

Big Data Era for Small and Medium-sized Enterprise E-commerce Outsourcing Problem Research^{*}

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Abstract

In recent years, with the rapid development of information and network, lots of enterprise involved in electronic commerce which makes the data level show exponential growth. With the rapid accumulation of e-commerce data, the enterprise comes into the era of big data. In that circumstance, how to seize the opportunity to gain the profit by using the big data and e-commerce becomes an important issue in enterprise management. Outsourcing will be one of the mainstreams of traditional enterprises to develop e-commerce. Basing on the theory of e-commerce service, this paper discusses the decision basis and feasibility of the implementation of the outsourcing service for domestic small and medium-sized enterprise. This paper also analyses the main factors in decision-making for outsourcing service, and presents the attentions and mode choices. Thus it provides theoretical method guidance for enterprises.

Keywords: *Big Data; Small and Medium-sized Enterprise; E-commerce; Outsourcing*

1 INTRODUCTION

China's e-commerce industry ushered in the explosive growth, electronic business service industry also obtained fast development. Besides the pure e-commerce enterprises such as integrated e-commerce platform, B2C mall, network brand, traditional retailers, brands, distributors are also involved in e-commerce. But network business operating methods are different from the traditional ones; it is counting on large of data. Since traditional enterprises lack of data management experience and e-commerce operation experience, therefore, the third-party e-commerce service operators arises at the historic moment, to help the traditional enterprise to dealing with online business in big data's era.

2 BIG DATA OF E-COMMERCE

2.1 Definition of E-Commerce Big Data

As the development trend of global IT, big data has not yet been definitely unified. Usually there are two main types description for big data. One is put forward by The McKinsey global institute in May, 2011, in a paper entitled "Big data: The next frontier for innovation, competition, and the productivity. The report said that:" Big data refers to the size is beyond the traditional database tool collection, storage, management and analytical data sets." [1] Another definition to identify big data is by using the basis key characteristics, also as known as the 4v characteristics of large data: Volume, Variable, Velocity, and Value. [2]

Electronic commerce big data is not only 4v; its core is after the accumulation and analysis of big data. From

^{*}The research is financially supported by Natural Science Foundation of Liaoning Province (201204796) and Outstanding Scientific and Technological Personnel Support Plan of Higher School in Liaoning Province (LR2011037).

quantity to quality, the analysis of data will mining the correlation, demonstrate its value in application. Data in electronic commerce each link has the outstanding characteristics, namely, its simplicity and ease of access to data. E-commerce business model is basic fixed, so there is plenty structured or at least semi-structured data in the users purchasing, payment, logistics, management and other process. Using big data technology can effectively deepen and expand the business intelligence of the enterprise, improve the level of decision-making, driven decision-making mechanism, promote enterprise data management into the new stage.

2.2 Content of E-commerce Big Data

Small and medium-sized enterprise to do e-commerce is driving favourable business outcomes from Big Data in a variety of ways. Including the following aspects [3]:

Personalization: Consumers shop with the same retailer via different channels, and data from these multiple touch points can be processed in real-time to offer the shopper a personalized experience, including special content and promotions.

Dynamic Pricing: E-commerce needs dynamic pricing if their products are to compete on price with others. This requires taking data from multiple sources, such as competitor pricing, product sales, regional preferences and customer actions -- to determine the right price to close the sale.

Customer Service: Excellent customer service is critical to the success of an e-commerce site. If a customer has complained via the contact form on your online store and also tweeted about it, it will be good to have this background when he calls customer service. This will make the customer feel valued.

Supply Chain Visibility: Customers expect to know the exact availability, status and location of their orders. This can get complicated for e-commerce companies if multiple third parties, such as warehousing and transportation providers, are involved in the supply chain. E-commerce companies must be able to quickly gather information from multiple parties on multiple products in order to accurately convey expected delivery timetables to customers.

Predictive Analytics: Big Data can help e-commerce companies identify events before they occur. This is called "predictive analytics." Such as identifying sales patterns from previous timeframes to better predict and manage inventory needs and avoid key out-of-stock products in the next go-around.

