Scaling Service Quality of Five Distribution Firms Serving E-commerce from Services Science, Management and Engineering

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Abstract: In this study, we outline business characteristics of a distribution company in the context of E-commerce spreading far and wide as well as its operation forms. Firstly, we set an indicator framework for a measurement of distribution service quality from services science, management and engineering. Then, we score five distribution firms, which engage in B-C business, through the AHP method. In this way, we concludes that among all dimensions of assessing distribution service quality for E-commerce, distribution service is the most important and information service is fairly important. Moreover, we also finds that all sampling firms have achieved superior performance in both customer and order processing services but three companies need to put a larger quantity of efforts into information service for enhancing performance of logistics distribution for E-commerce. The paper concludes with pointing out limitations and a future research direction.

Key words: Engineering, physical distribution, service quality, services science

INTRODUCTION

E-commerce is marked by shortening the time of products entering markets, providing customized services for customers, swiftly responding to customer demands, improving customer satisfaction, saving time and space, reducing transaction costs and inventories, shortening a production cycle, and increasing trade opportunities (Abe, 2005; Agatz et al., 2008). Consequently, there has been an explosion in online business. It is logistics that determines whether these merits are materialized in online dealing depends on logistics service performance. So, an increasing number of multinational firms have placed an emphasis on logistics performance. Both managers and academics have become increasingly aware of the strategic importance and value of logistics services to an E-commerce organization’s overall success as the internet, computer and information technology progress enables such procedures as online insurance (Aldin et al., 2003), ordering and payment for E-business to be carried out at a high speed except commodity delivery, which is subject to logistics. Therefore, logistics has been a critical determinant to and a significant source of competitive advantage for successful E-commerce ventures.

Physical distribution, as the final part of logistics services, has received a wide concern in the setting of increasingly growing online transactions. Physical distribution is the set of activities in connection with efficient movement of finished goods from the end of the production and operation to consumers. Physical delivery takes place within numerous wholesaling and retailing distribution channels, and includes such important decision areas as customer service, inventory control, material handling, protective packaging, order procession, transportation, warehouse site selection, and warehousing. It is part of a larger process called "distribution," which includes wholesale and retail marketing, and the physical movement of products.

Physical Distribution Service (PDS) comprises the process that supports the flow of materials and related information from point of origin (stocking location) to point of consumption (the consumer location) ranging from marketing customer service to the delivery of products. PDS focuses on three tangible result aspects:

- Inventory availability
- Timeliness in the duration of the order delivery cycle
- Reliability in order fulfillment

PDS is vital to the victory of an online business company. Although a company may have sophisticated information systems, its survival in a competitive market relies upon its ability to fulfill consumer orders economically. Scores of unsuccessful e-commerce ventures ignored this premise and devoted a considerable quantity of resources to constructing attractive sites. These businesses failed to realize that consumers do not pay E-business firms such as Internet retailers money to visit their sites. Consumers pay for goods that E-business firms must deliver (Bailey and Rabinovich, 2006). If they do not meet or exceed an acceptable level of fulfillment service, they are unlikely to hold onto their current customers or attract new ones.
However, studies on service quality at a distribution center for serving E-commerce are limited. This paper is aimed at bridging a gap in this regard by virtue of developing a model that can rate distribution service quality in logistics for E-commerce and evaluate performance of five distribution companies (Bitner, 2008; Cai et al., 2008; Zhang and Zhen, 2002; Chesbrough and Spohrer, 2006).

These sampling firms are LBEX (S1), ShenTong (S2), ZTO (S3), HuiTong (S4) and EMS (S5). LBEX Company Limited (S1), established in 2002 to provide logistic services across areas such as Hong Kong, Macao, Tai Wan, and middle-big cities across Chinese mainland, is a private express enterprise, with registered capital of 10 Million RMB, 10,000 staff and 3000 autos. ShenTong Express(S1) as one of earliest express service suppliers, established in 2007, with registered capital of 50M RMB, having a national distribution network covering areas from big cities to counties, an annual turnover reaching four Billion RMB, has been devoted to product innovation, getting involved in expanding the scope of business including distribution services for E-commerce (Cho et al., 2008; Guo, 2008). ZTO (S3), being a group company, specializing in logistics business, with 35,000 staff and 3000 offices, has dedicated itself to high quality door-to-door services, led by the philosophy of “customer-orientation and credible operation”. Huitong Express (S4), as one of earliest express service suppliers, founded in August 2003 and invested by Shanghai Zhengzhou Industrial Corporation, with its management philosophy being pooling elites and demonstrating magic power of express. EMS (S5) is an earliest supplier of express service, the biggest operator and leader in the domestic express industry, with 20,000 staff. The firm has delivered rapid and reliable door-to-door services to customers, under the guidance of the principle of “hearty, speedy and global”, fully satisfying customer and business demands at various levels.

