Customer Satisfaction Study of Disaster Recovery Based on IPA Model

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Abstract

As an important way of recovering data from disaster, disaster recovery technology has turned into a key issue of all the industries depend on computer software system. IPA model is used to analysis customers' satisfaction of disaster recovery outsourcing, the main factors are captured and analyzed. It is helpful to improve service quality, customers' relationship and customers' satisfaction.

Keywords: *disaster recovery; outsourcing; customers' satisfaction; IPA model*

1. Introduction

With the development of information technology，process of enterprise information continues to evolve, enterprise information construction is rapidly expanding at an unprecedented rate. At the meanwhile, the daily work of enterprise unprecedentedly depends on its computer software system. Thus, information and data security has become an unavoidable topic of all the enterprises. While emerging variety of catastrophic events bring huge economic damage and obstruct development, more and more people begin to examine the disaster resilience of their business computer information systems.

2. Literature Review

In the progress of social productive forces, production capacity surplus phenomenon appeared, service loyalty, with its final effect on repurchasing by customers, appears to have received relatively more and more attention, changes in consumer demand and satisfaction have become the focus of the market. Since 1960s, customer satisfaction theory began to rise gradually.

Gilbert A. Churchill(1982) investigates that whether it is necessary to include disconfirmation as an intervening variable affecting satisfaction as is commonly argued, or whether the effect of disconfirmation is adequately captured by expectation and perceived performance. Further, they model the process for two types of products, a durable and a nondurable good, using experimental procedures in which three levels of expectations and three levels of performance are manipulated for each product in a factorial design [1]. Tor Wallin Andreassen, Bodil Lindestad (1990) discuss and test corporate image and customer satisfaction as two routes to customer loyalty. Based on data from 600 individual customers categorized as having high or low service expertise of three companies within the package tour industry, a conceptual model is proposed and tested empirically using structural equation modeling [2]. Steven A. Taylor, Thomas L. Baker(1994) designed to aid in the understanding of these relationships by empirically assessing the nature of the relationship between service

quality and consumer satisfaction in the formation of consumers' purchase intentions across four unique service industries. The results of the current research, coupled with the weight of the evidence in the emerging services literature, suggest that consumer satisfaction is best described as moderating the service quality/purchase intention relationship. The managerial and research implications of the reported study are also discussed [3]. Claes Fornell, Sunil Mithas, Forrest V. Morgeson III and M. S. Krishnan(2006) find that customer satisfaction, as measured by the American Customer Satisfaction Index (ACSI), is significantly related to market value of equity. Yet news about ACSI results does not move share prices. This apparent inconsistency is the catalyst for examining whether excess stock returns might be generated as a result. The authors present two stock portfolios: The first is a paper portfolio that is back tested, and the second is an actual case. At low systematic risk, both outperform the market by considerable margins [4]. Roger Hallowell(1996) presents the findings of a study performed on data from a large bank's retail-banking operations. Illustrates the relationship of customer satisfaction to customer loyalty, and customer loyalty to profitability, using multiple measures of satisfaction, loyalty, and profitability. An estimate of the effects of increased customer satisfaction on profitability (assuming hypothesized causality) suggests that attainable increases in satisfaction could dramatically improve profitability [9]. Amy K. Smith, Ruth N. Bolton and Janet Wagner(1999) find that Customers often react strongly to service failures, so it is critical that an organization's recovery efforts be equally strong and effective. In this article, the authors develop a model of customer satisfaction with service failure/recovery encounters based on an exchange framework that integrates concepts from both the consumer satisfaction and social justice literature, using principles of resource exchange, mental accounting, and prospect theory. The research employs a mixed-design experiment, conducted using a survey method, in which customers evaluate various failure/recovery scenarios and complete a questionnaire with respect to an organization they recently had patronized. The authors execute the research in the context of two different service settings, restaurants and hotels. The results show that customers prefer to receive recovery resources that "match" the type of failure they experience in "amounts" that are commensurate with the magnitude of the failure that occurs. The findings contribute to the understanding of theoretical principles that explain customer evaluations of service failure/recovery encounters and provide managers with useful guidelines for establishing the proper "fit" between a service failure and the recovery effort [10]. Eugene W. Anderson, Claes Fornelland, Roland T. Rust(1997) suggest support for the contention that tradeoffs are more likely for services. Hence, simultaneous attempts to increase both customer satisfaction and productivity are likely to be more challenging in such industries. Of course, this does not imply that such firms should not seek improvements in both productivity and customer satisfaction. For example, appropriate applications of information technology may improve both customer satisfaction and productivity simultaneously [11].

