 * \text{Customer Satisfaction} - 0.001 * \text{Risk Outsourced Warehouse} - 0.03 * \text{Capability to Focus on Company Core Competencies}$$

From the multiple regression model, it can be seen that a relatively satisfactory relationship can be seen as the multiple R^2 values are about 0.42. Moreover, the model has shown that customer satisfaction has a relatively higher impact on the effective outsourcing of warehouse operations while other factors have a relatively low impact. Also, the cost for in-House Warehouses and Customer Satisfaction shown a positive relationship while Risk Outsourced Warehouse and Capability to Focus on Company Core Competencies shown a negative relationship in the multiple regression model. However, this model is to be improved by adding several factors and still this gives a better understanding of how the variables are affected by the outsourcing of warehouse operation.

4.3 Chapter Summary

Chapter four is described the analysis of the study by using the collected data. In this study, 100 respondent's data was collected from a questionnaire survey which indicated the normality of the data. The highest number of respondents were from logistic firms which is indicative of the quality of response that is used in this research.

The variables evaluated by using the Cronbach's Alpha value and it shows the variables values as effectiveness 0.97, Risk 0.704, Customer Satisfaction 0.696, Core Competencies 0.828, and Cost 0.748. Which provides sufficient evidence that there is strong reliability in the collected data. Moreover, the correlation between Outsourcing Effectiveness and the independent variable was established and it was found that customer satisfaction shown a strong relationship to that while other variables did not show a strong correlation.

Finally, to evaluate the combined effect of the factors a multiple regression analysis was conducted. Before the model development, it was checked that is there any multicollinearity

symptoms between variables, and it was found that there is no such issue. Then the model was developed and it was found that customer satisfaction has the highest positive impact while the cost of the in-house warehouse also shown a positive impact. However, risk and focus on core competencies have shown a negative relationship in the model. Although the model is not largely statistically sound still the relationship provides very important results in outsourcing warehouse operations especially in the Sri Lankan context.

5. CONCLUSION

The company named study King Ceramics is the dominant market leader in Sri Lankan tile industry with the expanding their business to 16 various countries worldwide. Existing conditions in King Ceramics, the purpose of this study is to cater the problem of “What are the factors influencing manufacturing companies to outsource warehousing facilities in Sri Lanka?”. It was identified that the factors influencing the manufacturing companies to outsource warehousing facilities in Sri Lanka.

Based on the analysis conducted referring to the gathered responses, cost associated with in-house warehousing operations, customer satisfaction and capability to focus on company core-competencies variables is identified as factors for Sri Lanka. Moreover, the study prescribed the variables to predict the effectiveness of outsourcing warehouse operations. A conceptual framework was developed by using a questionnaire.

100 respondent's data was collected from a questionnaire survey which indicated the normality of the data. Moreover, the correlation between Outsourcing Effectiveness and the independent variable was established and it was found that customer satisfaction shown a strong relationship to that while other variables did not show a strong correlation.

Finally, to evaluate the combined effect of the factors a multiple regression analysis was conducted. Before the model development, it was checked that is there any multicollinearity symptoms between variables, and it was found that there is no such issue. Then the model was developed and it was found that customer satisfaction has the highest positive impact while the cost of the in-house warehouse also shown a positive impact. However, risk and focus on core competencies have shown a negative relationship in the model. Although the model is not largely statistically sound still the relationship provides very important results in outsourcing warehouse operations especially in the Sri Lankan context.

Moreover, the following recommendation was established based on the study as follows;

Based on the analysis it is required to improve the positive factors and reduce the impact of negative factors at the time of deciding on outsourcing of warehousing operations in Sri Lanka.

- Cost Related to In-House Warehouse Operations

The cost gap between in-house warehousing operations and outsourced warehousing operations needs to be improved to enhance the effectiveness of outsourced warehouse operations. That means, if the company is planning to outsource warehouse operations, processes need to be streamlined and there should be a smooth flow between in-house operations and out-sourced warehouse operations. The company side coordinating employee costs need to be minimized and it is required to ensure the on-time delivery of materials. All material, information and finance flows should be organized to deliver the maximum output while maintaining the cost associated with outsourced operations at a minimum level.

- Capability to focus on core competencies

With the findings, the company has a considerable level of their secrets related to productions and based on the responses, most of them are related to tile manufacturing. Hence, if the company decides to outsource its warehouse operations, the company should have the capability to deploy its excess resources to enhance its core competencies and gain a competitive advantage through the implementation. The company can hire more professionals related to their core, with the excess finance and they can convert their existing warehouses to production facilities.

- Customer Satisfaction Related to Outsourced Warehouse Operations

With the current context organization believes, outsourcing will positively be impacted on customer service through on-time delivery of required materials with expected quality. If the organization selecting a third party to deliver warehouse operations, the service quality of the selected organization needs to be managed at a good level. This service provider selection should do by evaluating all service quality-related parameters.

