
Proposing an integrated logistics department model the case of Philkeram-Johnson S.A.

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Abstract: This paper presents the impact that fragmentation of logistics activities has on the logistics function of a ceramic tile manufacturing company. The study reveals the fragmentation degree of logistics activities within the company. It maps the current logistics structure and determines the performance of logistics. It describes the impact of logistics on the company's strategic objectives of sales volume, profitability and cash flow. The study benchmarks the company's logistics performance to the performance of other ceramic tile manufacturers. Finally, we propose a model that integrates logistics activities to enhance logistics performance.

Keywords: logistics organisational model; fragmentation of logistics, integrated logistics.

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1 Introduction

Fragmentation of logistics activities within a company has been suggested to hinder optimum levels of logistics performance (Gelinias and Bigras, 2004; Rodrigues et al., 2004; Rose and Sharman, 1989; Waters, 2003). Warehousing, transportation, procurement, inventory management, production planning are some of the key logistics activities (Stock and Lambert, 2001). These activities have been traditionally managed separately within an organisation. Hence, the development of distinct departments such as procurement, production planning, inventory management and warehousing. In several occasions, conflicts arise because each department seeks its own excellence and compliance to budgets and is not able to visualise the strategy to overall organisational excellence (Waters, 2003). While fragmentation may lead to departmental excellence, it can be the cause of higher logistics costs and lower customer service due to the arising conflicts. Such results directly undermine the two most essential objectives of logistics. To improve customer service with the lowest possible cost to the organisation (Ballou, 2004).

This study addresses the problem of logistics fragmentation as it appears at Philkeram-Johnson S.A. The company is a ceramic tile manufacturer located in Northern Greece at the city of Thessaloniki. It was founded in 1962 and it is a member of the Norcros group. The group has another four ceramic tile manufacturing divisions located in the UK, in South Africa, India and Australia. Philkeram-Johnson's practice up-to-now has been to divide and assign logistics activities to various departments. The aim of this study is to propose an organisational model of an integrated logistics department within the company. To reach this aim, the subject areas of 'corporate organisational structures', 'integrated logistics' and 'logistics organisational structures' have been reviewed, as these are presented in the state of the art. An in depth research has been carried out in examining the logistic function as it is currently performed at Philkeram-Johnson S.A.

The primary outcome of this study is expected to be an organisational model of an integrated logistics department for the company. This study seeks to justify the proposed model by highlighting the importance of integrating logistics activities into one structural function. The study also contributes to the company's awareness of current effectiveness and efficiency levels of its logistics function. More importantly it depicts the manner in

which logistics performance affects the company's strategic goals of sales volume, profitability and cash flow.

2 Literature review

2.1 Corporate organisational structures

The first structural configurations have been proposed by the 'principles of management' school of thought, which has focused on formal structures characterised by documented official relationships among employees of the organisation. Hence the introduction of concepts like span of control, unity of command, chain of command (Mintzberg, 1979; Urwick, 1956, 1974). The second school of thought emerged through the work of Frederick Taylor and Max Weber (Vecchio, 1990). This school has been promoting the standardisation of work within the organisation (Mintzberg, 1979). 'Human relations' has been the third school of thought, preoccupied with what was later termed 'organisational behaviour'. Roethlisberger and Dickson have discovered the presence of an informal structure within the organisation and argued it should be acknowledged along with the formal aspect described by earlier schools of thought (Whyte, 1987). Next, the socio-technical approach to organisational structure proposed that an organisation has two systems of structure interacting with one another: The technological system and the social system. It concluded that the interaction between the two should be taken into account when building structure (Vecchio, 1990).

The socio-technical perspective has been overshadowed by the 'contingency theory'. The contingency theory suggested that the structure of an organisation must fit its internal and external environmental characteristics, if the organisation is to survive or be effective (Drazin and Van de Ven, 1985). During the late 1970s Henry Mintzberg dynamically emerged into the scene of organisational structure theory. He reviewed the available literature up to the late 1970s and drew five specific structural configurations (Mintzberg, 1979, 1980, 1993; Mintzberg and Quinn, 1998).