This paper outlines business characteristics of a distribution company in the context of E-commerce spreading far and wide as well as its operation forms. Firstly, we set an indicator framework for a measurement of distribution service quality from services science, management, and engineering. After that, we score five distribution firms, which engage in B-C business, through the AHP method. We concludes that among all dimensions of assessing distribution service quality for E-commerce, distribution service is the most important and information service is fairly important. Moreover, we also finds that all sampling firms have achieved superior performance in both customer and order processing services but three companies need to put a larger quantity of efforts into information service for enhancing performance of logistics distribution for E-commerce. In this way, the paper concludes with pointing out limitations and a future research direction.

**THEORETIC ANALYSIS**

**Services science**: The growth and dominance of service sectors have enabled services science (Services Science, Management, and Engineering (SSME)) to become a primary concern so that researchers define it using different analysis. One conceptual foundation for services science research is service-dominant logic (vs. goods-dominant logic). This conceptual framework is built on the concepts of operant resources, resourcing, servicing and experiencing, value proposing, dialog, value-creation networks, collaborative marketing, etc. Operant resources are often intangible (e.g. knowledge and skills) and are capable of acting on operand resources (e.g. natural resources) and/or other operant resources. Resourcing has three essential aspects: resource creation, resource integration and resistance removal.

Generally, the definition of services science is not conclusive in the academic circle. Different perspectives are used by scholars to explain services science:

- From the discipline perspective. SSME is a cross-multi discipline of computer science, operational research, industrial engineering, math, management science, decision-making, and law science. Spohrer and Magliop (2005) defines SSME as a science which applies theories of science, management and engineering into jointly completing a specific lucrative task by a person, or an institution or a system with another person, another institution or another system. Guo (2008) holds that services science is a modern advanced science of management to be directed at probing into the relationship between the managing and the managed for entering into a fine interactive relationship.
- From the systematic viewpoint, serving system is a major researched object in SSME. Maglio et al. (2006) maintain that services science studies how a system develops the use of its resources to mutually benefit itself and another system, focusing on services innovation. Spohrer and Riehen (2006) point out that SSME resolves complicated practical problems through synthesizing various analytic methods from disciplines such as service science, management and engineering. Besides, SSME is a cross disciplinary approach on researching, designing and implementing a servicing system which is made up of personnel, internal and external systems of technology, and shared information to create value for customers.
- From the value-creating outlook, the role that SSME plays in services innovation and optimization during...
From contents to be researched, in which innovation significance of logistics service suppliers has increased in (Rabinovich and Knemeyer, 2006). In their terms, the reveal that this has not been totally materialized background, though the experiences of the past decade relationship has been broken in the e-commerce flow of goods, information, and cash. However, this linear logistics services are established to facilitate an efficient attention in an e-commerce background. Conventionally, et al. on corporation performance in a traditional context (Yang profoundly explored concerning the function of logistics Literature of logistics function:

Rapidly becoming the key driver of socio-economic growth (Paton and Mclaughlin, 2008). The factors in connection with logistics are experienced by clients after making payments, and are frequently grouped as one of the post-purchase factors. Studies have found that customers generally considered physical delivery as a very important factor (Agatz et al., 2008) and that logistics capability is positively associated with firm performance in the computer and consumer electronics retailing industry (Cho et al., 2008) and container shipping services (Yang et al., 2009). A great deal has been written about the “last mile” of internet supply chains (Kull et al., 2007). Failure of many dotcom enterprises is in general due to their incapability of fulfilling their online promises for insufficient logistics booster (Rutner et al., 2003). Important sources of customer dissatisfaction arises either due to late arrival (or non arrival) of the good, accuracy of the order and/or due to damaged goods.

