ASSESSMENT ON FACTORS AFFECTING LOGISTICS PERFORMANCE IN BATTERY INDUSTRY IN GUANGXI, CHINA

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ASSESSMENT ON FACTORS AFFECTING LOGISTICS PERFORMANCE IN BATTERY INDUSTRY IN GUANGXI, CHINA

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ABSTRACT

The main objective of this research is to examine the factors influencing logistics performance on battery industry in Guangxi China. The research investigates on six factors that affect the logistics performance such as inventory, facilities & warehouses, transportation, purchasing & sourcing, information & communication technology management. It also involves the factors affecting the general organizational performance. Data were collected from 10 selected battery companies in logistics department through questionnaire among the managers. Correlation analysis is used to examine the relationship between the six factors and logistics performance. The results on the mentioned factors indicated they were positively correlated with logistics performance in battery industries. The result suggests that transportation is the most important factors influencing logistics performance for the industry.

ABSTRAK

Objektif utama kajian ini adalah untuk mengkaji faktor-faktor yang mempengaruhi prestasi logistik didalam industri bateri di Guangxi China. Kajian ini cuba mengkaji enam faktor-faktor yang mempengaruhi prestasi logistik seperti inventori, kemudahan, gudang, pengangkutan, pembelian, maklumat dan pengurusan teknologi komunikasi. Ia juga melibatkan faktor-faktor yang mempengaruhi prestasi pengurusan organisasi umum. Data telah dikumpulkan daripada 10 syarikat bateri terpilih dari jabatan logistik melalui soal selidik di kalangan pengurus. Analisis korelasi digunakan untuk melihat hubungan di antara enam faktor dan prestasi logistik. Keputusan tentang faktor-faktor yang disebutkan telah mencadangkan ada kaitan positif dengan prestasi logistik dalam industri bateri. Hasilnya menunjukkan bahawa pengangkutan adalah faktor yang paling penting didalam mempengaruhi prestasi logistik untuk industri.

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Introduction

1.1 Background of the Study

Global competition is increasing tremendously and the business entities cannot be survived, if they have no the ability to adapt the environmental constant changes. More options were being provided to the consumers in buyers' market; any of organizations must have the strategies to manage well the cost, quality, quantity and timeliness to fulfill customers' requirement through excellent logistics management.

Logistics management has a broad, far-reaching effect on our society to improve our living standard. Logistics is significant to economy in the two perspectives: first logistics is one of the major costs for company, which means that logistics activities would be affected by or would affect other economic activities; secondly logistics provides the activities of the movement and flow in economic transaction, with the objective of facilitating the sales of substantial cargo and sales of some services (Lamber, Stock, & Ellram, 1998). According to Xi T. Z. & Zhang Z. Y (2012), Chinese Economic Report in 2011 showed that logistics activities contributed nearly 18% of GDP in China. Considers that without the support of logistics management, the cargo cannot arrive punctually or cannot arrive in the proper place or in the proper condition; there will be no any

economic transactions for substantial cargo and related services to be made.

Jones & Womack (2005) had mentioned that, during the last two decades, logistics management has been considered as an important element of competitiveness and effectiveness. When the organizations found the benefits of collaborative model in operations and in business in 1980s, interest on logistics management has increased steadily around the world. Due to the globalization, uncertainty of supply networks is increasing; meanwhile variety of products and product life cycle is becoming shorts. As result, most of manufactures have been forced to set up collaboration beyond their own boundaries with all logistics partners (Sahay, 2003). Kanungo et al. (1998) observed that, the market is diverse and fragmented in the developing country for example China and India, in those areas high performance on logistics management can give a remarkable benefit to the organizations. Sahay et al. (2003) also reported that the managers now prefer to pay more concerns on logistics performance among corporate; in their studies, the respondents who adopt a logistics strategy, are more than two-thirds in the organization; while one-third of total respondents present that the formulation of logistics strategy will be highly involved in board of directors. In increasing competitive environment, a new concept of logistics management appears. According to Lummus, Rhonda, Melnyk etc. (2007), logistics management is undergoing a radical transformation: the old concept of logistics management focuses on disruptions, on-time delivery and low cost; however the new logistics management not only focuses on reducing costs, but more on technology, trust,

and environmental performance cost avoidance.

In this article, for improving battery industry competitive ability and for fulfilling excellent customer service in battery industry, this paper will discuss the relationship between logistics performance and information & communication technology, inventory management, facility & warehouse management, transportation management, source management, which can drive the logistics management performance and are treated as logistics activities (Sunil & Peter, 2010). Besides that, this paper also will discuss the relationship between logistics performance and general supports in the organization, even they don't belong into the logistics activities, but it will affect the whole organizational performance (Sunil & Peter, 2010). By assessment on those relationships, the most powerful factor affecting the logistics performance will be found out.

1.2 Problem statement

According to Liu Yan-long (2010), association of physical and chemical electricity 2010, sales in the battery industries were over RMB 263 billion crossing the China. Since the green energy was introduced, electric power are used in huge quantity instead of petroleum, which will create a big potential demand on the battery, meanwhile the normal home-using battery (3A, 5A, 7A and relative laptop and hand-phone battery) keeps its amount of sales with slightly increasing. Besides that, based on the China Lead-acid Battery Industry Report, there are some features as below:

a. Raw material price is highly sensitive.
b. Policies affect supply and demand.
c. Integration of industrial chains becomes a key development strategy for enterprises.
d. New energy storage batteries become a hot spot for investment.

Today, customers are calling the shots. Manufacturers are scrambling to meet customer demands by providing cargoes or services in a variety of options, styles, features and in the short time, which gives a big challenge on the logistics management to fulfill customer requirement to improve customer service performance. Thus how to find out the most effective and most efficient factor to invest to improve and maximize whole the battery industry logistics performance

in Guangxi to fulfill the future excellent customer service, with the objectives of keeping the customer and counteracting or balancing the bad effects of features (a) and (b) as stated as before, will be the problems.

1.3 Research objectives and research questions

In this paper, the objectives are to determine the relationship between logistics activities (Information & communication management, Inventory management, Facilities & Warehouses management, Transportation management, Sourcing & purchasing management), general supports from other functions, and customers service level (the output of logistics performance). By the test, the factors will be ranked based on the degree or extent to which customer service quality was affected. It will provide the guideline relating on which factor should be firstly focused to improve logistics performance for other battery companies in Guangxi.

The research questions will be as below:

a. Is there relationship between information & communication technology management and customer service level?

b. Is there relationship between inventory management and customer service level?

c. Is there relationship between facilities & warehouse management and customer service level?

d. Is there relationship between transportation management and customer service level?

e. Is there relationship between sourcing & purchasing management and customer service level?

f. Is there relationship between general support from other functions and customer service level?

1.4 Scope of the Research

This research has limitation to explore logistics practices (information & communication management, Inventory management, Facilities & warehouses management, Transportation management, Sourcing & purchasing) and general factors in terms of the organization management. In this study, the objective of investigating will be the managers in the logistics department, who would be selected from 10 logistics companies. They will are required to assess the logistics practices and general factors in terms of the organization management. Besides that, they are also are required to assess the customer service level that their companies performed based on experiences from the feedback of the customers. In this study, the population is all the managers from all fifteen (15) battery companies in the Guangxi, China, the sample is the all the managers from ten (10) battery companies from Guangxi, China. Due to limitation of time in doing this research, data gathering is collected once.

1.5 Significant of the study

According to the Supply-Chain Council's literature, meeting customers' specific demands for delivery of product, has become as the next critical opportunity for competitive advantage. According to Wu Liu Wang (2012) an organization cannot thrive without excellent logistics system, a prominent logistics system can support an organization becomes prosperous. This article focuses on how to improve logistics performance, with the objectives of catering the opportunities and counteracting or balancing threat as stated at section **“problem statement”**. This study will combine both theoretical and empirical research, trying to abstract which factors will have most significant effect to the logistics performance in battery industry. Those factors are will be assessed by managers who are randomly selected in ten (10) of all fifty (15) companies in the Guangxi. Those assessed factors can be used as guideline to help other battery companies in Guangxi to improve logistics performance to increase the customer’s satisfaction by achieving the goal of meeting customers' specific demands for product delivery.

1.6 Conceptual definition

(a) Logistics Management

According to statement of Douglas etc. (1998), logistics has been called by many names, including “supply chain management” or “supply management”. In other words, logistics has same meaning with "supply chain management" or "supply management", which is defined as;

“the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services, and related information from point of original to the point of consumption for the purpose of conforming to customers requirements.”

(b) Customer service

Berard and Paul (1976) define customer service as

“is the output of logistics, it involves getting the right product to the right customer at right place, in the right condition and at the right time, at the lowest total cost possible.”

Douglas et al (1998) state that customer service is the measure on how well the logistics system is performing in providing a product or service. As the consequence, in this article, the logistics performance will be measured by customer service level.

(c) Information & Communication Technology

Information & communication technology (ICT) is a term, which includes of lots

technologies. Kling and Sawyer (2005) provided the following definition and description of ICTs:

"Artifacts and practices for recording, organizing, storing, manipulating, and communicating information. Today, many people's attention is focused on new ICTs, such as those developed with computers and telecommunication equipment to manage the information. But ICTs include a wider array of artifacts, such as telephones, faxes, photocopiers, movies, books and journal articles. They also include practices such as software testing methods, and approaches to cataloging and indexing documents in the library".

(d) Facilities & Warehouses management

According to Sunil Chopra (2010), the Facilities & Warehouses management refers to managing the places where and the methods what inventory is stored, assembled or fabricated or cargoes are distributed, it includes production sites and storage sites.

(e) Inventory management

Inventory is considered in forms of all raw materials, goods in process and finished goods. Each type represents money tied up until the inventory leaves the company as purchased products. According to Douglas (1998) inventory management refers to managing the cost of miss selling and the cost of holding inventory (including capital tied up in inventory, variable storage costs, and

obsolescence) to decrease total cost to achieve high customer services level.