'Team structure', the 'virtual organisation structure' and the 'boundaryless organisational structure' are three structural schemes that emerged in the 1980s and 1990s (Robbins, 1998). In team structure, the organisation employs a team as its central coordinating mechanism around which work is organised (Robbins, 1998). The virtual organisation can be defined in the intra-organisational and inter-organisational level. The latter refers to the collaboration of different organisations toward common goals, while the former refers to structure within the boundaries of a single organisation (Kasper-Fuehrer and Ashkanasy, 2004). The boundaryless organisation is understood through literature as an amplification of the concept of the virtual organisation (Ashkenas et al., 1995; Nelson, 1997; Robbins, 1998; Shamir, 1999). Its structure relies on empowered work teams that are formed and dismantled rapidly according to organisational needs.

Literature suggests that there are five dimensions of structure commonly found in organisations. These are: 'work specialisation and formalisation', 'height and width', 'flow of authority', 'decentralisation' and 'departmentalisation' (Mintzberg, 1980; Newstrom and Davis, 1993; Robbins, 1998; Thompson and Strickland, 1999; Vecchio, 1990).

2.2 *The concept of integrated logistics*

Bowersox and Daugherty (1987) suggest that logistics have undergone a three-stage evolutionary path with respect to the integration of all relevant activities within the organisation. In stage one, logistics control physical distribution of finished products. In stage two inbound distribution of materials is added to logistics to gain from the coordination between inbound and outbound activities. In stage three procurement and operations are included in logistics and all activities are under the responsibility of one manager. At this point the birth of integrated logistics is achieved. There are four important factors in achieving integration of logistics activities: 'management attitude', 'time', 'measurement systems' and 'information systems' (Bowersox and Closs, 1996; Chiu, 1995; Copacino, 1997; Coyle et al., 1992). At the same time there are certain barriers to integrating logistics activities within the organisation. These originate in traditional practices related to organisational structure, measurement systems, inventory ownership and information technology (Bowersox and Closs, 1996; Larson, 1994; Persson, 1997; Williams et al., 1997).

2.2.1 *Benefits of integrated logistics*

The total cost concept is a source of several benefits achieved from logistics integration. The concept suggests that logistics should be viewed as an interconnected process that performs best when managed as one system in order to achieve synergy (Chiu, 1995). Tangible benefits of integrated logistics to the organisation include cost reductions (Gustin et al., 1995; Masters and Pohlen, 1994), lead times reduction and enhanced customer service (Copacino, 1997; Gustin et al., 1994; Muller, 1991), increased productivity and asset utilisation (Gustin et al., 1995), competitive advantage to the market (Copacino, 1997; Gelinas and Bigras, 2004; Masters and Pohlen, 1994), improved profitability (Larson, 1994; Masters and Pohlen, 1994).

2.3 *Logistics organisational structures*

Logistics structure is a subset of the overall organisational structure. It can materialise in the form of a department or as a set of activities characterised by fragmentation or unity, depending on the level of integration within the organisational structure (Caputo and Mininno, 1998). Logistics organisational structures exhibit certain characteristics relative to the treatment of the logistics activities they control. Logistics activities can be positioned in the strategic or operational level of authority. They can be decentralised or centralised under one manager. They can be performed as line or staff activities (Coyle et al., 1992; Lambert et al., 1998).

Literature indicates there are certain basic logistics organisational structures that appeared several years or even decades ago but remain valid today. These are the function, programme and matrix structures (Caputo and Mininno, 1998; De Hayes and Taylor, 1972; Persson, 1997; Stock and Lambert, 2001). Ballou (2004) offers another set of logistics structures: the informal, semiformal and formal structures, which in certain aspects resemble the function, programme and matrix structures. According to Ballou's informal structure, the original organisational structure remains intact. Coordination of logistics activities is achieved through coercion, persuasion and cooperation among those employees who are responsible for them. In the semiformal structure, a manager is assigned to coordinate projects that cover several functional areas. While the logistics

manager has responsibility for the entire logistics system, he or she does not have direct authority over the different logistics activities. The existing organisational structure remains intact and the logistics manager shares decision authority and accountability with the functional managers (Ballou, 2004). In Ballou's formal structure, the organisational structure is altered to establish clear lines of authority and responsibility for logistics. This involves placing a manager accountable for all logistics activities and placing the manager's authority at the same level with the rest of the functional managers (Ballou, 2004).