Overdue arrival of the commodity would often make customers wait for the commodity with compounded anxiety levels. Logistics performance mostly copies with delivery velocity and reliability but a few studies have also comprised responsiveness, communication, order-handling and distribution, in the scope of logistics (Cho et al., 2008). Esper et al. (2003) have considered four logistics-related variables (delivery time, product condition, delivery satisfaction expectations and carrier reliability) in their analysis and have found that they are more conducive to retail merchants enjoying higher awareness. Lee and Whang (2001) have put forward five logistics strategies to fill online orders: logistics postponement, dematerialization, resource exchange, leveraged shipments and click-and-mortar. In a word, logistics performance can be improved by employing multichannel distribution, and most multi-channel e-tailors offer online consumers the option to return product via offline stores, which is greatly valued by customers (Agatz et al., 2008). The logistic platform for e-commerce fulfillment is made up of logistics structure (e.g., direct distribution or via distribution centers), logistics processes (e.g., order-handling, storing, packing and transportation), and systems for information and reporting (Aldin et al., 2007). It is of importance that goods reach customers from warehouses intact. Studies showed that firms employing reliable carriers for delivery had better

Literature of logistics function: Much has been profoundly explored concerning the function of logistics on corporation performance in a traditional context (Yang et al., 2009), but this topic has not received sufficient attention in an e-commerce background. Conventionally, logistics services are established to facilitate an efficient flow of goods, information, and cash. However, this linear relationship has been broken in the e-commerce background, though the experiences of the past decade reveal that this has not been totally materialized (Rabinovich and Knemeyer, 2006). In their terms, the significance of logistics service suppliers has increased in the electronic marketplace. They have classified the logistics services in the e-commerce situation on the ground of service-form (information-based and physical-asset based) and hub-functionality (buyer-focused, supplier-focused and delivery-focused). Bailey and Rabinovich (2006) have deal with the effects of inventory delay and speculation on e-commerce activities, finding that two key merchandise characteristics--popularity and vintage-were drivers in internet retailers’ decisions to put off their inventory. Logistics is critical to guaranteeing customer loyalty.
sufficient arrangements to process the products returned by customers is an important factor in the competitive market. This issue of reverse logistics is increasingly becoming a crucial concern in e-commerce transactions.

**Logistics service measurement:** Much has been studied on logistics service quality in current literature for many years. (Frederick, 1974) proposed the theory of 7 Rs, maintaining that distribution service delivers suitable customers the products or services of an appropriate quantity and quality at a proper cost and at a proper place and time, causing them time and place utilities. Lalonde and Zinzez defined logistics as a set of activities aimed at satisfying customer needs, insuring customer satisfaction and winning enterprise recognition in 1976. (John, 1989) summarized indicators for scaling physical distribution service quality from twenty-six aspects. John et al. (2001) proposed the customer-oriented LSQ model based on the time process of logistics services. (Jukka et al., 2001) employed AHP to evaluate distributing service quality through indicators such as liability, order cycle, quality/price ratio and value-added service. (John, 2004) proposed the concept of two stage logistics service on the process basis and customer oriented models of logistics service quality. (Wang, 2000) thought that concrete indicators for measuring logistics service quality are mainly time, cost, quantity and quality. (Zhang and Zhen, 2002) dealt with the topics concerning the aging of indicators and explored the establishment of logistics service quality and operation. But little is done on distribution service quality for E-commerce.

**Features of logistics distribution services in an e-commerce context:** Logistics is the management of the flow of goods and services between the point of origin and the point of consumption in order to meet the requirements of customers. Logistics involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, and often security. In the context of E-commerce, a higher requirement is placed on a logistics system. Concretely, the system needs to be capable of adapting a small batch of goods, multi-varieties of goods, massive customers, and delivering goods just in time (fast in-and fast-out), and rapidly picking goods and timely responding to orders. And a corresponding logistics process should keep pace with high-speed E-commerce development, fulfilling functions such as system linking, order tracing, returning goods, online management, and inquiry. What is more, the logistics network should cover a broad range because E-commerce clients spread far and wide across the whole country and product management by E-commerce companies, which must deal with problems from specifications, colors, sizes and an increasingly improvement of customer demands, is getting more meticulous and complex.

Furthermore, consumers, as purchasers, expect to gain desired buying experiences at anytime and anywhere from E-commerce. For instance, whether delivery can be swifter and whether a distribution center can install furniture after having delivered it to its customer. To do this, a logistics company should afford a stop-typed or an integration solution to logistics services.