Steve M. Hawkins, David C. Yen, David C. Chou(2000) investigate the migration from centralized mainframe computers to distributed client/server systems has created a concern on data security. If a disaster occurs to the organization that destroys a server or the entire network, a company may not be able to recover from the loss. Developing an effective disaster recovery plan will help an organization protect them from data loss [5]. Ray Stanton (2005) indicates that it can take less than 60 seconds for a company's reputation to be ruined and its business to be crippled. In just one minute a server failure or hacker can knock out vital applications and lead to a catastrophic series of events. This can do untold damage to a company's reputation, taking months or years to rectify. Some may never open their doors again [6]. Brett J. L. Landry, M. Scott Koger (2006) find out that disasters happen all the time; yet despite this, many organizations are caught unprepared or make unrealistic assumptions.

These factors create environments that will fail during a disaster. Most information technology (IT) curricula do not cover disaster recovery (DR) plans and strategies in depth. The unfortunate result is that most new computer systems are implemented without sufficient disaster recovery plans and testing. Courses on network security need to examine DR as a real threat and cover it as a core module. By dispelling the 10 common myths, organizations can better plan, develop, and test true DR plans [7]. Kevin Fox Gotham(2008) examines the process of post-disaster recovery and rebuilding in New York City since 9/11 and in New Orleans since the Hurricane Katrina disaster (8/29). As destabilizing events, 9/11 and 8/29 forced a rethinking of the major categories, concepts and theories that long dominated disaster research. We analyze the form, trajectory and problems of reconstruction in the two cities with special emphasis on the implementation of the Community Development Block Grant program, the Liberty Zone and the Gulf Opportunity Zone, and tax-exempt private activity bonds to finance and promote reinvestment [8]. Philip R. Berke, Jack Kartez, Dennis Wenger(1993) review key findings and raises issues that are not fully addressed by the predominant disaster recovery literature. Achievement of equity, mitigation and sustainable development, particularly through local participation in redevelopment planning and institutional cooperation, is the central issue of the review. Previous research and past assumptions about the process by which communities rebuild after a disaster are reviewed. A conceptual model for understanding local disaster recovery efforts is then presented. The conceptual and practical significance of this model is then demonstrated by presenting case studies of local recovery experiences. Finally, conclusions on the current understanding of disaster redevelopment planning, as well as implications for public policy and future research are offered [12]. Gil Zussman, Adrian Segall (2003): The terrorist attacks on September 11, 2001 have drawn attention to the use of wireless technology in order to locate survivors of structural collapse. We propose to construct an ad hoc network of wireless smart badges in order to acquire information from trapped survivors. We investigate the energy efficient routing problem that arises in such a network and show that since smart badges have very limited power sources and very low data rates, which may be inadequate in an emergency situation, the solution of the routing problem requires new protocols. The problem is formulated as an anycast routing problem in which the objective is to maximize the time until the first battery drains-out. We present iterative algorithms for obtaining the optimal solution of the problem. Then, we derive an upper bound on the network lifetime for specific topologies and describe a polynomial algorithm for obtaining the optimal solution in such topologies. Finally, numerical results regarding the upper bound and the algorithms are presented [13]. Fallara, P(2004) finds out that in today's world, where fears of "what if" grow daily, information technology (IT) professionals are planning for those possible disasters. According to a 2003 article found on Computer World's web site, nine out of ten IT leaders surveyed had already cemented a disaster recovery plan or will have one in place within the year. Planning for a disaster may seem odd at first. But it is a smart choice for anyone who wants to protect a valuable asset. For instance, just as you would not carelessly store paper money next to the fireplace, the same intelligence applies to data and computers. A catastrophe is anything that threatens the function or existence of a business, ranging from a computer virus to a huge earthquake. A well thought out disaster recovery plan can play a major role in a company's survival/success. Disaster recovery covers a broad range of topics and includes practically everyone in an organization. Every employee - manager and janitor - must be on the same page when a disaster occurs. The support of all the management teams is also necessary. This article covers two important topics in disaster recovery, risk management and disaster recovery planning [14].