In the function structure, logistics assume the role of a function in the organisation exactly the same as marketing, operations, finance and other major functions (Coyle et al., 1992). The programme structure places logistics higher in the organisational chart than the rest of the functional areas. In this structure logistics considerations are of paramount importance (Stock and Lambert, 2001). The matrix structure recognises that logistics activities occur in areas throughout the rest of the organisation's functions. The logistics manager in this structure coordinates logistics activities occurring within the different functions (Coyle et al., 1992).

3 Research methodology

The aim of this study is to propose a model that integrates logistics activities to enhance logistics performance. The objective of the study is threefold:

- 1 to analyse the logistics function as it is currently performed at Philkeram-Johnson S.A.
- 2 to identify and describe the existing logistics organisational structure and
- 3 to determine the effectiveness and efficiency of logistics within the company.

Two research instruments have been used for this purpose: interviews and the logistics audit.

Interviews reveal the logistics activities performed by Philkeram-Johnson, the departments controlling them, the information and measurement systems used for supporting them. They also identify the logistics organisational structure of the company. Five employees capable of providing information on logistics activities and structure have been selected as interviewees. Structured interviews were used to guide interviewees into presenting the requested information.

The logistics audit reveals Philkeram-Johnson's customer service levels and logistics costs. Service levels are related to the effectiveness and logistics costs to the efficiency of the logistics function within the company (Stock and Lambert, 2001). The audit also provides insight regarding the company's logistics performance compared to the performance of the remaining divisions of the Norcros group. Finally, it describes the relationship between the performance of logistics and Philkeram-Johnson's strategic objectives.

This study has utilised the audit model provided by Stock and Lambert (2001) applying certain modifications in line with the scope of the research. Designing and implementing the model involved seven steps. Firstly, a task force has been established to support the implementation process. Secondly, three primary company objectives that are affected by logistics have been identified. These objectives are: sales volume, profitability and cash flow. Thirdly, one key question the audit shall throw light into has

been formulated. This question is: How does Philkeram-Johnson's current customer service performance and logistics costs affect its annual sales volume, profitability and cash flow objectives? Fourthly, ten variables have been established. The audit assigned values to these variables in order to determine customer service levels and logistics costs. The values of the variables were also utilised to conduct a benchmark with the other four ceramic tile divisions of Norcros. To perform the benchmark, questionnaires have been sent to all divisions. The variables for customer service effectiveness are: 'order cycle time', 'fill rate', 'backorder recovery time', 'number of stock outs over total number of SKUs'. The variables for logistics costs are: 'transportation costs', 'warehousing costs', 'purchasing costs', 'inventory value', 'inventory carrying costs', 'inventory turnover'.

The fifth and sixth steps involved an external and an internal audit, respectively. The external audit aimed at exploring customer's perceptions of the company's service performance. This was achieved with a customer survey. The survey population consisted of 184 customers. The sample consisted of 70 customers located within Greece and was selected according to geographical area. A questionnaire was administered to the sample. The questionnaire was designed so as to include the above mentioned variables on customer service effectiveness. The survey data were analysed according to inferential statistics. The internal audit aimed at determining the actual values for the aforementioned ten variables on customer service and logistics costs. Three sources of data were utilised for this purpose:

- 1 incoming customer orders
- 2 inventory files of the company's stock control system and
- 3 accounting records.

The final step of the logistics audit involved answering the key question formulated at the third step. Specifically, the information derived from the audit was utilised to throw light into the relationship between the performance of logistics and the company's strategic objectives.

4 Results, analysis and discussions

Our findings from the interviews revealed that Philkeram-Johnson S.A. performs eight key logistics activities. These are depicted in the following Table 1.

Table 1 Key logistics activities performed at Philkeram-Johnson S.A.

	<i>Key logistics activities</i>
1	Inbound transportation
2	Outbound transportation
3	Production planning/scheduling
4	Procurement of raw material, spare parts and equipment
5	Procurement of finished products (outsourcing)
6	Warehousing and storage
7	Customer service
8	Inventory management

These activities are performed and controlled by four departments within the company: the control, procurement, logistics and sales departments. The fact that eight key logistics activities are controlled by four departments indicates a high fragmentation degree of the logistics function within the company.

Philkeram-Johnson S.A. has progressed from an informal to a semi-formal logistics organisational structure. Until 2002, logistics activities have been performed in an informal way. Specifically, logistics activities were being coordinated through coercion and cooperation among the employees of the departments that were responsible for them. During 2002, Philkeram-Johnson S.A. initiated the development of the logistics function. The company introduced the position of Head of Logistics in the organisational structure. The informal gave its position to a semi-formal logistics organisational structure (Ballou, 2004). Finally, according to our findings the four departments utilise 20 measures for monitoring logistics performance and 12 information systems for supporting logistics activities.