According to Tao Gong, vice president at Tao Bao Shopping Department, E-business has shifted retailers’ serving commitments to a logistic firm, requiring it to offer more value-added services as well as storing, packaging, transporting, and delivering. And these value-added offerings are equivalent to transferring the functions of a counter to a distribution center, even a courier.

Delivery to door, as an indispensable part of E-commerce process, has a direct bearing on customers’ buying experience so a competitive spotlight of E-commerce in the future will be in buyers’ shopping experience. As a result, it is the companies which will furnish consumers with the most content purchasing experience that can create a surplus and survive in the scenario of fierce competition.

Therefore, the distribution center of a logistics enterprise plays an important part in the success of E-business and serves to improving logistics service quality, lowering costs, and increasing core competiveness and comparative advantages. Studies have demonstrated that a logistics distribution center in the context of E-business gets involved in production, wholesales, distribution and consumer services and the forms of its operations are of diversification.

On the basis of all above analysis, we make the comparison of traditional and E-commerce distribution companies in services (Table 1).

**SPECIFICATION AND METHODOLOGY**

**Model of measuring service quality:** Based on all above analysis, specifically SSME, we design the following model to calculate a composite index $Y$ for service quality of a distribution company from four dimensions:

$$
Y = \sum_{i=1}^{4} W_i X_i
$$

where $\sum_{i=1}^{4} W_i = 1$, $w_i$ is the weight of an indicator and $X_i (i = 1, 2, 3, 4)$ denotes the score of an indicator (Table 2).
Table 1: Comparison of traditional and e-commerce distribution centers

<table>
<thead>
<tr>
<th>Distribution center</th>
<th>Function</th>
<th>Space</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>Material custody</td>
<td>All for custody</td>
<td>In the plane manner</td>
</tr>
<tr>
<td>E-commerce</td>
<td>Storing custody preparing goods sorting circulation-processing</td>
<td>Half for custody, half for other functions</td>
<td>By the process of a circulating center strict work management</td>
</tr>
<tr>
<td>Information feature</td>
<td>Information processing &amp; disseminating</td>
<td>Automation work</td>
<td>Adaptability to logistics diversity</td>
</tr>
<tr>
<td>Conditions of goods different from real information</td>
<td>Artificial</td>
<td>Artificial</td>
<td>Not adapt</td>
</tr>
<tr>
<td>Identical</td>
<td>By information system</td>
<td>Automatically</td>
<td>Adapt</td>
</tr>
</tbody>
</table>

Table 2: Service quality indicators of a distribution center

<table>
<thead>
<tr>
<th>Target layer Y</th>
<th>Indicator layer x, (criteria layer)</th>
<th>Sub-indicator layer Xij</th>
<th>Distribution service quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distribution</td>
<td>Order processing</td>
<td>Information service</td>
</tr>
<tr>
<td></td>
<td>X1</td>
<td>X2</td>
<td>X3</td>
</tr>
<tr>
<td>Transport service X11</td>
<td>Time X11</td>
<td>Information quality X11</td>
<td>Complaint rate X11</td>
</tr>
<tr>
<td>storage service X12</td>
<td>accuracy X12</td>
<td>customer information management X12</td>
<td>satisfaction rate X12</td>
</tr>
<tr>
<td>mistake handling X13</td>
<td>information X13</td>
<td>service expense X13</td>
<td>staff qualification X13</td>
</tr>
</tbody>
</table>

The following model is established for calculating $X_i$ ($i = 1, 2, 3, 4$):

$$X_i = \sum W_{ij} X_{ij}$$  (2)

where $\sum W_{ij} = 1$, $j = 1, 2, 3, 4$ and $W_{ij}$ denotes the weight of an sub-indicator $X_{ij}$ under the category of criteria layer $i$. More details regarding $W_i$ and $W_{ij}$ are shown on Table 4 and 5.