For e-commerce the common thread running through these is big data intelligence. In many cases, intelligence gleaned from Big Data is used to support real-time interactions. For e-commerce, the turnaround time for Big Data-driven information requests needs to be measured in minutes or even seconds rather than days.

3 E-COMMERCE OUTSOURCING SERVICE IN BIG DATA ERA

3.1 Connotation of E-commerce Outsourcing Service

The rapid development of e-commerce, and its high efficiency and low cost in the process of enterprise management have already been showed up. More and more small and medium-sized enterprises begin to use e-commerce as a effective means to enhance the competitiveness of enterprises. But small and medium-sized enterprise is restricted by the resources such as cost, the talent, experience etc. Since it's difficult to effectively play the role of e-commerce for small and medium-sized company, e-commerce service outsourcing model arises at the historic moment. Electronic business service outsourcing is refers to enterprises contracting out of electronic business process to another part. The contractor can provide a series of professional e-commerce services by using information technology, marketing experience or other specific functions, including enterprises strategic consulting, the electronic commerce planning, e-commerce website building, online promotion activities implementation, network marketing, channel construction and standard management. Electronic business outsourcing services can help enterprises to reduce costs, obtain professional service, improve work efficiency, and meet the needs of enterprises to develop e-commerce strategy.

3.2 Necessity of Small and Medium-sized Enterprise E-commerce Outsourcing in Big Data Era

Small and medium-sized enterprises into e-commerce face many challenges. Currently the vast majority of

companies only stay in a state of the portal website waiting for customers. Without professional data analyst and e-commerce experts, the enterprise electronic commerce equals to none. Small and medium-sized enterprises who want to use e-commerce to bring business have to spend big strength to do research and predict which will apparently increasing costs.

Secondly enterprises lack of e-commerce operation experience. Small and medium-sized enterprise business itself and the limited resources decided their low innovation ability. The human cost in formation of a new e-commerce team will be a serious impediment to the enterprise network marketing business, coupled with the difference of personnel management operating experience and new team potential problems, the enterprise may lose confidence in the e-market or even cut it.

Another huge problem is the management of volume data. The operating data, customer information data, personal privacy and behaviour's data, purchasing details data can add up over TB or EB. Small and medium-sized enterprise cannot bear that large number of enterprise data's collection, storage, protection and analysis, so the risks will increase undoubtedly.

E-commerce outsourcing service is an inevitable choice for small and medium-sized enterprises. By contracting the strategic outsourcing of electronic business, enterprise can focus on its best core business and build company's core competitiveness. In the meantime outsourcing can make the enterprise appropriate downsizing, streamline institutions, get rid of unnecessary burden, travel light. With that realization, more and more small and medium-sized enterprises choose outsourcing not only to reduce costs; the most fundamental problem is to strengthen the core competitiveness of the enterprise.

3.3 Feasibility of Small and Medium-sized Enterprise E-commerce Outsourcing in Big Data Era

According to China's ministry of commerce statistics, in 2013 China's service outsourcing industry overall size is close to 1.7 trillion yuan, 167424 service outsourcing contracts. Lots of enterprise chooses outsourcing contractors are because it has many benefits for the enterprise.

1) E-commerce Outsourcing Can Effectively Reduce the Enterprise Cost

Their own e-commerce team, want to spend a lot of manpower and material resources, financial resources, a large amount of money is spent to purchase hardware and software equipment, to constantly put into talents, cultivation of professional and technical personnel and team, this will greatly increase the operating costs of enterprises. If outsourced to professional providers, the use of external resources is greatly reduced because of the talent employment or loss and risk.

2) E-commerce Outsourcing Can Reduce the Risk of Enterprise Operation

E-commerce outsourcing contractors and be bound by the contract between the enterprise and the contractor pay cost for enterprise to bring the benefits of the enterprise is proportional to the, the enterprise will cost the contractor feedback in the form of visible benefits to the enterprise. Greatly reduce the blindness of enterprise investment.