3. IPA Model

IPA model(figure 1) is used to analyzed customer satisfaction in this paper. Analysis of this model is through disaster recovery services for the customer on the importance of each factor and their actual satisfaction factors and evaluation, so as to provide data support for identifying the key factors affecting customer satisfaction. In future work, practical adjustments of service management could be made according to the focus of attention for the customer, improve their satisfaction and maintain their loyalty. The objective conclusion of this model can be applied to internal management of the service providers, provide evaluation basis for the customer relationship management performance.

As shown in Figure 1, IPA model distinguish four factors through evaluation of the customer satisfaction affecting factors: The first quadrant is the Dominant Region, in this area the product or service is extremely important for the customer, also won the satisfaction of the customer. Landed property in this area is often the key that why customer chose the certain outsourcing service provider, continue to maintain the level of quality of these services can effectively guarantee the competitiveness of the service provider. The second quadrant is known as Threatened Area, the product or service in this region is highly important to the customer, however, the services of the provider did not meet the requirements of the customer. The characteristics in threatened area are often the "short board" of service provider, also one of the important factors to affect the outsourcing contract between customer and service provider. If the service provider fail to provide effective improvement program or guarantee, outsourcing relationship may therefore end. The third quadrant is Opportunity Zone, the importance of product or service in this area is low, these features do not involve vital interests of the customer, also, services of the provider have not achieved a high degree of consumer satisfaction. If possible to do further research and excavation to the relevant factors in the area, the service provider might find a new value growth point. The fourth quadrant is known as Maintenance Area, product or service in this zone is not high importance, however, customer satisfaction is very high. Thus, in the course of related services is not necessary to service provider involves too much effort in this regard, as much as possible to maintain the current situation is a good choice.
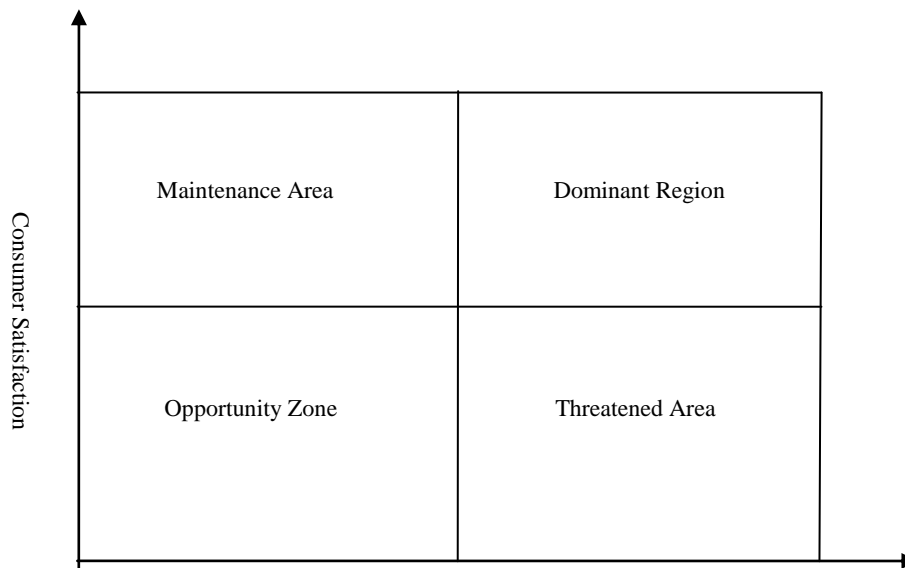

Figure 1. Importance of Product Characteristics

4. Disaster Recovery Metrics

RPO(Recovery Point Objective) and RTO(Recovery Time Objective) are important indicators to measure the quality of disaster recovery project, Recovery Point Objective (RPO) is the metric in the case of a disaster company acceptable amount of data loss, represents the amount of data allowed to be lost when a disaster occurs. For example, a corporate setting RPO is 24 hours, then the corporate allow to lose 24 hours business data through disaster recovery system to recover.