AHP: For the first part, this paper is to examine the relative weights among the factors that affect service quality. The phenomenon under study is viewed as a Multi Criteria Analysis (MCA) problem. To solve this MCA problem, an Analytic Hierarchical Process (AHP) proposed by (Saaty, 1980). The AHP method uses pair wise comparisons of attributes in the decision making process. This process is called the importance intensity of the reasons (attributes) affecting the decision. Pair wise comparison can be used to determine the priorities of each pair of criteria, indicating the strength with which one element dominates the other. It helps to quantify intangible and non-economic factors included in the factors affecting the decision. The AHP helps to rank and make decision in a rational and systematic way. Weighing can be changed according to different companies or industries, thus it is a flexible kind of data analysis. The decision makers assign an important intensity number that represents the true preference of each reason with respect to other reasons. These numbers represent the weight factors (priorities) of the reasons involved in the decision making process. The intensity importance of factor $i$ over factor $j$ is equal to $a_{ij}$ and the intensity importance of factor $j$ over $i$ is equal to $1/a_{ij}$. If we have $n$ factors to compare, we develop a matrix $A$ to represent the importance of these factors: $A_{mn} = (a_{ij})_{mn}$ ($i = 1, 2, ..., n; j = 1, 2, ..., n$).

To find the consistency of the decision maker’s judgment of assigning intensity importance to the factors considered, the following steps are suggested by Saaty (1980):

- Discover the priorities of the factors ($P_i$) by:
  - Multiplying the $n$ elements in each row in the intensity importance matrix by each other. The result is ($A_n$).
  - Take the $n$th root of $A_n$ for each row, the result is ($B_n$).
  - Normalize by dividing each number; ($B_n$) by the sum of all the numbers ($B_n$). The result is a vector $P_i$.
  - Discover the vector $F_i$ by multiplying $A_{max}$ by $P_i$.
  - Divide $F_i$ by $P_i$ to find the vector $C_i$.
  - Sum $C_i$, and divide by $n$ to find the maximum Eigen value: $\lambda_{max}$, which is the average.
  - Find consistency index $CI = (\lambda_{max} - n)/(n - 1)$.
  - Obtain access to the random index $RI$ which is given by Saaty (1980) for the number of factors used in the decision making process.
  - Attain the consistency ratio $CR = CI/RI$. Any value $CR$, if more than 0.1, is regarded as an acceptable ratio consistency.

The score of each indicator is based on questionnaires where each question has five choices: very satisfactory, satisfactory, average, dissatisfactory, and very dissatisfactory, representing 1, 0.8, 0.6, 0.4 and 0.2 point, respectively.

**EMPIRICAL ANALYSIS**

Data collection and weight calculation: We conducted an investigation to experts regarding importance of an indicator to determine its weight and made a survey of service quality to B-C customers, issuing 1000 questionnaires and getting back 928, to obtain the score of an indicator (averaging interviewees’ reply) under the
Table 3: Preference of one attribute over another and value for an indicator by consumers

<table>
<thead>
<tr>
<th>Scale</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Two elements are equally important</td>
</tr>
<tr>
<td>3</td>
<td>The former element is weakly more important than the latter one</td>
</tr>
<tr>
<td>5</td>
<td>The former element is strongly more important than the latter one</td>
</tr>
<tr>
<td>7</td>
<td>The former element is absolutely more important than the latter one</td>
</tr>
<tr>
<td>9</td>
<td>The former element is much strongly more important than the latter one</td>
</tr>
<tr>
<td>2, 4, 6 and 8</td>
<td>Middle value for above conditions</td>
</tr>
</tbody>
</table>
| Inverse | For i different from j, the i-j

Table 4: The fuzzy evaluation regarding the goal

<table>
<thead>
<tr>
<th>Distribution service X1</th>
<th>Order service X2</th>
<th>Information service X3</th>
<th>Customer service X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution service X1</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Order service X2</td>
<td>1/3</td>
<td>1</td>
<td>1/3</td>
</tr>
<tr>
<td>Information service X3</td>
<td>½</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Customer service X4</td>
<td>1/4</td>
<td>1/2</td>
<td>1/3</td>
</tr>
<tr>
<td>W'</td>
<td>0.46</td>
<td>0.14</td>
<td>0.30</td>
</tr>
<tr>
<td>Xmax</td>
<td>4.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRd</td>
<td>0.03&lt;0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Weight and consistency test