- Risk related to outsourcing of warehousing operations

This is the only negative parameter out of the selected four variables. The organization should take precautionary measures to minimize the risk related to information sharing and technology sharing. If outsourcing creates a negative impact on trade secrets, the company should not outsource the warehouse operations or the part which includes high information and technology sharing risk.

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7. QUESTIONNAIRE SURVEY TEMPLATE

ANNEX-1: Determinants of Outsourcing Warehouse Operations in Sri Lankan Ceramic Industry

A Research Conducted Based On King Ceramics Lanka PLC Tile Manufacturing Operations

Hi,

I Invite You to participate this research study. The following questionnaire will take only 10 minutes to complete.

All your responses will be confidential and will be used only for study purposes. To protect your confidentiality, the survey will not gather any kind of identical data.

Thank You,

SHAMMIKA DE SILVA

Your position in the organizational hierarchy

- ☐ Entry Level
- ☐ Executive
- ☐ Mid level Management
- ☐ Senior level Management
- ☐ Other: _____

What is your working division

- ☐ Logistics/ Supply Chain Management
- ☐ Finance
- ☐ Marketing
- ☐ Operations
- ☐ Other: _____

Section 02: King Ceramics Warehouse Outsourcing Effectiveness

Please Answer below questions based on your understanding on costs associated with managing own in-house warehouse for finished tile storage.

1 - Strongly
Agree

2 - Agree

3 - Neither
Agree Nor
Disagree

4 - Disagree

5 - Strongly
Disagree

Employee requirement
for managing in house
warehouse is
considerably high

☐☐☐☐☐

Material handling cost
of an in warehouse is
high

☐
☐
☐
☐
☐

Utility bills costs is a
extra cost of
maintaining in house
warehouse

☐
☐
☐
☐
☐

5

Outsourcing
warehouse
facility is cost
effective than
own warehouse
maintainance

☐
☐
☐
☐
☐

Please answer below questions based on your understanding on Risks associated
with outsourcing warehouse for finished tile storage.

1 – Strongly
Agree

2 - Agree

3 - Neither
Agree Nor
Disagree

4 - Disagree

5 - Strongly
Disagree

There is a high
sensitive
information
sharing risk
while working
with outsourced
warehouse

☐
☐
☐
☐
☐

Tile storage and
transportation
needs a set of
unique skilled
labour force

☐
☐
☐
☐
☐

Outsourcing will negatively impact on on-time finished good deliveries to outlets

☐☐☐☐☐

There are unique product and process knowledge associated with warehousing operations

☐☐☐☐☐

Please answer below questions referring to customer satisfaction with regards to outsourced warehouse operations for finished tile storage.

1 – Strongly Agree

2 - Agree

3 - Neither Agree Nor Disagree

4 - Disagree

5 - Strongly Disagree

Capability to continue on-time deliveries based on customer demand

☐☐☐☐☐

order cancellations by customer is subjected to reduce due to warehouse outsourcing

☐☐☐☐☐

Recommendations for service quality has been improved

☐☐☐☐☐

Availability of wide product range based on customer demand

☐☐☐☐☐

Please answer below questions referring to capability of focusing on company core-competencies with regards to outsourced warehouse operations for finished tile storage.

	1 – Strongly Agree	2 - Agree	3 - Neither Agree Nor Disagree	4 - Disagree	5 - Strongly Disagree
Per product time consumption from raw material to finished status has been reduced	☐	☐	☐	☐	☐
Minimization of per product wastage cost	☐	☐	☐	☐	☐
Capacity for new innovations has been improved	☐	☐	☐	☐	☐
Capacity expansion capability has been improved	☐	☐	☐	☐	☐

	1 – Strongly Agree	2 - Agree	3 - Neither Agree Nor Disagree	4 - Disagree	5 - Strongly Disagree
Outsourcing will minimize the operational issues	☐	☐	☐	☐	☐
Continuous and smooth services via outlets can be guaranteed through outsourced warehouses	☐	☐	☐	☐	☐
Possible to make Right product at Right time at Right quantity via outsourcing warehouses	☐	☐	☐	☐	☐
Overall satisfaction on supply chain operations will be increased through outsourcing	☐	☐	☐	☐	☐

Do you have any sort of experience with outsourced warehouses?

- ☐ Yes
- ☐ No

What are the factors to be considered in outsourcing decision other than, cost, risk, customer satisfaction, focusing on core-competencies?

Your answer

Do you think outsourcing warehouse operations is possible solution for Rocell tiles?

- ☐ Yes
- ☐ No
- ☐ Maybe

Gender?

- ☐ Male
 - ☐ Female
 - ☐ Prefer not to say
-

Monthly Income?

- ☐ Below Rs.10,000
 - ☐ Rs.10,000 - Rs. 20,000
 - ☐ Rs.20,001 - Rs. 50,000
 - ☐ Rs.50,001 - Rs. 100,000
 - ☐ Above Rs. 100,000
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