Recovery Time Objective (RTO) represents the time required to restore the system, generally a few hours needed for short, a few days it takes for long. The shorter the RTO indicates the shorter time required to recover information system. Purely on the application perspective, RTO is the shorter the better. However, this also means that need to buy more high-end storage, faster hardware system and application software, which need more capital investment. For different industries, their RTO objectives generally are not the same. Even within the same industry, since each company's specific business and requirements are not the same, their RTO could be different as well.

Service price is always an index that the customer would consider about. Disaster recovery as a kind of outsourcing, the customer would like to buy professional service at a lower price. Geographical location is considered because the customer always want a timely door-to-door service. Enterprise scale, timeliness of data backup, correctness of backup and recovery and some other indexes also have been considered.

5. Disaster Recovery Outsourcing Customer Satisfaction Analysis

5.1. Questionnaire Design

Disaster Recovery Services Outsourcing Customer Satisfaction Survey table design draws some real relevant provisions of outsourcing contracts, in addition, interviews have been made with the related staff from some professional outsourcing enterprises and financial enterprises and manufacturing enterprises who is need for disaster recovery and backup service to gain authoritative first-hand data. The specific design of the questionnaire are shown in Table 1.

Table 1. Survey Design and the Index Scores

Code	Factor	Importance	Satisfaction
A	Data Security	8.25	7.82
B	Service Prices	6.23	3.81
C	Geographical Location	3.38	7.36
D	Enterprise Scale	3.27	4.17
E	Timeliness of Data Backup	7.88	4.12
F	Correctness of Backup and Recovery	9.45	9.32
G	RPO	7.28	4.01
H	RTO	8.76	7.72

5.2. Paper Payment and Collection

Two hundred copies of the questionnaire were on-site distributed in Bank of China, Postal Savings Bank, Hua Tuo Digital Technology Co., Ltd. and other financial institutions and enterprises, 200 copies of questionnaires recovered, 198 questionnaires were valid, effective questionnaires respond rate was 99%. Full credit of characteristics importance degree and customer satisfaction is 10 points, higher scores indicate the higher importance or satisfaction.

5.3. Statistical Results of Importance and Satisfaction

As shown in Figure 2 coordinate chart, factors in first quadrant are data security, backup and recovery is correct and the recovery time objective (RTO). This shows that the customer is generally believed that after the disaster, it is important to recover the application data accurately, safely and in time. This conclusion is in conformity with the relevant research results of consumer psychology, recovery backup as the last line of defense after disaster is attached importance to the customer, the accuracy of the data recovery is the basis of the disaster backup, data security is the precondition of business security. The outsourcing service provider is fully aware of the importance of correct data security, backup and recovery time objective (RTO), relevant measures of above aspects are made to maintain customer satisfaction at a high level.
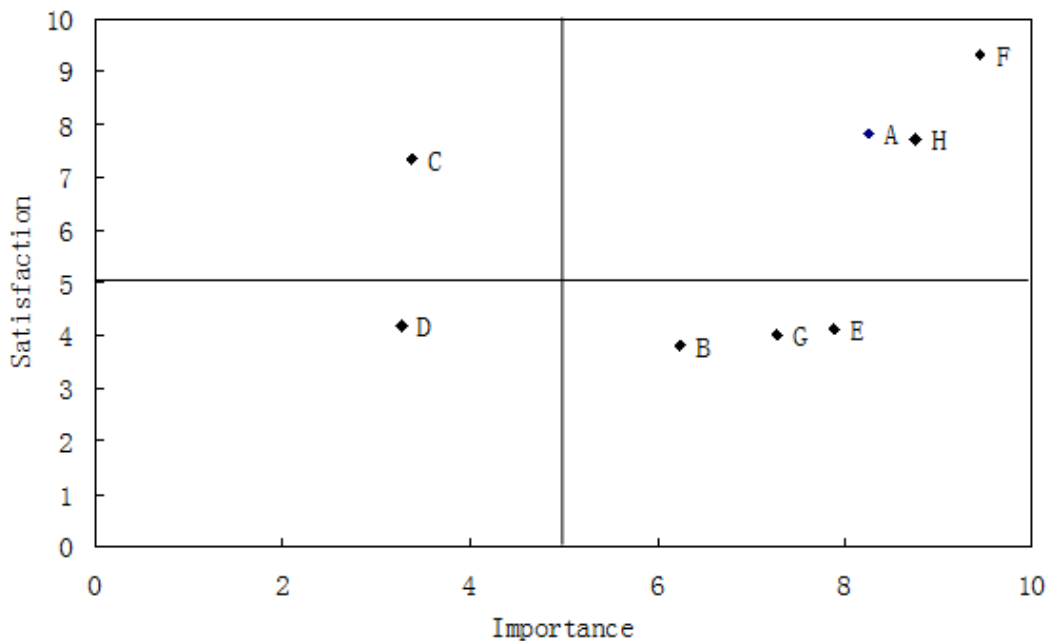