3) E-commerce Outsourcing Project Success Rate is High

Enterprises when choosing the contractor can examine contractor qualification, performance, experience, etc., effectively avoid self-built team professionals scarce, combined with the recruitment cycle is long, high management costs (staff costs frequently tens of tens of thousands of annual salary, liquidity) caused by such as low working efficiency (team need running-in). So the project success rate low, low price.

4 MAIN MODE OF E-COMMERCE OUTSOURCING IN BIG DATA ERA

E-commerce is a new business model. Implementation of e-commerce needs adjusting the strategic of product brand, management, and marketing. E-commerce involves electronic business consulting, planning, e-commerce technology, e-commerce payment on operation, product promotion, sales network design, etc. According to analysis of enterprises' business content, small and medium-sized enterprises electronic commerce outsourcing service can be divided into two modes: the whole outsourcing and parts outsourcing [4].

4.1 Whole Outsourcing Mode

Enterprises according to their own characteristics, give web design, web site maintenance, and operation of all activities to e-commerce service provider, and choose enterprise outsourcing service provider. Now good service suppliers are less, and electronic business outsourcing service choice is directly related to the success of outsourcing. It is very necessary to have a correct evaluation process when choosing service suppliers. So the main decision-making evaluation index is: service brand of suppliers, the comprehensive ability of resources integration, the ability of quick response carries out, the prestige of price and service, etc. The two sides sign the agreement after considering many factors, as the basis to abide by. The whole outsourcing is fit for enterprise is ready to implement e-commerce but lack of talents and initial experience [5].

The whole outsourcing can solve planning, marketing, channel, and so on, reduce operating costs, and the enterprise can obtain professional e-commerce platform construction and technical support to carry out their own core business.

4.2 Parts Outsourcing Mode

The parts outsourcing model is that the enterprises outsource the business they are not good at. The enterprises recombine the original business, and determine which business on their own, what outsourcing, and at the same time, also consider how to combine internal process with external process, avoiding repeat business [6]. Such as enterprise website operation maintenance, web site planning, promotion, background management system, ERP, CRM system integration, IT system hosting, etc[7].

5 INFLUENCE FACTORS OF E-COMMERCE OUTSOURCING SERVICE

5.1 Enterprise Management Concept

Implementation of e-commerce is related to update enterprise management concept. Influenced by management scale, industry background, development stage, the enterprise management ideas should keep up with the times. This requires that the contractor should have strategic vision, help contract enterprises find business opportunities actively. Improve and maintain the core competitiveness [8]. Enterprises should do further research, which non-core business can be outsourced to the contractor, which is the core business. Only when the enterprise determine their own core business, they can implement outsourcing, use outside resources to remedy their lack of enterprise resources, achieve benefits, enhance competitive advantage [9].

5.2 Technical Factors

Technical factors directly affect the development of the small and medium-sized enterprises' e-commerce, and carry out labour cooperation across the enterprise management. It is suggested that enterprises using the supply chain management thought, strengthen coordination, avoid unhealthy phenomenon. It is needed to integrate resource from different enterprises, and achieve the same goals. Through the study and communication of both sides, the enterprises display their own superiority, create more value for the e-commerce contract enterprises.

5.3 Human Factors

E-commerce operation is combined by brand credit, marketing, website construction, logistics, after-sales service, customer relationship maintenance, product positioning and other factors. For traditional enterprises to develop e-commerce business, the seven factors are all important. That means the e-commerce operational matters involved in technical level and operation level, and that needs multi-skilled persons, but the growth of talent is a ecological develop process. Although some enterprises have good ideas, the lack of talents restricts the implementation of enterprises' e-commerce. In this case, enterprises can use third-party e-commerce service power and carry out electronic business which can shorten the time of implementing e-commerce and reduce operating costs.

6 ENTERPRISING OUTSOURCING DECISION IN BIG DATA ERA

In big data era, key indicators are very important for decision making especially when enterprise making e-

commerce outsourcing decision. There are many methods, in this paper uses the analytic hierarchy process (AHP) to make the outsourcing decision. The data used in this paper can be seen in the reference [10]. Through the calculation process, a quantitative analysis method is provided, which make the decision more reasonable.