4.1 Customer service effectiveness

The internal audit determined the actual values for the 'order cycle time', 'fill rate', 'backorder recovery time' and 'number of stock outs over total number of SKUs' variables. The external audit (survey) identified customers' perceptions for the same variables. The response rate for the survey has been 55.71% (39 out of 70 customers). During the internal audit 1.844 customer orders have been analysed. These have been received between 5th of April and 3rd of May 2005. The average value for 'order cycle time' has been found to be 1.97 days, with a standard deviation of 1.03 days. The minimum value has been less than a day and the maximum value three days. Customers' perceptions coincide with this measurement. Out of the 39 respondents, 21 (53.8%) have stated the company to have a two days order cycle time and 7 (17.9%) stated a one day cycle time. The majority of respondents (71.4%) consider the two days to be a short order cycle time. They also perceive it to be shorter or the same (91.9%) as the lead time offered by Philkeram-Johnson's competitors.

The analysis of the 1.844 customer orders indicated that a fill rate of 96.51% has been achieved during the audit period. Survey results revealed customers to exhibit positive perceptions on this fill rate. Customers also consider it to be better or the same (89.2%) in relation to competitors' fill rates. The average backorder recovery time has been found to be 13.37 days with a standard deviation of 6.25 days. Customers' perceptions on the company's backorder recovery time coincide with these numbers. Specifically, 20 respondents (51.3%) stated Philkeram-Johnson to have a one-week or a two-week backorder recovery time.

Another expression of the fill rate is the 'Number of stock outs over total number of SKUs' ratio. Its average value during the audit period has been 95.51% with a standard deviation of 0.55%. This value calculated based on stock outs is lower than the value of 96.51%, which is the fill rate calculated based on the 1.844 customer orders. The main reason for this fact is the Pareto law of 20–80 that applies to Philkeram-Johnson's sales. In other words, the 20% of the products generate the 80% of sales revenue. Therefore, not all products are demanded by customers at the same rate and customers have not ordered certain products that were out of stock during the audit period.

4.2 *Logistics efficiency*

In order to identify logistics efficiency, the audit determined the values of six variables for fiscal year 2004. These variables are: 'Transportation costs', 'Warehousing costs', 'Purchasing costs', 'Inventory value', 'Inventory carrying costs' and 'Inventory turnover'. The following Table 2 summarises the values of the variables.

Table 2 Values of variables depicting logistics efficiency

	<i>Variables</i>	<i>Values</i>
1	Transportation costs	2.500.267 €
2	Warehousing costs	1.557.989 €
3	Purchasing costs	16.270.858 €
4	Inventory value	10.334.591 €
5	Inventory carrying costs	713.087 €
6	Inventory turnover	3.81

The magnitude of logistics costs is clearer when these are expressed as part of the net sales revenue. Adding the values of variables 1–3 provides Philkeram-Johnson's main logistics costs for 2004:

$$2,500,267 + 1,557,989 + 16,270,858 = 20,329,114 \text{ €}$$

This number equals to 61.88% of the company's net sales revenue for 2004 (32,851,332 €). The average inventory value alone (10,334,591 €), equals to 31.46% of the company's net sales revenue for 2004. These percentages make it clear that managing the associated logistics costs should be of paramount importance to Philkeram-Johnson S.A.

4.3 *Benchmark results*

Out of the four divisions, only the ones located in UK and Australia have returned the questionnaires. Findings revealed logistics activities to be more fragmented in Philkeram-Johnson than in the British and Australian divisions. The three divisions (Greece, UK, Australia) do not adequately monitor customer service performance. Furthermore, findings revealed the logistics function to incur considerable costs for all divisions. This fact designates the importance of managing efficiently these costs. In terms of inventory management, the British division appears to manage its inventory more efficiently than the Greek and the Australian divisions. At the same time, Philkeram-Johnson S.A. presents better inventory management results than the Australian division.