(f) Transportation management

It focuses punctually moving the products from where they are produced to where they are needed in different way such as land transportation, air transportation and sea transportation.

(g) Sourcing & purchasing management

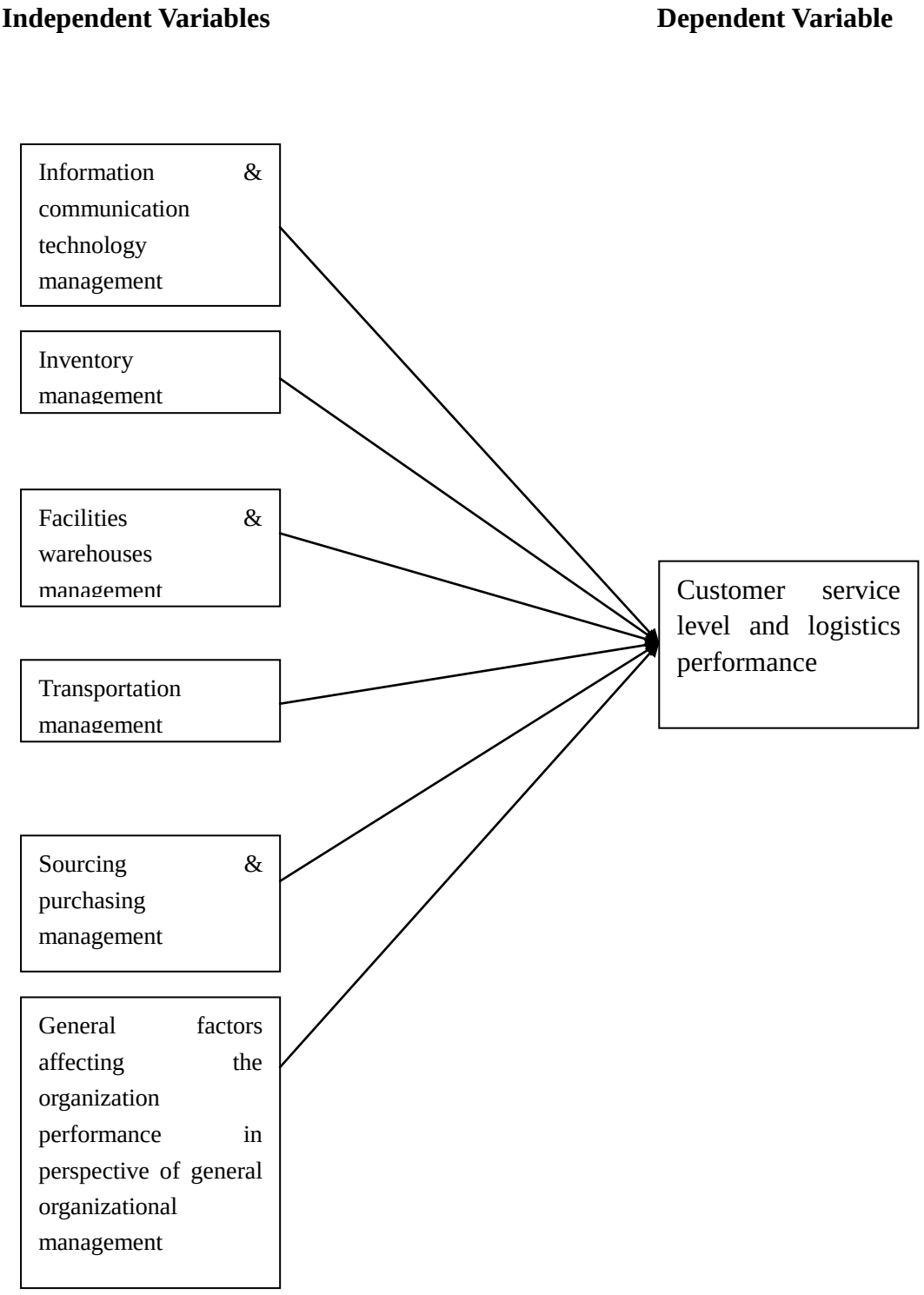
According to Sunil Chopra (2010), Sourcing relates to a set of business processes required to purchase goods and services. Managing sourcing & purchasing activities also related finding, evaluating and managing suppliers (Douglas etc. 1998).

(f) General factors from other functions

In this paper, it forces on marketing management, financial management, human recourse management, strategies management.

1.7 Research framework

Figure 1.1: Research Framework



CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will provide information about the logistics performance, customer services (assessment on the output of logistics system performance), logistics activities (Information & communication management, Inventory management, Facilities & warehouses management, Transportation management, Sourcing & purchasing management) and general organizational factors. The objective of this chapter is to get the direction and supports from other previous studies related to these areas.

2.2 Logistics management and customer service

Due to the extraordinary global competition, there are more options provided to the consumers in the new market. Now the bargaining powers of customers is bigger, which requires the organizations to enhance product quality, increase variety, shorten product development process and improve services quality. To try to remain the competitive abilities, the organizations or businesses must be flexible and customer-oriented to provide varied services and products, with achieving customers' demand by improving their performance and responsiveness. Besides that, the organizations must be innovative to reduce costs to keep the cost competitive-ability.

According to Daugherty， Sabath and Rogers (1992), an excellent logistics management can help the organizations to manage or balance the cost, quality, quantity and timeliness well. Beside that it also helps the organizations to fulfill different customers' requirements to satisfy their customers. Thus by improving the logistics performance, the organizations or businesses can satisfy, keep and attract their customers. As the result, the organization can survive and thrive in the competitive market. The council of logistics management, has defined logistics management as following:

"the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point

of consumption for the purpose of conforming to customer requirements."

According to Caplice and Sheffi (1995)，systems approach concept is significant to the logistics management; the logistics must be treated as the systematic network, which links and comprises of the all activities (information and communication management, warehouses and facilities management, purchasing and sourcing management, inventory management, transportation management, etc.) and personnel involved in the logistics channel, with the objective of managing well the flow of material and products and achieving specific level of customer service. Thus when the managers design the logistics system, any activity or any factor is prohibited to consider as separated or isolated, and all the activities must be viewed to interact with one another.

In the logistics field, the ICT must be mentioned. ICT gives significant effects to the whole logistics activity. By implement of ICT, the organizations can better monitor intensive transaction activities such as ordering, movement and storage of products or materials (Lancioni, Smith and Oliva, 2000). In addition, now ICT normally is combined with the availability of computerized quantitative mode; by this way, ICT can analyze the current situation and provide specific improvement to managers to help them managing the cargo flows smoothly (Jakobs, Pils and Wallbaum, 2001) and optimizing inventory levels (Closs, Goldsby and Clinton, 1997), as the result, it helps the organization achieve a higher logistics

performance.

In logistics system, according to Berard and Paul (1976), customer service is the output of the logistics system, which is a measure to evaluate how well the logistics system functions to make time and place utility; and according to their statement, the customer service is to focus on customers. According to Douglas, etc. (1998), the level of customer service represents the organizations' abilities on serving the customers' need; it will determine whether the organizations can retain the existing customers and how many new customers the organization will attract. Due to the customer service is the output of the logistics system (Berard and Paul, 1976), the whole logistics performance can be evaluated through customer service quality audit. According to Chow, Heaver and Henriksson (1994)，the elements of customer service quality audit includes as below:

(a) The consistency of order cycle time

(b) Absolute length of the order cycle

(c) Order or purchase or bill conveniently

(d) The number of orders shipped complete

(e) Back-order policy to the organization

(f) Backhaul policies

(g) The accessibility and availability to destination

In summary, an excellent logistics management can help the organizations to

manage or balance the cost, quality, quantity and timeliness well; and it also help the organizations to fulfill different customers requirements to satisfy their customers. When the manager have strategic plan on logistics activities, they should use total logistics cost concept; at the same time the managers must treat logistics system as network and keep the systematic approach in mind. Customer service is the output of the logistics system, which can evaluate at what level the logistics system is performing about "*getting the right product to the right customer at right place, in the right condition and at the right time, at the lowest total cost possible."* Since it is the output of logistics system, it also will be affected by any one of logistics activities.

2.3 Information & communication technology management

The ever-increasing internationalization, the complexity related to marketing and production processing has changed the management pattern. Now the whole performance of the entire industrial chain is focused instead of the single company's performance (Furst and Schmidt, 2001). According to their statements, every transaction requires that the companies must have efficient and effective cooperation, which can dynamically adjust the all activities to fulfill customers' different requirements, with the objectives on improving customer service quality. Such a complex scenario emphasizes all participants' cooperation in the supply chain, which comprises of materials control, cash, production, transportation and warehousing processes (Andersen, 2001). Thus the role of excellent communication is more important than ever.

ICT is defined as "the interactive structure composed of people, teams, methods and controls, which together, give the information management needs to form a basis for decision making on planning, implementation and control" (Casanovas and Cuatrecasas, 2001). The importance of ICT is to communicate people efficiently and is to transform data into useful and relevant information to facilitate decision making in business management (Introna, 1993).

Mainly, the manufacturing companies show that, when they set up advance information and technology systems, the logistics service quality, the customers'

satisfaction and customers' loyalty are going to increase (Bharadwaj, 2000). Beside that some researchers also found that high-intensity on ICT has strong relationships in the service quality and much stronger relationship in the satisfaction-loyalty (Gattorna and Berger, 2001). In addition the advanced information management is a key factor in improving logistics service quality (LSQ) (Andersen, 2001).