6.1 The Basic Principle of Analytic Hierarchy Process

First of all, according to the nature and requirements of the problem, put forward a overall goals, then decompose the problem according to the AHP theory, calculate the weight coefficient of the factors on the same level by comparing in pairs. This has been decomposition down, until the last layers, then get a sequence of all factors are relative with general objective. Finally provide reference for the decision-maker.

The basic steps of analytic hierarchy process can be described as follows:

First of all establish a hierarchy structure model. The structure model includes target layer, criterion layer and scheme layer.

Secondly, Structure paired comparison matrix. Compare the elements on the same level in pairs with the weight coefficient, structure judgment matrix and check the consistency. When structure judgment matrix, according to the expert, level and habits usually use scale method.(see table 1)

TABLE 1 JUDGMENT MATRIX SCALE DEFINITION

Scale	Implication
1	Equally Important
3	The former is a little important than the latter
5	The former is a obvious important than the latter
7	The former is a strongly important than the latter
9	The former is a extreme important than the latter
2,4,6,8	The intermediate value of above judgment
Inverse	Define a_{ij} a is the value of element i compares to j ,Then the Inverse is j_i ij

For the compared elements, if you think they are as important as each other, assignment 1:1,very important is 9:1,or 6:1,etc.Compare them in pairs and fill in the number, and form judgment matrix.(Judgment matrix is a positive and negative matrix with diagonal product is 1)

Then, Calculate single sorting weight vector and check consistency

- Calculate formula for consistency index

$$\lambda = \frac{1}{n} \sum_{i=1}^n \frac{(Aw)_i}{w_i} \quad (1)$$

It is the biggest characteristic root of approximation.

$$CI = \frac{\lambda - n}{n - 1} \quad (2)$$

CI = 0, A is consistent.

The larger CI is, the more serious of consistency of A.

- Random consistency index RI

TABLE 2 CONSISTENCY INDEX OF 3~11 ORDER MATRIX RANDOM

N	3	4	5	6	7	8	9	10	11
RI	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52

- Consistency ratio (used to determine the permissible range of A's inconsistency)

$$CR = \frac{CI}{RI} \quad (3)$$

When $CR < 0.1$, degree of A's inconsistency is in the allowable range, then use A's feature vector as weight vector. For each paired comparison matrix calculate the largest eigenvalues and the corresponding eigenvectors, and use consistency index and consistency ratio to check consistency. If the test through, feature vector (normalized) is the weight vector; If not, new paired comparison matrix is needed.

Finally, calculate the total order weight vector and check consistency

Calculate the lowest weight vector of the whole sort, and use total sort consistency ratio to test. If test pass, decision can be made according to the total order weight vector, or model is needed to be reconsidered.

6.2 Application Analysis

There is a e-commerce enterprise, according to its own statistical data and expert advice, gets five assessment criteria: service brand advantages, professional service level, service response speed, service quality and service offer. There are three outsourcing service providers. The hierarchical structure model is as follows:

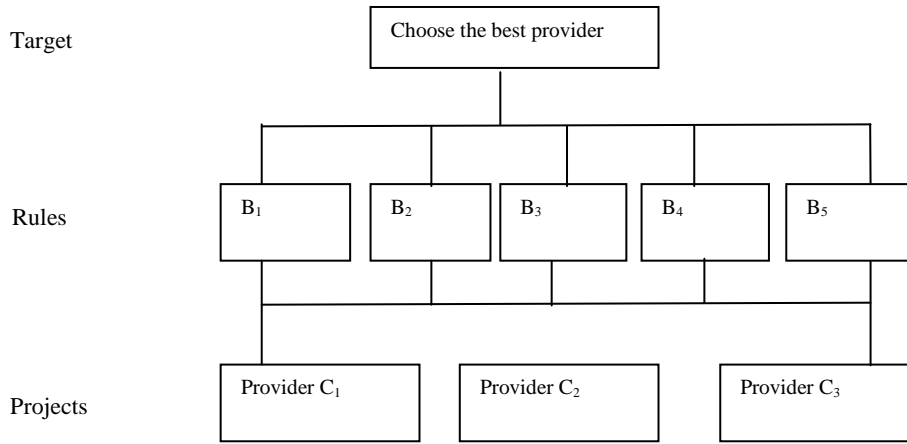


FIG 1 HIERARCHY STRUCTURE NETWORK DIAGRAM

$B_1 \sim B_5$ are service brand advantages, professional service level, service response speed, service quality and service offer respectively.