<table>
<thead>
<tr>
<th>Distribution service X1</th>
<th>Order service X2</th>
<th>Information service X3</th>
<th>Customer service X4</th>
</tr>
</thead>
<tbody>
<tr>
<td>W'</td>
<td>0.46</td>
<td>0.14</td>
<td>0.30</td>
</tr>
<tr>
<td>Wq</td>
<td>0.49</td>
<td>0.33</td>
<td>0.41</td>
</tr>
<tr>
<td>λ</td>
<td>3.05</td>
<td>3.09</td>
<td>2.06</td>
</tr>
<tr>
<td>CRd</td>
<td>0.052</td>
<td>0.087</td>
<td>0.047</td>
</tr>
</tbody>
</table>

Table 6: Index for service quality

<table>
<thead>
<tr>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>0.8</td>
<td>0.85</td>
<td>0.86</td>
<td>0.81</td>
<td>0.89</td>
</tr>
<tr>
<td>X2</td>
<td>0.85</td>
<td>0.81</td>
<td>0.89</td>
<td>0.91</td>
<td>0.91</td>
</tr>
<tr>
<td>X3</td>
<td>0.75</td>
<td>0.81</td>
<td>0.76</td>
<td>0.77</td>
<td>0.88</td>
</tr>
<tr>
<td>X4</td>
<td>0.91</td>
<td>0.89</td>
<td>0.92</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Y1</td>
<td>0.80</td>
<td>0.84</td>
<td>0.84</td>
<td>0.82</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Quality measurement: We take S as an example to demonstrate how to calculate the index for service quality through the following steps: First, according to the results from questionnaires,

$X_{11} = 0.75$, $X_{12} = 0.82$, $X_{13} = 0.85$

we calculate,

$X1 = W_1X_{11} + W_2X_{12} + W_3X_{13} = 0.80$

Then, we adopt formula (2) to compute $X_2 = 0.85$, $X_3 = 0.75$, and $X_4 = 0.91$. Finally, according to model (1), we calculate the index for $S_i$: $Y_i = 0.80$. Likewise, we attain indexes for service quality in other four distribution centers (Table 6).

It can be seen that the ranking of the five distribution centers in service quality is $S_1$, $S_2$, $S_3$, $S_4$, and $S_5$ are scored 0.88, with each criteria indicator exceeding 0.88 points, implying high-quality operation in logistics distribution service. As a matter of fact, since 2007, EMS has undertaken Post Delivery Business for E-commerce (PDDE) in 248 cities across China, including e-EMS express, which takes the form of whole journey express by land transport at a lower price than general EMS and this is helpful to saving costs for E-commerce companies as well as just-in-time service. Typically, the firm has cooperated with an E-shopping center, Tao Bao Website, getting involved in its 90% trading areas, delivering goods to 2000 cities nationwide. EMS is in an attempt to increase its service quality for meeting customer wants and expectations. And it contributes to pushing China’s E-commerce into further development and boom. The firm has constructed an information processing platform with 3000 cities being at the core, being linked with UPU information system and can globally trace EMS posts. Furthermore, it has established an information-inquiring system, which integrates a website, messages and customer calls into an organic whole one. Therefore, EMS owns a leading capability of handling information. Besides, EMS has developed an express system for E-commerce, which is able to complete business reservation and link up an express platform, an e-payment system, and two sub-systems, having fulfilling process.
informationization from start to finish. Information such as mailing feedback is delivered to customers through the E-commerce website. Consequently, it is scored 0.90 in information service, demonstrating a very satisfactory performance.

ZTO (S₂) Express ranks No 2 for obtaining a score of 0.84, demonstrating a satisfactory performance. Particularly, the company is scored 0.92 in Xn, indicating competence in customer service. As a matter fact, this firm has been rated as top 10 brands with a great effect and top 100 privately-owned service enterprises in China mainland. F. Wang, Vice President said “what customers are desirous for is perceived services as well as goods dispatched by us”. ZTO is employing service employees of high qualifications for the purpose of guaranteeing the improvement of its overall standard of service, strengthening staff training, standardizing their service modes and enhancing their teamwork spirit. Furthermore, the firm judges its staff through quantifying their performances and achievements from express processing to customers’ complaining rates and engraff them “more pay, more gain and better do, more gain”. As a result, employees’ enthusiasm for offering quality services has been growing. Additionally, ZTO has been cooperating with People’s Insurance Company of China to cover insurance for dispatched goods. Therefore, safe and swift services are delivered to customers, satisfying their needs and expectations to the full degree. Consequently, ZTO is scored 0.92 in customer service, suggesting a satisfactory customer service.