According to Angeles (2000), the order processing system is the nerve center in the logistics system. The reason is that customer order, which is managed and controlled by order processing systems, will set on all the logistics' processes. According to Andersen (2001), ICT implement has given significant benefits to the order processing system; it achieves that order processing system can automatically order, when the stock reaches to the reorder point. In this way, there are some advantages as below:

(1) Human labor cost and human mistake will decrease (Bharadwaj, 2000);

(2) The lead-time will decrease which leads the cash flow improved (Kuan and Chau, 2001); and

(3) The organizations will be more environment-friendly due to paperless (Gattorna, 2001);

According to Min and Galle (2003), the efficient and smooth activities on the interfaces throughout the supply chain, can be achieved by better communication

supported by ICT. At the same time authors state that, by better communication, excessive inventory cost, warehousing cost and lead-time will decrease. As the result customers service level and their satisfaction will increase, which can help the organization keep its old customers and attract new customers. Besides that according to Sua ´rez A ´ lvarez et al. (2004), ICT implement also can shorten the channel and reduce intermediaries. Thus the organizations can exchange information with retailers or customers directly, which can significantly reduce information transmission costs and improve communication speed.

Besides operation processes, ICT also can improve performance in the planning processes by Decision Support Systems (DSSs), Expert systems (ES). According to Yazici (2002), when DSSs and ES incorporate with the artificial intelligence, by gathering information supported by ICT, DSSs and ES can simulate to future situation to forecast then provides relative decision with "what-if" or uncertain analysis in ways of heuristics and algorithms. In this way managers can conveniently make optimum decisions by assessing the alternative options related to

(a) set levels of inventory,

(b) determine warehouse size, layout or location

(c) transportation mode or schedule or route,

(d) the materials purchasing

In the summary, companies should invest in ICT to improve information flow management throughout the supply chain, because the advanced information management is a key factor in improving logistics service quality (LSQ). ICT improves the logistics performance by facilitating operation processes and by facilitating decision making processes. By making activities of interfaces smooth, minimizing inventory cost, warehousing cost and lead-time, which are achieved by making better decision and better communication, customer service level will increase.

Hypothesis: There is relationship between information & communication technology management and customer service level (the output of logistics performance).

2.4 Inventory management

In the transportation and purchasing section, to order a large quantities of raw materials or finished goods, of which part are saved as inventories, and of which part are used to process immediately, can make the companies have bargaining power to lower the per unit price (Anonymous, 2005). Meanwhile ordering a large quantities can share the transportation cost of per unit, as the result handing cost needed will be less; the reason is that normally the cost of ordering 1 unit requires the same administrative handling cost as 1,000 units ordering (Douglas,1998). According to Sunil and Peter (2010), in the manufacturing section, when the companies schedule production activities in longer session with fewer line changes, the plant utilization will be greater. As the result, quantities of production will be larger, per unit manufacturing costs will be lower, which leads that inventories exist.

In the contrast, without permission on inventories existing, the companies only can manufacture in the small quantities, which will lead the sessions of companies' production will be short. As the result, the time of waste relating to machine changing will be long, the high changeover costs will be high. Thus, inventories existing allows the companies exploit economies of scale by purchasing, transportation or manufacturing large quantities to reduce the cost (Srikanta and Rambabu).

Holding inventory also can provide the protection to the whole supply chain from the uncertainties; it can prevent the stock-out in the situation which is full of variability on demand or replenishment cycle (Douglas etc., 1998). As the result when the managers have thought on supply shortage happening and price increasing in the future, they will have speculative purchases on mass raw materials inventories to prevent uncertainties (Parlar and Gerchak, 1995). In fact, when the mangers plan on managing the inventory, they should consider that the costs of holding the inventory should be compared with the saving achieved.

Brian (2005) stated that, critical interfaces (supply chain parties) normally are geographically separated; thus Inventory can act as buffer to achieve the place and time utility successfully. Based on the statement from Brian (2005), the interfaces related to as below:

(a) From supplier to procurement,

(b) From procurement to production,

(c) From production to marketing,

(d) From marketing to distribution,

(e) From distribution to intermediary,

(f) From intermediary to consumer.

According to Song and Zipkin (1996), when the organization keeps inventory, there are three categories costs, which include ordering costs, holding costs and

penalty costs;

(a) Ordering costs normally comprise of two components: (1) a fixed cost which will happen each time when the order is set up, (2) a variable cost which mainly changes follow the amount of materials or products ordered. Besides that authors believes that the structure of the ordering costs will affects the form of optimal policy;

(b) Holding costs normally is considered as the carry cost, which will change based on the amount of physical inventory held per period. The holding costs normally will comprise of such costs for example insurance cost, spoilage or breakage or obsolescence cost, taxes cost, the opportunity cost of alternative investments and the cost of the physical space where is used to store the inventory.

(c) Penalty costs occur, when the companies have no abilities to meet customers' demand. One of the most common of penalty costs is a proportional cost to the number of items backordered in a period. Based on the authors' research, the penalty cost often represents a loss of customer goodwill.

Inventory normally is considered as a huge utilization of working capital, which represents the largest single investment in assets for a wide variety of retailers, manufacturers and wholesalers (Hadley and Whitin, 1963); based on their

statements, the investments on the inventory will compete with other investments opportunities available to the firms, so balancing related-opportunities to make the maximum return of investment (ROI) in the whole organization is extremely important in inventory management.

Minimizing the inventory costs can definitely give cost-competitive abilities to the organization, which has significant effect to the companies' logistics performance. The reason is that the customers service (the output of logistics performance) also relates to "at the lowest cost possible" (Douglas, James and Lisa). Decreasing inventories costs has some measures which include: (a) achievement on expedited shipments for reducing the back-order, (b) improving the accuracy of forecasts (Silver, 1981):

(a) In his research, the instability and duration of lead time can be decreased, by a sustainable and rapid transportation; at the same time, he also stated that, a sustainable and rapid transportation can help the organization decrease the quantity of inventory's safe level. However, a rapid and sustainable transportation may increase the transportation cost, thus how to balance those cost will be focused by logistics managers.

(b) In his research, an accurate forecasting may assist that, the companies can produce and order the right amount on products or materials to prevent the lost-sale

and prevent excessive inventory costs. Nevertheless an accurate forecasting may lead the high research costs thus logistics managers must balances those costs during planning.

As the result, the measures mentioned before in the context will respectively increase the transportation costs and research costs, which will have negative effects to customer service quality, because the total logistics cost may increase.

Recently, Just-in-time is a quite popular philosophy and concept on inventory management, which aims at deducting redundant and wasted inventory by delivering components, products, or materials just at the time when the companies needs them (Moinzadeh and Aggarwal, 1997); In their research, achieving JIT requires that the all parties among the supply chain including logistics, carries, manufacturing, and suppliers must coordinate closely and familiarly. In that way the communication costs will increase, which includes the investment cost, operation cost or outsourcing cost on relative information and communication service and relative training fees.

A good inventory management must need the thorough knowledge on total cost to make optimum decisions on the design of the logistics system, which comprises of customer service levels, inventory levels (also related to the size of the warehouse), where to hold inventory (related to the location of distribution center or

warehouses) and environment of storing the inventory, production schedules and transportation modes.

In the context, there is the conclusion that, good management on inventory may provide the foundation or fundamental to help the customer getting the right products, at the right time, in the right condition and at the low cost price, since it helps the supply chain achieve the economy of scale.

Hypothesis: There is relationship between inventory management and customer service level (the output of logistics performance).

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2.5 Warehouses & facilities management

According to Ackerman (1997), the general warehousing concept mainly includes the storage and retrieval operations; besides that its task consists of moving goods without damage in an acceptable time and doing it economically. According to Bartholdi and Hackman (2005), the right cost related to warehousing management, can be managed by balancing the transportation cost with the cost of development and maintenance on warehouse and facilities; at the same time the right cost also can be managed by optimizing the layout to decrease the movements inside the warehouse.

Storage is the core activity of warehousing (Tompkins, White and Bozer, 2003). According to their statement, the location where the goods are deposited and held until the goods are demanded for usage, will affect the storage activities. And based on their report, there are different shapes and sizes for the products and materials, as the result, usage rates of the storage space for different products and materials will be different, which makes problems for assigning the location for storing the different cargo. Thus a good storage mechanism must exist to fit category of items, even each item, meanwhile it should be built-in flexibility to help the organization continuously improve their inventory control.

Besides storage, normally, warehousing has another five major throughput activities:

(1) receiving;

(2) transfer;

(3) handling & picking up;

(4) packing; and

(5) expediting.

When the materials or products are received and transferred to the storage area, or when they are picked up and transferred to the expediting area, there are the movement costs in term of time, fuels and equipments (Ackerman, 1997). Thus, based on his research, an excellent layout is required to minimize those costs expended in receiving, retrieving (picking-up) and transporting cargo; and during those activities, the warehouses should have appropriate equipments to handle those materials to keep them in the good condition. According to Ackerman (1997), Packing plays a significant role on the dispatch function, which usually occurs in the warehouse; thus warehouse should have abilities on containerization to facilitate the mechanization to improve warehousing performance, and improve the cost-effectiveness of transportation. By achieving containerization, the quantity of material used for package also can be reduced (Van, 1999).

It was mentioned before, an excellent design of layout of warehouses and facilities is necessary (Ackerman, 1997). Hassan (2002) also support that concept, besides that, he also mentioned that there is not always the most suitable warehouse layout; the layout of the warehouses and facilities should be designed

based on the particular operational conditions. Besides layout, in the processing of designing warehouses, the size, the number, the location selection of warehouses and facilities also must be considered to balance with the transportation factors to improve customer service quality, when the managers plan the warehouses (Douglas, etc. 1998).

Ang and Andren (1995) have pointed out that, the development of information technology and automatic technology has given a new way to manage the warehouses and facilities. In their statement, those technologies not only decreases redundant manual operation and improve warehouse performance, but also make the organizations become more environment-friendly by decreasing paper-intensive operations; there are some figures as examples as below: in their research, they stated that the warehousing activities averagely reduce labor cost by half and saved 25 per cent on warehouse overheads by implementation on automation and barcoding technology.