Let A-B' Judgment Matrix is:

$$A = \begin{pmatrix} 1 & 2 & 7 & 5 & 5 \\ 1/2 & 1 & 4 & 3 & 3 \\ 1/7 & 1/4 & 1 & 1/2 & 1/3 \\ 1/5 & 1/3 & 2 & 1 & 1 \\ 1/5 & 1/3 & 3 & 1 & 1 \end{pmatrix}$$

The weight vector of A is:

$$U = (0.4773, 0.2636, 0.0531, 0.0988, 0.1072)^T \quad \bar{\lambda}_{\max} = 5.0756 \quad CI = 0.0189 \quad RI = 1.12 \quad CR = 0.0169 < 0.1$$

Pass the consistency test.

Let B-C' Judgment Matrix is:

$$B_1 = \begin{bmatrix} 1 & 1/3 & 1/8 \\ 3 & 1 & 1/3 \\ 8 & 3 & 1 \end{bmatrix} \quad B_2 = \begin{bmatrix} 1 & 2 & 5 \\ 1/2 & 1 & 2 \\ 1/5 & 1/2 & 1 \end{bmatrix} \quad B_3 = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 1 & 3 \\ 1/3 & 1/3 & 1 \end{bmatrix}$$

$$B_4 = \begin{bmatrix} 1 & 3 & 4 \\ 1/3 & 1 & 1 \\ 1/4 & 1 & 1 \end{bmatrix} \quad B_5 = \begin{bmatrix} 1 & 4 & 1/2 \\ 1/4 & 1 & 1/6 \\ 2 & 6 & 1 \end{bmatrix}$$

Calculate the weight Vector of $B_1 \sim B_5$:

$$B_1: V^{(1)} = (0.0819, 0.2364, 0.6817)^T \quad \bar{\lambda}_{\max} = 3.0014 \quad CI = 0.0007 \quad RI = 0.52 \quad CR = 0.0035 < 0.1$$

$$B_2: V^{(2)} = (0.5954, 0.2763, 0.1283)^T \quad \bar{\lambda}_{\max} = 3.0055 \quad CI = 0.0028 \quad RI = 0.52 \quad CR = 0.0054 < 0.1$$

$$B_3: V^{(3)} = (0.4286, 0.4286, 0.1428)^T \quad \bar{\lambda}_{\max} = 3.00 \quad CI = 0.0 \quad RI = 0.52 \quad CR = 0.0 < 0.1$$

$$B_4: V^{(4)} = (0.6337, 0.1919, 0.1744)^T \quad \bar{\lambda}_{\max} = 3.0091 \quad CI = 0.0046 \quad RI = 0.52 \quad CR = 0.0088 < 0.1$$

$$B_5: V^{(5)} = (0.3234, 0.0890, 0.5876)^T \quad \bar{\lambda}_{\max} = 3.0093 \quad CI = 0.0047 \quad RI = 0.52 \quad CR = 0.0090 < 0.1$$

All pass the consistency test. Combination weight vector is: $W = (0.3161, 0.2369, 0.4470)$

The order of the project is:

Decision results show that among the three alternative e-commerce outsourcing service providers, 3 C 's weight greater than supplier 1 C and 2 C . So supplier 3 C is the first choice; Supplier 1 C is the second, and supplier 2 C is the final.

From the principle, steps and application of hierarchy analytic process, we can see that it is systematic, practical, and simplicity, but for some

7 CONCLUSIONS

Along with the development of social economy and information technology, the social division of labor is more and more fine, and the demand of people become more and more high, so the competition pressure of enterprises become more and more big. Therefore, having the non-core business outsourced, using the best professional team to carry out business, to reduce costs, increase efficiency, improve the core competitiveness, is the inevitable choice for most enterprises.

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