Shen Tong (S₂) is positioned as equally as ZTO, showing a satisfactory performance and is scored over 0.8 in every criteria indicator, revealing a satisfactory service in the four dimensions. In effect, after 10 years of development, ShenTong has developed a sounded and fluent Express network, covering 830 subsidiaries and 5000 stores, 62 transferring centers, and an area of 1240 Mu. Importantly, the company has set up bulky business institutions for tackling information collection, market development, physical distribution, and customer complaints. It has put one billion RMB into the development of ST E3 Express Soft System Platform, including the data collection system, the wireless GPRS data transmission system, the auto operation management system, the customer-calling center, and the E-commerce order system. Its philosophy is that ShenTong Express, just as a relative arrives, accomplishes you and me with a beautiful heart. Thus, it is good in information services for obtaining the score of 0.81, relative to three other firms, only next to S₅. Additionally, all the processes like scanning, uploading, and inquiry in connection with information are completed in the company’s internal information management system and information is controlled and managed identically by the headquarters. In 2011, ShenTong ranked China top 100 logistics enterprises, was conferred with the title of the annual influencing enterprise of China logistics industry prize, and also the best employer.

Huitong and LBEX rank bottom two, being scored 0.82 and 0.80 globally, and this is mainly attributed to a low score of 0.77 and 0.75 in information service. However, Huitong is scored 0.91 in order processing, illustrating a very satisfactory performance in this regards. LBEX accomplishes a high performance in customer service, suggested by the score of 0.91.

It is noted that scores for X₄ in the five firms are no less than 0.89, indicating that sampling firms have achieved superior performances in customer service, concretely in these areas such as complaint rates, satisfaction rates, service expenses and staff qualifications. This can be explained by companies in today’s China having accepted the idea that customers are the emperor. Five companies are scored 0.87 on the average in X₄, showing satisfactory order processing. In addition, sample 1 in delivery, S₁ in customer service, S₄ and S₅ in both order processing and customer service are scored more than 0.90, demonstrating their prominence in these areas. The points sample 2 has won in each indicator are above 0.80 and less than 0.90, showing an equilibrium development in business but without competitive advantages in some certain area. Scores for X₁ in five centers are averaged 0.79, generally revealing dissatisfactory information service despite sample S₅ having 0.88 point. For all of them, much work needs to be done in supplying satisfactory information service.

CONCLUSION AND SUGGESTIONS

This study constructs an indicator framework with a view to gauging service quality of a distribution company from the E-commerce perspective, on the ground of analyzing its features and operation forms. On this basis, the paper ranks five distribution firms by virtue of employing the AHP method. The main conclusion is that EMS ranks top, accomplishing a satisfactory service quality while Huitong and LBEX rank bottom two largely for an uncertain quality in information service shown. The paper also concludes that all sampling firms have achieved superior performance in customer service and order processing.

The article suggests that on the basis of maintaining their own comparative advantages, Huitong, LBEX and ZTO should increase input in information infrastructures, and Shentong should shape its core competitiveness in certain area, with the aim to creating added value for customers and themselves per se. Intelligibly, logistics management of E-commerce, marked by massive orders but the quantity for a single commodity to be ordered being marginal, gets involved in millions of SKUS, massive individual customers who are extensively distributed in geography, so the quantity, frequency and direction for traded goods to be delivered remains uncertain, which puts a higher requirement on a logistics
information system and operational procedures. Consequently, a logistics system for E-commerce should be automated, networked, intellectualized, and softened, in particular informationized. Therefore, these five distribution companies need to develop a more advanced and efficient logistics system and equipment so as to meet E-commerce demands.

Two important study limitations should be highlighted. First, this study’s samples were drawn from Xi’an subsidiaries which specialize in B-to-C business in which customers are end-users. Therefore, the conclusions inferred may exclude other kinds of distribution firms, for instance those companies which are engaged in B-B business. Second, all participants responded within a particular time frame and were only given a single opportunity to respond. Therefore, it cannot be reliably established whether such data would hold true over time, especially in an unstable business environment. So, this paper suggests that the more scientific standards and more pragmatic procedures for establishing an indicator framework in future research should be flexibly devised based on both a distribution company’s core business, its service level, and E-commerce’s new features, to explore problems arising from distribution activities.

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