In addition, according to Chaudhuri and Dayal (1997), online analytical processing (OLAP) and data analyses are available to the organizations, because of the development of information and communication technology. In his research argues that, those systems as the decision support systems used in warehousing operations, can provide or extract worthful knowledge to the organizations. In that way, enterprises can gain competitive advantage to analyze

current and future situation by automatically integrating a huge quantity of information.

According to Green, Inman and Birou (2011), JIT now is a quite prevalent management approach; in their research the achievement of JIT approach needs the excellent communication which is supported by the information and communication technology. Andersen (2001) also supported this view, he stated that only when the organizations confirm the certainty of the products or materials by excellent communication, JIT can achieve. Jones, Hines and Rich (1997) stated that, JIT approach contrasts observably with those warehousing operating systems, which is based on substantial inventory; since JIT only produces and provides amount of goods based on the requirement of customers; as the result, WIP will be low, space requirement in the warehouse also will be reduced.

In the summary, warehouse and facilities is important to the whole activities to the customer service quality (the output of logistics performance). The reason is that, an excellent warehouse and facilities management provides foundation of cargo flows smoothly, and it also provides foundation to manage inventory better, which can reduce total logistics cost. The profile of warehouse and facility affects the performance of warehouses and facilities significantly, thus the size, the number, the layout, the design, and the location of warehouse and facilities must

be considered, during in the planning process of warehouses and facilities development. Information system and automatic system not only increases warehouse productivities, but also reduces warehousing-related cost, which bring a significant innovation to the pattern of warehousing by achieving JIT.

Hypothesis: There is relationship between facilities & warehouses management and customer service level (the output of logistics performance).

2.6 Transportation management

According to Douglas, etc. (1998), transportation normally relates to (a) time utility and (b) place utility:

(a) Time utility

Based on their article, time utility will be conducted when the warehousing and storing products are needed. Normally the time utility relates to term of "at the right time" in the customers service. Meanwhile the time utility also determines that how consistently and how fast the products are transported or moved from one point to another point, which is known as "consistency of service" and "time-in-transit" respectively;

(b) Place utility

When right products or materials are moved across space or distance from where they are produced to where they are needed by transpiration, the place utility will be conducted. In the dimension of place utility, the terms of customer service "right products, right conditions, right customers right place, and right cost" will be conducted.

Transportation plays a significant role on integrating logistics structures, which has positive effects on integrating and coordinating the flows of cargoes throughout the supply chain (Clinton and Morash, 1997; Goldsby and Stank, 2000). Beside that according to Horsley (1993), only transportation-related activities already occupy

about 36 percent of total logistics costs; thus it has significant effects to the total logistics cost, because the transpiration activities directly affect the customer service quality related “at the lowest cost possible”.

Based on the transportation ministry report 2012, now Guangxi municipality has five (5) basic transportation modes including motor, water, air, rail, and pipeline to transport materials and products. In addition, intermodal combinations are also achieved in the Logistics Park in different cities, which comprises of rail-motor, motor-water, motor-air, and rail-water. According to Lee, Hung, and Liang (1998), the intermodal transportation can offer lower cost and specialized services, which are not generally available when the organization uses the only one single transport mode. Anyone of transportation mode has its owned advantage, thus the managers should plan a suitable transportation mode or plan a suitable intermodal transportation combination modes based on the customers' requirement.

Besides selecting suitable transportation mode, when the logistics managers plan the transportation activities, they also must consider those factors as blow:

(a) scheduling and routing on company-owned transportation equipments (including cars, ships, trains and airplanes)，

(b) managing shipments consolidation,

(c) choosing the suitable carries,

(d) filing claims with carriers, and

(e) negotiating with carries

Scheduling and routing well on company-owned transport equipments (including cars, ships, trains and airplanes)，managing well shipments consolidation, choosing the suitable carries, filing claims well with carriers, and negotiating well with carries can increase the effectiveness and efficiency of transportation activities(Barrett, 1998).

In nearly decades, the professional third-party logistics providers and cargo-forwarding companies grow up quickly (Coyle, Bardi and Langley, 1996), which provides organizations a new way of managing transpiration. According to Barrett (1998), Outsourcing transportation service can give the relative companies mutual benefits as below:

(a) The organizations will be free from day-to-day interactions with carriers,

(b) The organizations can get the more professional information related to the transportation situation, which is provided by the third-party and

(c) The third party helps the organizations focusing on its owned business by managing and monitoring the thousands of shipments for the organizations by the third party itself.

Meanwhile according to Bowersox and Closs (1996), the application on information and communication technology affects the patterns of transportation, which gives many significant advantages to the transportation activities:

(a) ICT can provide effective routes, which can conduct all origin-destinations coordinates and pairs;

(b) ICT can help the companies to improve the utilization of the existing transportation infrastructure;

(c) ICT can help the companies to reduce areas of warehouses for storage by better communications and connections, and

(d) ICT can help the organizations to diminish traffic congestion, which also will make the organizations to become more environment-friendly because fuel consumption and emissions will decrease.

Douglas, etc., (1998) stated that, an excellent transportation affects the customer service performance (the output of logistics performance) by consistency of service, time-in-transit; besides that it affects the other logistics activities like inventory management, warehouse management and packaging pattern. Thus the transportation activities must be taken into account in critical strategic planning to confirm the cargo flow fluently through the different stages (Gentry, 1996). At the same time the organization must ensure that the transportation activities can create value and achieve logistics goals by meeting specific customer service level (Crosby and LeMay, 1998).

In addition，safety on transportation is important to the logistics performance in battery industry, since it directly not only affects whether the right cargos can be

transported to the right customers in the conditions. At the same time it affects the society and the environment; due to the materials of battery or battery itself are the chemical items which are easy to explode. Thus the transportation sectors in this industry must have the right or suitable equipments which are approved by government to confirm the safe ability.

In the context, there is the conclusion that, good management on transportation will directly increase customer service quality by related factors as following:

a. Dependability-consistency of service.

b. Time-in-transit

c. Market coverage- the ability to provide door-to-door service

d. Flexibility-Handling a variety of products and meeting the special needs of shippers.

e. Loss and damage performance

Those statements can be related to the philosophy of the customer service, which is "getting the right products, at the right time, in the right condition and in the low cost price to the right customer ".

Hypotheses: there is relationship between transportation management and customer services level (the output of logistics performance).

2.7 Sourcing & purchasing management

According to Douglas, etc. (1998), the purchasing and sourcing activities are mainly responsible for inbound flows (including existing products or services) into the companies. According to Knemeyer, Coris and Murphy(2003), by recent decades, division of labor have been classified into small segment and becoming more specified; as result many professional third-party service providers are developing, which includes third-party warehousing providers, cargo forwarder, information system or information service providers and logistics service providers, etc.. Now many organizations is beginning to have strategic alliance with those third-party, in way of purchasing or outsourcing to use their more professional services(Londe and Maltz, 1992).

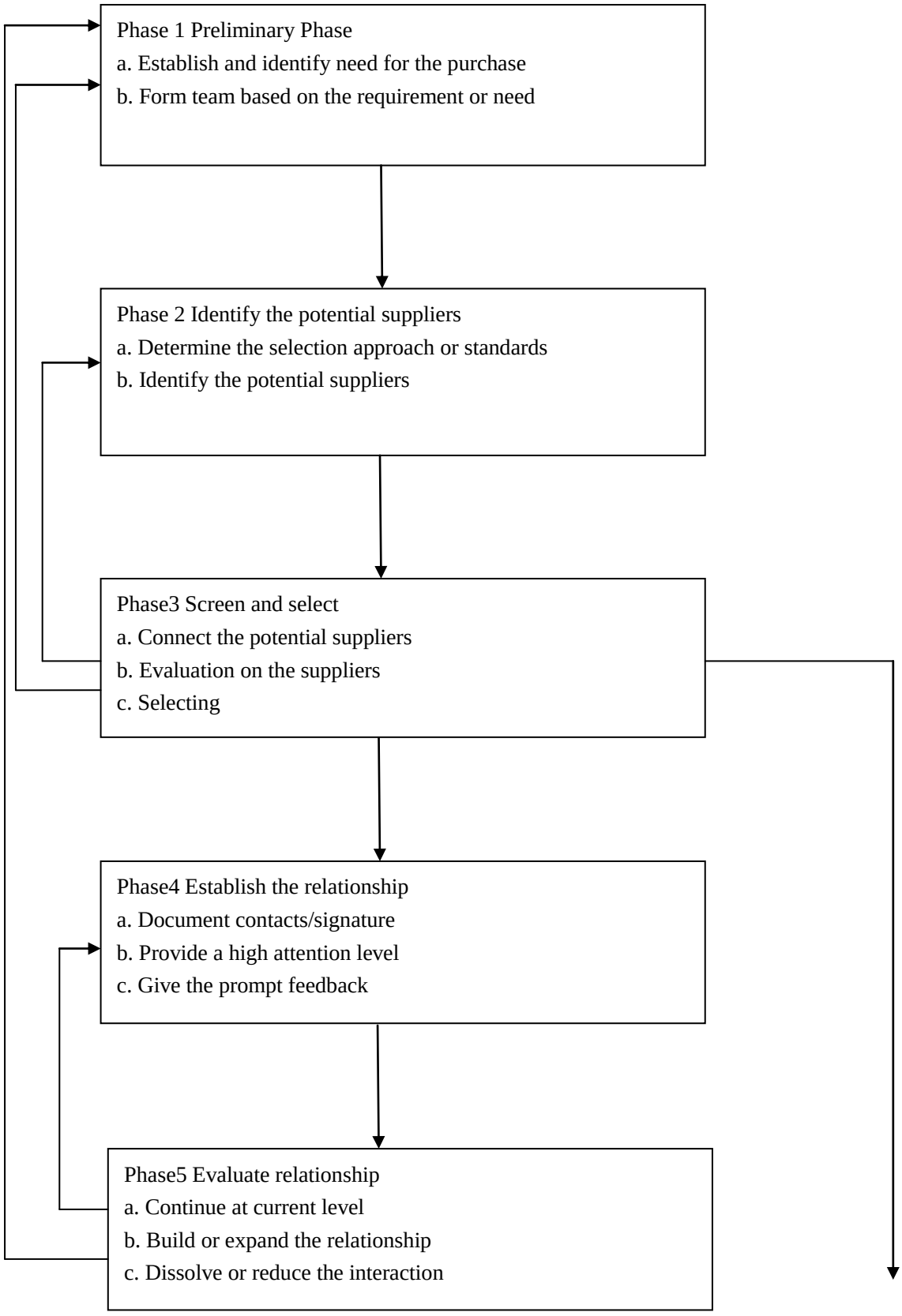
Due to uncertainty in the current business environment, now making the sourcing and purchasing decisions for key items is more complex and uncertain (Douglas, etc., 1998). At the same time, the effect of sourcing and purchasing decisions becomes more long lasting (Maltz, 1994). Thus structure of the organization has change: the purchasing and sourcing area within many organizations has already broadened their responsibilities (Knemeyer and Murphy, 2003).