4.4 *Logistics performance and strategic objectives*

The audit sought to answer one key question: How does Philkeram-Johnson's current customer service performance and logistics costs affect its annual sales volume, profitability and cash flow objectives? Although Philkeram-Johnson appears to have an

acceptable customer service performance, each stock out has a considerable possibility to incur a lost sale. According to survey results, when stock outs occur, there is a chance of 21.8% that customers will either cancel the order or search for the product to other suppliers. This is translated to lost sales both in revenue and in volume.

Logistics have been also found to affect the company's gross profit. Specifically, the element 'Cost of goods sold' is the one affected by logistics according to the following accounting formula:

$$\text{"Cost of goods sold} = (\text{Beginning} - \text{Ending}) \text{ inventory value} + \text{production costs} \\ + \text{purchasing costs of finished products"} \text{ (Hilton et al., 2003).}$$

(Beginning – Ending) inventory value, production costs and purchasing costs of finished products are the cost elements falling partially or totally under the control of logistics. An increase in each of these cost elements causes an immediate decrease in gross profit. Within fiscal year of 2004, the costs incurred by logistics affecting the 'Cost of goods sold' formula have been 10,027,743 €. If these costs were increased by 3% (300,832 €) gross profit would be decreased by 3.89% during 2004. If these costs were decreased by 3% gross profit would be increased by 3.89%.

Cash flow depends mainly on three elements:

- 1 the average collection period of accounts receivable
- 2 the average payment period of accounts payable and
- 3 the inventory value and turnover (Gitman, 1994).

Apart from the average collection period, the other two elements fall within the authority of logistics. In the case of Philkeram-Johnson S.A., the average payment period during 2004 has been 45 days. Other things being equal, a decrease or an increase of one day in the average payment period, would result to a respective decrease or increase in the company's cash flow. At the same time, the company's average inventory value has been 10,285,453 € for 2004. If this value was decreased by one Euro, cash flow would be increased by one Euro and vice versa. Inventory turnover for finished products has been 3.81 for 2004. This means that for each square meter of finished product, the company has tied up capital for 95.8 days. If inventory turnover was increased to 4, the company would have tied up capital for 91.25 days. The difference of 4.55 days would be translated to an increase in cash flow of 313,358 €

4.5 Development and implementation of the integrated logistics department model for Philkeram-Johnson S.A.

Findings revealed a high level of fragmentation of the logistics function within Philkeram-Johnson S.A. Eight key logistics activities are performed by four departments. These activities and the relevant departments must merge into one department to achieve internal integration of logistics (Figure 1).

The internal structure of the integrated logistics department should be the one depicted in Figure 2. In this structure all activities of Figure 1 have been placed under the control of the logistics manager. The height of each position indicates its importance within the department and its importance in relation to other positions (except the secretary position). Overall, the proposed integrated logistics department

has three management layers and 35 employees. It is placed in the same line of authority as the rest of the major functions (finance, marketing, sales). This means the existing semi-formal logistics organisational structure is replaced by a formal or function logistics organisational structure.

Figure 1 Activities controlled by the proposed integrated logistics department at Philkeram-Johnson S.A.

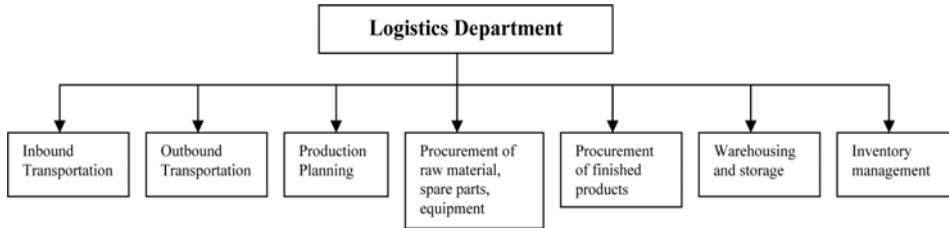
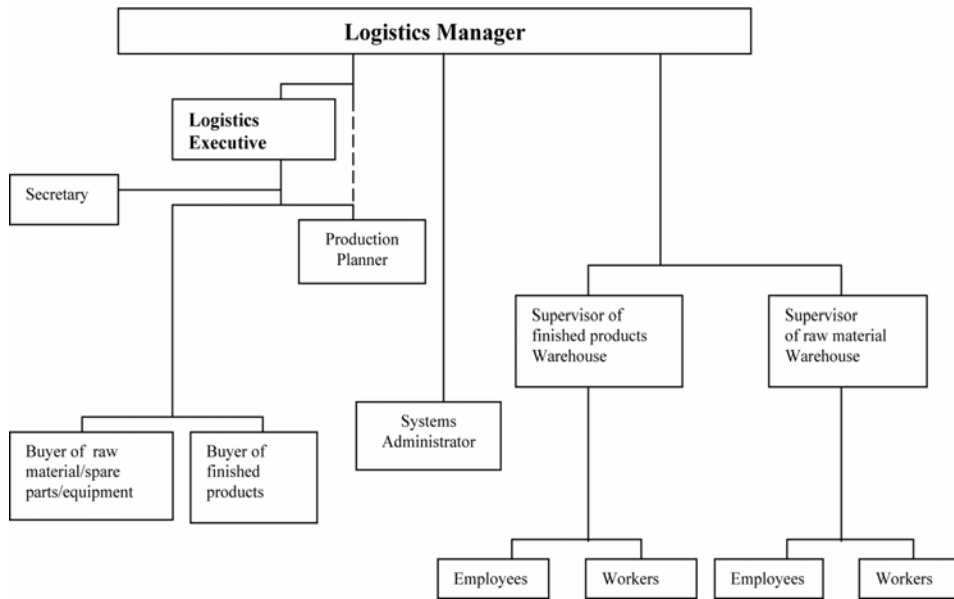