Now purchasing and sourcing is focusing on procurement of the right materials or relative services in the right place, at the right time, in the right quantity, in the right condition or quality from the right supplier at the right price (Douglas, etc.,

1998). Thus the role that purchasing played is more and more important, because purchasing is not only keeping the operation smooth by ensuring a reliable source of supply, but also accomplishing at the lowest total logistics cost as possible (Lisa, 1995). The reason affecting the total logistics cost is that, accord to Lisa (1995), the quantity of purchasing will relate to the inventory cost, order processing cost, economy of scale on handling and transporting materials, and discount price from huge purchasing.

Purchasing managers may consider a broad of range of factors, which includes uncertainty of supply and demand for the key commodities (Stone, 2000), price increasing (Sohail and Sohal, 2003), extended and variable lead time (Lieb and Randall, 1996)， energy shortages (Virum, 1993)，government regulation such as environmental laws(Coombs and Battaglia, 1998)，and increasing worldwide competition(Douglas, etc., 1998), thus sometimes the purchasing managers will have speculative purchasing to offset those effects (Parlar and Gerchak, 1995). Besides uncertainty of environment, the managers also need to make a decision on choosing the suppliers and evaluating their performance, when they manage the purchasing and sourcing activities (Lisa, 1995); and based on her research, there are five steps from supplier selection to supplier evaluation as Figure2.1 below:

Figure 2.1: Managing supplier



Choosing suitable suppliers can help the producing activities to operate smoothly by pledging to provide reliable materials and services. As result, it provides the foundation on organization getting the right product or service at the right place and right time, right price, in the right quantity, right condition or quality to the right customers.

According to Hendricks, Singhal and Stratman (2007), ICT also improves purchasing and sourcing activities performance; combines the purchasing and sourcing activities with electronic data interchange (EDI), not only can enable purchasing activities to play a more proactive role in the organizations, but also can eliminate the routine clerical activities.

In summary, the third-party service provider developed quickly in recent decades, which lead the purchasing and sourcing management not only focuses on materials but also on the services. Excellent purchasing and sourcing management can provide the possibility to handle total logistics cost at the minimum level, by balancing the order processing cost, inventory cost with the saving from economy of scale on handling and transporting materials. In this perspective, customer service performance in terms of "at the right cost" will be conducted. In addition, excellent purchasing and sourcing can keep the operation and producing processes smooth, which is important to facilitate the manufactures to produce the right product to customers at the right time, thus excellent purchasing and sourcing can

improve the customer service performance. If the organization purchases or sources the services like warehousing, information or information system, transportation, there will be different effects on customer service performance respectively, since every activity will affect customer services performance in different perspectives.

Hypothesis: There is relationship between sourcing & purchasing management and customer service level (the output of logistics performance).

2.8 General factors affecting the organization performance in perspective of general organizational management:

To make the whole logistics activity having a high performance, besides managing well the all logistics activities discussed before, the organization itself is also very important to improve the logistics performance. According to Douglas, etc. (1998), the factors contributing the effectiveness and efficiency of organization comprise of organizational characteristics, management style, organization communication process, resource related to human, technology and financial support.

2.8.1 Organizational characteristics

According to Henkoff (1994), the logistics activity is affected by the overall corporate structure. According to his research, logistics activities will normally stick tightly to and be affected by the marketing group, if the organization is consumer goods company; and if the firm is primarily an industrial goods produce, the logistic will trend to stick to and be affected by the manufacturing or operations or administration group instead of marketing group.

Besides of organizational structure, the organizational goals, vision and culture also affect the organizational logistics activities significantly. According to Douglas, etc., (1998), strategic goal and strategic vision setting comprises of two the establishment: (a) individual employee goals

establishment and (b) the whole organization goals establishment; the authors also state that both sets must be compatible to maximize company-employee effectiveness. Organizational culture not only can affect how people set its-own personal goals, but also can affect how people perform tasks to achieve to organizational objectives (Douglas, etc., 1998). Organizational culture will affect people's thought and perception consciously and subconsciously, which will affect them to make decisions. As the result, it will definitely affect people's feeling and action in the organization (Hansen and Wernerfelt, 1989; Schein, 1990). In addition, Peters and Waterman (1982) suggested that, organizational culture should exert its tremendous influence to make people becoming more responsibilities and committed. Consequently organizational performance including the logistics performance will be increased.

2.8.2 Management style:

According to Douglas, etc., (1998), the personality or style of the senior logistics managers will affect the motivation, attitudes, productivities and work ethic of all of employees in the organization. In addition, he also stated that management style is intangibles asset, which can make two companies with same organizational structures perform at totally different level of efficiency, productivities and profitability. Thus management style can be considered as vital component to achieving of organization logistics mission, goal and vision.

2.8.3 Organization communication process

According to Douglas, etc. (1998), one of the most vital component influencing organization effectiveness is the communication process. Without good communication, the policies and procedures cannot be effectively transmitted throughout the firm; meanwhile the feedback concerning the success or failure on those policies, cannot take place. As the result, the managers in the top level of organization cannot correct the problems which occurs in the former strategy plan, then the implement of new strategies will fail again; the employees in the low level of organization become perish due to they don't know what they should do. Consequently the organizational performance will be extremely low. According to Andersen (2001), communication flows within the logistics area can be downward (boss-employee), upward (employee-boss) or horizontal (boss-boss or employee to employee).

2.8.4 Resource related to human, technology and financial support

Many researchers stated that, the most important factors affecting the effectiveness of organization should be people (Douglas, etc., 1998). It is the people who eventually determine whether the company operates in a high performance. The reason is that people directly handle or operate the whole organization activities. The factors related human recourse affecting the logistics performance, will comprise of the employees' skill and abilities,

pay scales, training programs, selection and retention procedures, and other employee-related policies.

According to Douglas, etc. (1998), technology is the combination of skills, knowledge, equipments, work methods, and computers, and it was used for transforming the resource inputs into organizational outputs. Another group of researchers also define technology as a way to achieve vision mission and goal by using machines, tools, human know-how and techniques (Campling, Poole, Wiesner and Schermerhron, 2006). Thus how to utilize and manage technology must be considered to increase the outputs and the performance related on activities of whole organization.

According to Douglas, etc. (1998), Financial support related to

(1) acquisition on suitable or advanced equipments or services,

(2) acquisition on experienced persons by training properly and hiring,

(3) making the company take advantage of forward buying opportunities, massing of inventory, and

(4) using the sophisticated storage and retrieval systems for the company's warehouses

Thus financial support is very important to improve the organizational performance. Because financial support will relate so many factories as stated above, how to arrange limited investment on different area to make

the maximum performance must be considered.

In summary, the organization itself is also very important to improve the logistics performance. An excellent management on organizational characteristics, management style, organization communication process, resource related to human, technology and financial support will improve logistics performance in respective ways.

Hypothesis: There is relationship between general factors affecting the organization performance in perspective of general organizational management and customer service level (the output of logistics performance).

2.9 Conclusion

This chapter presented literature review, concentrating on previous studies related to investigate the relationship between the logistics practices (Information & communication management, Inventory management, Facilities & warehouses management, Transportation management, Sourcing & purchasing management) and factors affecting the general organization performance towards customer service (the output of logistics performance). The following chapters describe in detail the procedures and methodology that were used for data collection and analysis in this identification.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