Figure 2 Structure of the proposed integrated logistics department for Philkeram-Johnson S.A.



The implementation of the model requires the full support of the company’s top management team. Integration of activities and departments should occur in a gradual manner over a two to four years time span. The existing measurement systems need to be improved to properly measure customer service performance and logistics costs. Another factor to successful implementation of the model is the information systems that support logistics activities. Our findings revealed the existing systems to be aged and without sufficient sophistication. Philkeram-Johnson intends to overcome the problems of its current systems by utilising an ERP system in the near future. It is important that the new system provides adequate support to logistics activities and to the relevant measurement systems.

5 Conclusions

The study aimed to propose a model that integrates logistics activities to enhance logistics performance at Philkeram-Johnson S.A. The proposed integrated logistics department model can be compared to a product with a three-stage life cycle. Each stage entails implications for Philkeram-Johnson S.A.

The first stage in the life cycle is the suggested period of two to four years for achieving integration. There are certain implications for the company during this period. One will be resistance to change. Employees and managers of the departments involved will not easily absorb the continuous changes until the completion of integration. Another implication will be the shift in the balance of power among the company's major functions. While the integration process will be in progress, logistics will be developing a stronger voice within the company. Philkeram-Johnson will have to decide as to the strength of this voice in relation to the other major functions.

The second stage in the life cycle commences upon the establishment of the integrated logistics department. The implications for the company stem from the performance of the new function and its contribution to the strategic objectives (sales volume, profitability, cash flow). The third stage is a derivative of the expected positive contribution to company objectives. Once positive results are measurable, the integrated logistics department model can be presented to other Norcross divisions.

There are four limitations worth mentioning for the study in hand. The first concerns the researcher of the study. The researcher is an employee of the company under investigation. This fact entails a certain degree of bias with regard to the objectivity of results. The second limitation regards the results of the internal audit for customer service effectiveness. The audit period was between 5th of April and 3rd of May. In general, customer service effectiveness is affected by the rate of demand. In the case of Philkeram-Johnson, the rate of demand is affected by seasonality. Therefore, the results of the internal audit on service effectiveness cannot be generalised to apply for all the months of the year. A third limitation is related to customer survey. Customers located in islands and customers of the export department have been excluded from the sample for specific reasons. Therefore, the results of the survey cannot be generalised to apply for all customers of the company. The fourth limitation is related to benchmark results. Questionnaires have been sent to the four divisions but only two have returned them. Therefore, Philkeram-Johnson's performance was compared only with the two out of the four divisions.

Additional research should be conducted to alleviate the limitations of the present study. An external consultant should be employed by Philkeram-Johnson to repeat the conducted research. The objective should be to fully eliminate the subjectivity factor from results. The internal audit on customer service effectiveness should be repeated for different periods during the year. The aim should be to incorporate the seasonality effect of demand to results. Supplementary research should also be conducted to identify service effectiveness for the customer groups that were excluded from the sample of the survey. Further research should be conducted to determine the logistics performance of the two divisions that have not replied to the benchmark.

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