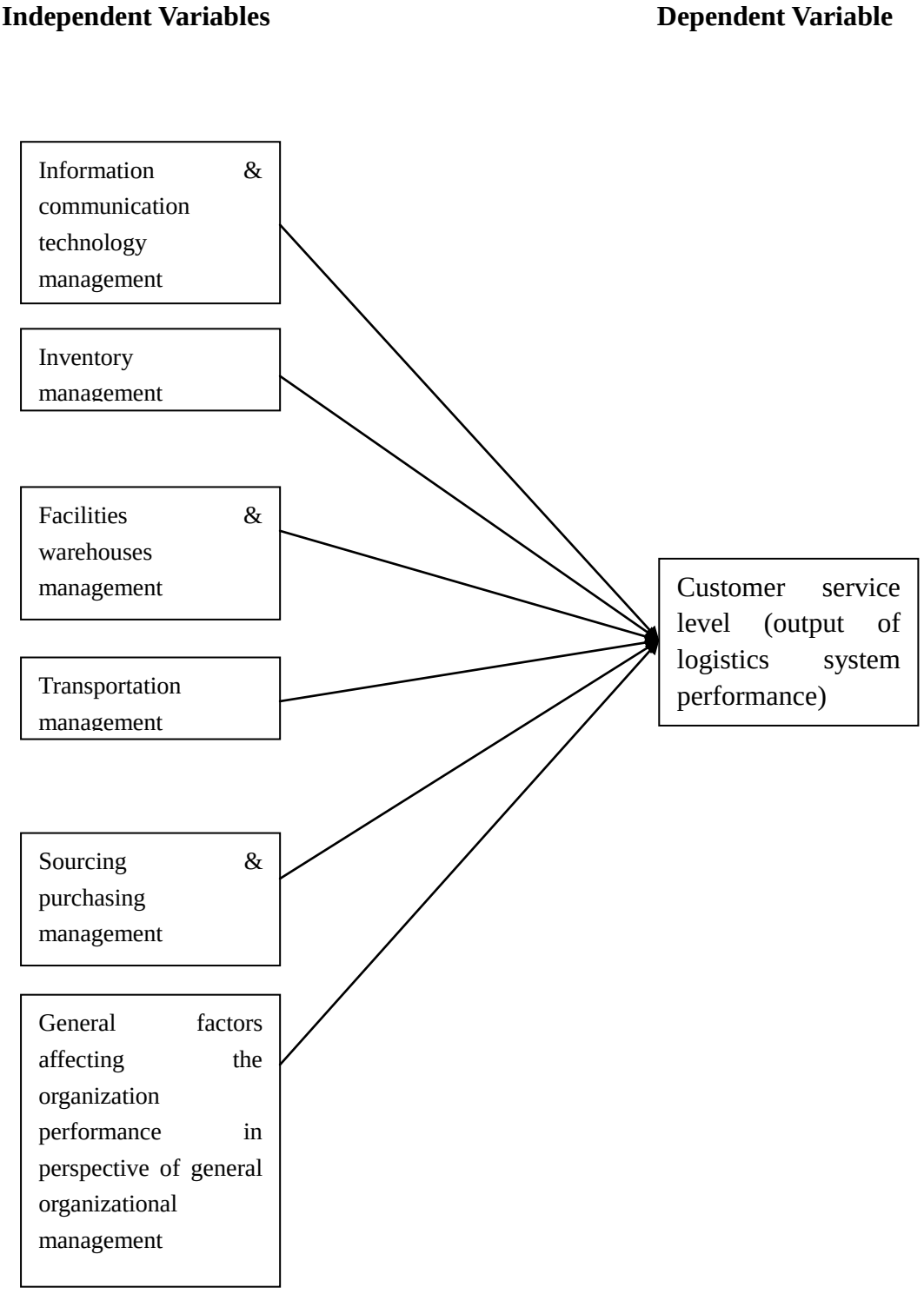
This chapter will discuss the research methodology which is used in this project paper. The research framework, which relates to information & communication technology management, inventory management, facilities & warehouses management, transportation management, sourcing & purchasing management, General factors affecting the organization performance in perspective of general organizational management, and the customer service level (the output of logistics system performance), will be at first presented in this chapter. A discussion on regarding population and sampling, and the approach of collecting data will be presented after building up research framework. This study will adopt a quantitative approach to analyze the relationship among customer service level (the output of logistics system performance) and the relative variables in scope of battery industry Guangxi, China.

3.2 Research framework

This study concentrates on the relationship between information & communication technology management, inventory management, facilities & warehouses management, transportation management, sourcing & purchasing

management, general factors affecting the organization performance in perspective of general organizational management, and the customer service level (the output of logistics system performance), the framework is following below:

Figure 1.1: Research Framework



There are 6 factors in the independent variables, namely information & communication technology management, inventory management, facilities & warehouses management, transportation management, sourcing & purchasing management, and general factors affecting the organization performance in perspective of general organizational management. The dependent variable is the customer service level (the output of logistics system performance).

3.3 Research hypothesis

Based on research framework, there are six(6) hypotheses will be examined on information & communication technology management, inventory management, facilities & warehouses management, transportation management, sourcing & purchasing management and general factors affecting the organization performance in perspective of general organizational management. The six (6) hypotheses are as follows:

a. There is information & communication technology management and customer service level.

b. There is relationship between inventory management and customer service level.

c. There is relationship between facilities & warehouses management and customer service level.

d. There is relationship between transportation management and customer service level.

e. There is relationship between sourcing & purchasing management and customer service level.

f. There is relationship between general factors affecting the organization performance in perspective of general organizational management and customer service level.

3.4 Research design

The objective of research design is to build the mechanism to investigate and analyze the research question and get the results. The function of research design is to ensure that the data collected can answer the questions without any ambiguous in the study (Craig & Charles, 2008).

3.4.1 Descriptive research

Descriptive research is known as statistical research. The main objectives of this type of paper are to describe the relative data and characteristics. Descriptive research is for studying certain existing phenomena; it is carried out when a researcher needs to get better understanding of a topic (Craig & Charle, 2008).

3.4.2 Sampling

Sampling means selecting specific proportion of individuals from the whole population, which must be able to present the characteristic of the population. The advantages of using sampling include lower costs and less

time (Craig & Charle, 2008). In this project paper, the simple random sampling will be adopted. The amount of sampling is all logistics managers in ten (10) battery companies.

The most popular data collection techniques include: surveys, secondary data sources or archival data, objective measures or tests. In this study, techniques of setting up questionnaires and collecting archival data will be used. Those companies' background information can be obtained from Administration of Industry and Commerce. Meanwhile the questionnaire method is to collect data through the questionnaires. The relevant questions will be listed to respondents to answer according to their knowledge or perception. There are some relative advantages using questionnaires approach such as:

(a) It can reduce bias and less intrusive than face-to-face surveys,

(b) It is familiar to most people, and

(c) It is easy to analyze,

3.4.3 Primary data

Primary data source is the first hand information obtained by the researcher (Craig & Charle, 2008). In this project paper, the primary data will be collected through the questionnaires to analyze the relationship between the dependent variable and independent variables.

As stated earlier in Chapter 1, the purpose of this study was to examine the relationship between information & communication technology management, inventory management, facilities & warehouses management, transportation management, sourcing & purchasing management, general factors affecting the organization performance in perspective of general organizational management, and the customer service level (the output of logistics system performance) in battery industry Guangxi, China. Therefore, a correlation study is engaged. According to Craig and Charles (2008), the purples of correlation research are to discover relationships between two or more variables.

A quantitative method was employed to study the relationship among the customer service level (the output of logistics system) with logistics practices and general factors affecting the organization performance in perspective of general organizational management. The research needs to get the original data and do the analysis. This is because the research of quantitative method is to use reliable and valid date to process statistical analyses (Ghauri, 1995). Thus, a set of questionnaire for collecting data were employed as in instrument for this study. The study was conducted in the natural environment of the organization, where the researcher interference is minimal.

3.5 Instrumentation

The questionnaires will be distributed in English and Chinese version and divided two sections.

Section 1	This section contains 6 questions, and it is used to measure the customer service level in battery companies in Guangxi China, by logistics managers based on their experience of their customers feedback.
Section 2	This section contains 66 questions, and it is used to measure the information & communication technology management, inventory management, facilities & warehouses management, transportation management, sourcing & purchasing management, and general factors affecting the organization performance in battery companies in Guangxi China, by logistics managers.

In section 1 & section 2, the respondents will be required to rate items based on 5 point rating scale based on Likert scale technique – psychometric scale commonly used in survey research. The rating scale from 1 (strongly dissatisfactory) to 5 (strongly satisfactory) was used.

1 = strongly dissatisfactory

2 = dissatisfactory

3 = neutral

4 = satisfactory

5 = strongly satisfactory

Section 1

Dependent Variable		Items
Customer Service	-	1. What do you think of the place where you receive the products, is it convenient to you? 2. What do you think of the time when you receive the products, is it punctually for you? 3. What do you think of the quality and condition of the products that you receive? 4. What do you think of the quantity and amount of the products that you receive? (Is it followed to your expected order amount?) 5. What do you think of the costs related to that you receive the products, Does it satisfy you? 6. What do you think the consistency of providing cargoes?

Source: Logistics Association China. Retrieved from: http://wenku.baidu.com/view/5aa1de7b168884868762d6be.html

Section 2

(a) Information & communication technology management

Independent Variable	Items
Information & Communication Technology Management	1. How do you think the operation situation of ICT in your companies? 2. How do you think the communication system with people outside the companies only by phone, is it easy to connect the company by customers when the line is busy? 3. How do you think the communication system with people inside the companies? 4. How do you feel the quality and speed of information flow? 5. How do you feel the frequency of the software system updating to match the increasing tasks? 6. How do you feel the frequency of the hardware system updating to match the increasing tasks? 7. How do you feel repaired service quality? 8. How do you feel the security of ICT operation? 9. How do you feel the suggestions that comes from MIS system? 10. How do you think the inquiry service from the ICT engineers? 11. How do you feel the automatic system? 12. How do you feel the cost management?

Source: Logistics Association China. Retrieved from:

http://wenku.baidu.com/view/c6b413f4f61fb7360b4c6571.html

(b) Inventory management

Independent Variable		Items
Inventory management	-	1. How do you think the inventory management policy? 2. How do you think the timing for reporting the damaged or obsoleted inventory? 3. How do you think the communication quality with people inside the companies? 4. How do you feel the inventory turnover? 5. How do you feel frequency on inventory audit? 6. How do you feel investments that company place on the inventory management equipment? 7. How do you feel amount of the obsolete or expired inventory due to excessive inventory? 8. How do you feel the amount of miss selling due to the out of stock? 9. How do you feel the flexibility your company has relating amount of order from customers? 10. How do you feel the cost management?

Source: Logistics Association China. Retrieved from: http://wenku.baidu.com/view/980b7e8c84868762caaed572.html

(c) Facilities & warehouses management

Independent Variable	Items
Facilities & warehouses management	1. How do you think the location of facilities and warehouses? 2. How do you think the layout of the facilities and warehouses (is it easy for the workers to access and put in or out the cargoes)? 3. How do you think work environment for worker in the facilities and warehouses? 4. How do you feel safety of the facilities and warehouses (including the safe sign, emergency exit sign, etc.)? 5. How do you generally feel processes of inventory into the facilities and warehouses (including fast movement and fast dealing procedure, accurate quantity amount of cargo)? 6. How do you generally feel processes of inventory out of the facilities and warehouses (including fast movement and fast dealing procedure, accurate quantity amount of cargo)? 7. How do you feel differences between the amount of the actual inventory and the amount in the record? 8. How do you feel the operation equipments in the facilities and warehouses? 9 How do you feel the speed of package? 10 How do you feel the speed of unpackage? 11. How do you feel the speed of load on the vehicle? 12. How do you feel the speed of unload off the

	vehicle? 13. How do you feel quality of the inventory storage? (How do you generally feel the condition of cargoes just finishing producing compared the condition stored in the warehouse?) 14. How do you feel the security of the inventory? 15. How do you feel the cost management?

Source: Logistics Association China. Retrieved from: http://wenku.baidu.com/view/782ebd60a98271fe910ef929.html

(d) Transportation management

Independent Variable	**Items**
Transportation - management	1. What do think of the issues that arrival vehicles punctually? 2. What do you think of the transporting capacity supported by the vehicles, which relates to being fit the requirements of transportation? 3. How do you think the transportation accessibility to everywhere (last meter transporting is achieved)? 4. How do you feel the flexibility the transportation has relating amount of order from customer? 5. How do you generally feel the condition of cargoes received by customer compared the condition in the warehouse? 6. How do you feel the transportation servicer related to on-time deliveries of cargoes to the customers?

	7. How do you feel the competitive rate? 8. How do you feel the cost management? 9. How do you feel the assistance from carriers on handling damage and loss claims? 10. How do you feel the carriers' attitude related to problems and complaints? 11 How do you feel the consistency of the transportation? 12 How do you feel the information prompted related to the transportation? 13. How do you feel the honesty of the carriers? 14. How do you feel the safety of transportation since many materials of battery are dangerous cargoes?

Source: Logistics Association China. Received from: http://www.doc88.com/p-784378417763.html

(e) Sourcing & purchasing management

Independent Variable	**Items**
Sourcing & purchasing management	1. What do think of the quality of materials purchased? 2. What do you think of the cost of materials purchased? 3. What do you think the ratio about quality to cost? 4. How do you think the post-transaction service? 5. How do you think the consistency of

	materials provided? 6. How do you think of the quality of communication and cooperation within organization during the purchasing and sourcing activities? 7. How do you think of the quality of communication and cooperation with suppliers during the purchasing and sourcing activities?

Source: Logistics Association China. Received from: http://wenku.baidu.com/view/de9faf4fe518964bcf847c85.html

(f) General factors affecting the organizational performance

Independent Variable	**Items**
General factors affecting the organizational performance -	1. What do think of the structure of the company? 2. What do you think of organizational goals, vision and culture in the company? 3. How do you feel the extent to which the goals, vision and culture spreads throughout the company? 4. What do you think of Management style in the company? 5. How do you think the Organization communication process in the company? 6. How do you think the HR management in the company? 7. How do you think of the technology in the company? 8. How do you think of the financial support in the company?

Source: Douglas, etc.(1998)

3.6 Data collection

3.6.1 Background of the battery industry in China

According to Liu Yan-long (2010) reported, sales in the battery industries was over RMB 263 billion crossing the China. Due to the green energy was introduced; electric power for car will be used in huge quantity instead of petroleum, which will create a big potential demand on the battery; meanwhile the normal home-using battery (3A, 5A, 7A and relative laptop and hand-phone battery) keeps its amount of sales with slightly increasing; Based on the China Lead-acid Battery Industry Report, there are some features as below:

a. Raw material price is highly sensitive.

b. Policies affect supply and demand.

c. Integration of industrial chains becomes a key development strategy for enterprises.

d. New energy storage batteries become a hot spot for investment.

3.6.2 Population and the amount of sampling

In this study, the object of investigating will be the managers in the logistics department in battery companies Guangxi, China. The population is all the logistics managers from all fifteen (15) battery companies in the Guangxi, China, the sample is the all the managers from ten (10) battery companies from Guangxi, China.

3.6.3 Unit of analysis

The unit of analysis for this study is the manager from the 10 companies randomly selected.

3.6.4 Data collection procedure

In order to make sure the smoothness of the research process, initial contacts with the ten (10) battery companies which are randomly selected, were made in March 2013 by phone. In those contacts, the sample of copy of questionnaire was faxed to them. Then the companies will copy those questionnaires and assigned those questionnaires to relative managers. At the last researcher (me) will collect those questionnaires in different companies. The actual data collection duration was conducted from April 15th, 2013 until May 7th. As the result, 30 sets questionnaires were collected finally from those ten (10) selected randomly companies

3.7 Data analysis

3.7.1 Technique of analysis

Two statistical methods will be used to analyze the data collected from respondents. In this study, the Statistical Package for the Social Sciences (SP 16.0) will be used for the data analysis.

3.7.2 Correlation analysis

Correlation analysis is to analyze the relationships among variables. The correlation coefficient is a measure of linear association between two variables. Values of the correlation coefficient are always between -1 and +1.

3.8 Conclusion

This chapter has discussed the methodology of this research, including the research framework, the population and sampling, the selection of respondents, the development of questionnaire, the data collection and statistical analysis method adopted in this research. The results these tests will be reported in the next chapter, chapter 4.

CHAPTER 4

FINDINGS

4.1 Introduction

This chapter is to present the results of the study. The data was analyzed mainly by using Pearson Correlation.

4.2 Overview of data collection

A total of 30 questionnaires were collected from ten (10) battery companies.

4.3 Data analysis

This section will discuss the results of the statistical analysis, including reliability test and correlation Analysis.

4.3.1 Reliability test

Table 4.1

Reliability coefficient of the study variables

Variable	Total items	No. of deleted	Alpha Coefficient
Cs	6	None	0.714
ICT	12	None	0.812
IM	10	None	0.822
FWM	15	None	0.688
TM	14	None	0.839
SPM	7	None	0.816
GF	8	None	0.838

The reliability tests were used to exam the initial consistency of this project paper. The test is employed to ensure that the developed factors have ability to keep the consistency with items which are intended to be measured. The reliability coefficient of the study variable exceeding 0.60 will be considered in acceptable level (Craig & Charles, 2008). In this study, all the tests will be considered as effective, since Cronbach's alpha for the customer service level is 0.714, for the information and communication management is 0.812, for the inventory management is 0.822, for the facilities and warehouses management is 0.688, for transportation management is 0.839, for the sourcing and purchasing management is 0.816,

and finally for the general factors in perspective of organization management is 0.838.

4.3.2 Correlation analysis

The Pearson correlation is used to measure the significance of linear bivariate between the independent and dependent variables in the study (Craig & Charles, 2008). Perfect positive correlation (r) would be said between two variable when it is represented by 1.0 (positive 1) while perfect negative correlation if -1.0 (negative 1). Significance between two variable need to be known where if $p = 0.05$, it indicated that 95 times out of 100 is a significant correlation, and only 5% chance that the relationship is not truly exist. The following table shows the relationship between customer service level (the output of logistics system) and the 6 variables. The result indicates that:

a. There is relationship between information & communication technology management and customer service level.

b. There is relationship between inventory management and customer service level.

c. There is relationship between facilities & warehouse management and customer service level.

d. There is relationship between transportation management and customer service level.

e. There is relationship between sourcing & purchasing management and customer service level.

f. There is relationship between general supports from other functions and customer service level.

Correlations between variables

Table 4.2

Correlations

		CS	ICT	IM	FWM	TM	SPM	GF	OVER
CS	Pearson Correlation	1	.744(**)	.389(**)	.512(**)	.833(**)	.396(**)	.298(**)	.553(**)
	Sig. (2-tailed)		.000	.000	.002	.000	.000	.000	.000
	N	30	30	30	30	30	30	30	30
ICT	Pearson Correlation	.744(**)	1	.389(**)	.298(**)	.431(**)	.295(**)	.245(**)	.577(**)
	Sig. (2-tailed)	.000		.000	.004	.000	.004	.002	.000
	N	30	30	30	30	30	30	30	30
IM	Pearson Correlation	.389(**)	.389(**)	1	.001	.365(**)	.034(**)	.332(**)	.220(**)
	Sig. (2-tailed)	.000	.000		.994	.000	.749	.001	.035
	N	30	30	30	30	30	30	30	30
FWM	Pearson Correlation	.512(**)	.298(**)	.001	1	.385(**)	.513(**)	.423(**)	.355(**)
	Sig. (2-tailed)	.002	.004	.994		.000	.000	.000	.001
	N	30	30	30	30	30	30	30	30

TM	Pearson Correlation	.833(**)	.431(**)	.365(**)	.385(**)	1	.429(**)	.231(**)	.368(**)
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.005	.000
	N	30	30	30	30	30	30	30	30
SPM	Pearson Correlation	.396(**)	.295(**)	.034(**)	.513(**)	.429(**)	1	.211(**)	.723(**)
	Sig. (2-tailed)	.000	.004	.749	.000	.000		.006	.000
	N	30	30	30	30	30	30	30	30
GF	Pearson Correlation	.298(**)	.245(**)	.332(**)	.423(**)	.231(**)	.211(**)	1	.357(**)
	Sig (2-tailed)	.000	.002	.001	.000	.005	.006		.000
	N	30	30	30	30	30	30	30	30
OVE	Pearson Correlation	.553(**)	.577(**)	.220(**)	.355(**)	.368(**)	.723(**)	.357(**)	1
	Sig. (2-tailed)	.000	.000	.035	.001	.000	.000	.000	
	N	30	30	30	30	30	30	30	30

Correlation is significant at the 0.05 level (2-tailed).

Among those factors, from the table, we can see that, the ranking related to the most significant relationship with customer service level, is Transportation management> Information & communication technology management> Facilities & warehouses management> Sourcing & purchasing management> Inventory management> General factors in perspective of organization management.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter attempts to interpret the key findings. It provides a summary and discussion on the result of analyses provided in chapter 4. This chapter also examines on limitation of this study and provides its recommendation for future research.

5.2 Discussion

As stated in chapter 1, the purpose of this study is:

a. To examine the relationship between information & communication technology management and customer service level.

b. To examine the relationship between inventory management and customer service level.

c. To examine the relationship between facilities & warehouse management and customer service level.

d. To examine the relationship between transportation management and customer service level.

e. To examine the relationship between sourcing & purchasing management and customer service level.

f. To examine the relationship between general factors affecting the organization performance in perspective of general organizational management and customer service level.

5.2.1 Information & communication technology management (ICT) and customer service level

The analyses indicated that there was a positive relationship between the information & communication technology management (ICT) and customer service level.

Through adequate and updated of the hardware system and software system of ICT, the companies in battery industry have much better communication quality with their customers and supplies; meanwhile that also make information flow more fluent in the organization. Better repair and inquiry services will definitely ensure to the fluency of information by ensuring the information systems function. The people are one who directly used or implement those systems. Thus ICT training, which make the employees become professional on ICT, also has positive relationship with the ICT performance. Eventually there are four elements to perform the ICT in a high level, which are the software system, hardware system, the repaired & relative-support engineers and the operators.

Information & communication technology management plays significant

roles in the customer service. It directly affects smoothness of the all activities throughout the all supply chain, as result lead-time will be decreased. Meanwhile by the better communication with customers and suppliers, the companies can forecast much more accurately, as result the manufacturer is able to produce the products as required by the customers on time. The reason is that they can get timely feedback and requirement from their customers much more easily. Implement on automatic technology with ICT (barcode, RFID) improves the quality of material flow and decrease human labor. As result, it helps the companies "getting right products to the right customers in right quantities at the right time and right cost" for improving the customer service level. In addition, by gathering information from suppliers, customers and the companies themselves, decision support system are able to improve the quality of decision-making process, with objective of helping the manager and staff solves the problems for making better strategies.

5.2.2 Inventory management and customer service level

To have a good inventory management, there must be a good checking and report policy to ensure that the quantity of actual inventory in warehouse is the same with quantity of inventory in the account book. A better communication with the marketing sector in the company or customers outside the company, needs the support of an excellent information and

communication technology; and in this way, the excessive inventory or inventory insufficiency happening can be prevent effectively.

According to the results, inventory management is positively correlated with the customer service level in battery industry in Guangxi. Inappropriate inventory management may cause problems for customer service quality in three ways:

First, if the company has excessive inventory, it will require more cost to maintain more warehouse space and it also will have risk of products expiration. Thus the total inventory cost will increase, and customer cannot get the product at the right price.

Second, if the company minimizes the carrying cost through simply reducing inventory, the possibility of the stock out and miss selling will be higher. Customer service quality will decrease due to they cannot get the right products in the right quantity.

Third, the companies spend excessive money to over investigate the customers' need to keep an optimum inventory level, which can fulfill customer needs and has no excessive inventory; but it may increase research cost which is higher than cost of carrying inventory or miss-selling, then the total cost will increase. As result, the customer cannot get the products at the

right cost.

Poor inventory management will make the customer service level and the business opportunities lower. Thus the planning of inventory management is significant. During planning the inventory management, the organizations must balance inventory carrying costs with other logistics costs, such as transportation cost, information management cost (marketing research cost). By maintaining the suitable inventory and lowering relative costs, the customer service quality "getting the right product to the customers at the right quantities and right cost" can be definitely improved.

5.2.3 Facilities & warehouses management and customer service level

To have a good facilities & warehouses management, during the planning processing, the manager must consider the location, the layout, and the work environment of the warehouse, because those factors has good scores following that the warehouses or facilities management has good scores total .

From the analysis, there is conclusion that, there is positive relationship between warehouses & facilities management. The speed of the package, unpackage, picking order, loading and unloading, the outbound or inbound activities, will definitely affect the total lead time; and it relates to the customer service level in terms of at the right time. Storage is the main

function in the warehouse, it relates on what kind of quality & condition the products are provided to customers. A good storage management may lead a good storage environment, and a good security, which will prevent the inventory damage or lost happening. Choosing a suitable storage location not only can decrease the transportation cost, order cycle time, but also can increase local transportation availability. Thus there is inference that the whole the logistics system will be affected by facilities & warehouses management.

In summary an excellent facilities & warehouses management is important to the customer service, since it related to provide the right cargo in the right quantities and right conditions, at the right cost and the right time to the customer. In addition, implement on ICT and automatic system also can help the facilities or warehouses activities become smooth.

5.2.4 Transportation management and customer service level

Based on the result of the analyses, it proves that there is positive significant relationship between transportation management and customer service level. A good transportation management can ensure the consistency of service and decrease the lead time, which will decrease inventory carry level to reduce the inventory carry cost. As the result, high customer service performance "getting the product to the customer at the

right time and right cost" will be achieved. When the cargoes were loaded into the vehicles, the cargoes are stored in the vehicles, then the storage services occur. Thus, the transportation service also will relate to the responsibility of keeping the cargoes in the original characteristics, which will directly affect the term of "right products" in the customer service performance. Transportation capacity also will affect the quantity of cargoes that customers receive, thus, it also effect the customer service quality "getting the products at the right quantity". An good schedule and route planning supported by decision making system can decrease transportation cost by maximum using the spare capacity, which will decrease the cost, then the customer service level will increase since it achieves the term of "at the right cost", and with the help information technology and automatic technology, the cargoes will be easy to easy to handle and load or unload the vehicle, then the total lead time also will decease to improve the customer service level by achieving the term "at the right time".

5.2.5 Purchasing & sourcing management and customer service level

Based on the analysis, it indicates that there is a positive relationship between purchasing & sourcing management and customer service level. Choosing suitable suppliers and managing well relationship with suppliers by excellent communication, can help the producing activities operate

smoothly, which can indirectly affect the customer service quality "getting the right product in right quantity to the customer".

Besides that an excellent purchasing and sourcing management can help the companies handle total logistics cost at the minimum level, through balancing the order processing cost and inventory cost with the saving from speculative purchasing and saving from economy of scale relating on handling and transporting materials, which can affect customer service level in terms of "at the right cost".

5.2.6 *General factors affecting the organization performance in perspective of general organizational management and customer service level*

In the analysis, it proves that there is relationship between customer service level and general factors affecting the organization performance in perspective of general organizational management. The organization needs the good organizational characteristics to facilitate the completion of the task, improving the organizational performance. The organizational characteristics not only relate to how to motivate those employees by organizational culture, but also relate to assign them the work legitimately to ensure all logistics activities operate smoothly by organizational structure. Besides that better communication management in the organization may also increase the abilities of cooperation, making the logistics activities

smooth. In addition management style will have similar effect with culture, increasing employees working commitment to make they have wills to work, and then the organizational performance will increase. Human and employees are crucial to affect the logistics performance, since work performance actually is "made" from them. Financial assistance helps the organization to get the right people (including training and recruiting) and right equipments. Conformity or consistency of right people and right equipments will happen by assistance of excellent technology management, with the objectives of helping organization to achieve goals and to improve logistics performance.

5.3 Limitation of the study

This study has some limitations as listed below:

1. The present project paper just concentrated on the managers in battery industry companies in Guangxi, China. Therefore, the result of study could not be generalized to other industries and in other place, because it may have different cultures or management systems.

2. Due to the time limitation, the data is gathered once from those companies.

3. Some articles categorize the activities of packing, unpacking, loading and

unloading into warehouses or facilities management, but some articles categorize them into transportation management. In this project paper, those activities are considered to belong to warehouses or facilities management. Thus the output of this project paper is not matched for the output of studies that categorize the packing, unpacking, loading, unloading in the transportation management.

5. 4 Contribution to knowledge

China has a hugest population in the world, but due to language problems, there is not so much research related to inside of China. This study will focus on the battery industry in Guangxi China. After collecting and analyzing date, this study will provide localized knowledge related to improve logistics performance of those battery companies. Even though there are many studies around the world related to improve logistics performance, but due to the difference of policy, economy, social-culture, technology, landform, etc., the factors will affect the total logistics performance in different levels and different ways. Thus this project paper is meant to just provide the specific knowledge to battery companies in Guangxi to improve their logistics performance.

5.5 Suggestion for the future research

For the future study, it is suggest that the reversed logistics activities should also considered the factor affecting the total logistics performance, since it relates to the post-transaction service and also the re-collection of used battery, however

due to the logistics in China just developed and the environment issue for re-collection of battery is not becoming the very hot, many companies still don't put concern on that, that is why this project paper doesn't involve this factor.

5.6 Recommendation

This study was carried out for finding the relationship between several logistics activities management, organizational factors and customer service level (the output of logistics system) in the battery industry Guangxi, China. The result recommends that companies in battery industry in Guangxi should pay more attention on the transportation management, since the transportation management has the most significant relationship with the customer service quality. Transportation can be considered as the last process to serve the customers, helping the customers getting the right products at the right time, right cost and right place, in the right quality and right quantity.

5.7 Conclusion

In the chapter 5 the researcher had discussed on the result of data analysis and offered the basis of the suggestions. This study has been conducted to find the relationship between several logistics activities management, organizational factors and customer service quality (the output of logistics system) in the battery industry Guangxi, China. It has been revealed that all factors have positive relationship with customer service level (the output of logistics system) and the

results normally were supported by most of the previous studies. Through the analyses, the transportation is the most significant factor effecting to customer service quality in battery industry in Guangxi (the output of logistics system). Consequently, the others battery companies in Guangxi, China are able to improve their logistics performance by mainly improving quality of transportation management.

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