Figure 2. Importance of Factors and Satisfaction Scatter Diagram

The factors of second quadrant includes: service price, backup data timeliness and the recovery point objective (RPO). The disaster recovery backup services for small probability event，the investment effect can be measured only after the disaster, therefore, often cause ROI not reasonable, so most of the customer will be very concerned about the price factor. However, due to the importance in the process of reconstruction after disaster occurred, the construction of disaster recovery center and later operation and maintenance costs are very high, cause service provider offer is often high which might damage customer satisfaction.

Furthermore, because disaster recovery work can not affect the customer's normal business, data backup often not timely phenomenon which affects the customer Recovery Point Objective (RPO) satisfaction. From Figure 1, we learned that a point in the second quadrant belongs to the high importance but not let customer satisfaction, so be called service indicators in the threatened area. If service provider can not make improvements to these factors, customer satisfaction would be seriously affected, even threat contractual relationship of disaster recovery outsourcing.

Factor in the third quadrant is service provider scale, importance and satisfaction of this factor is not high. Because scale is not a direct factor of safety and quality in the services, therefore, customers generally believe that this indicator is not very important. The score of that factor is not high which indicates that in our country scale of disaster recovery service providers is small, attraction for some large scale customer is not strong. This quadrant is called Opportunity Zone, if subdivision the various types of disaster recovery projects, expand scale and impact of the business in a particular area, it helps service providers find new value growth point, improve customer satisfaction and loyalty.

Factor in the fourth quadrant is service provider location, this factor is not very important because by the help of modern information and network technology, services can be provided in any suitable location. However, the service providers need to be aware that the customers generally do not care about the service provider location, but efficient and timely onsite service is an effective way to improve customer satisfaction, thus, while choose business and office location should also fully consider the possibility to target customers with timely and on-site service.

6. Conclusion

To gain customer satisfaction, it is required to know what factor is important to the customer and which part of work we have done is satisfied by the customer. IPA model is used in this paper to analyze customer satisfaction, classified the factors into four parts. The study shows that disaster recovery services outsourcing industry maturity is low, manifested in small scale of the service provider which can not take advantage of economies of scale to reduce cost, and be restricted on the business scale. In addition, the disaster recovery service providers are lack of experience, service process is not standardized, quality of service is low. To promote the healthy development of disaster backup outsourcing and improve customer satisfaction, recommend that the disaster recovery service providers should pay attention to the following points:

(1)Emphasis on raising the level of professional business. Disaster recovery as last line of defense after disaster, the key is to provide a data backup before damage, timeliness of data backup and recovery point objectives (RPO) are crucial for improving customer satisfaction. Therefore, should regard the timeliness of data backup and recovery point objectives (RPO) and other factors in the threatened area as the next focus of the work.

(2)Strengthen communication with customers and feedback. Some service providers often lack of communication with the customer contract, this is mainly related with the initiative and skills to collect the customer satisfaction information, should regularly carry out training to improve these skills. The service providers' requirements analysis staff is the most contact with the customer, primarily responsible for recording and analyzing customer requirements and potential demand for its depth of excavation, if the collection and analysis of customer satisfaction information included in its priorities, carry out necessary skills training of gathering information on customer satisfaction,

allow service provider to increase customer satisfaction information, contribute to their effective exercise program to improve customer satisfaction.

(3)Correctly determine market orientation, disaster recovery is a kind of job services for various industries working dependent on computer software systems. Its particularity is project developers not only need to proficient in technology development, but also need to understand the application domain. The service providers need to locate their own characteristics for the business services industry, and subdivide disaster backup outsourcing market, because an important idea for outsourced disaster recovery services is to buy the most professional services by low price.

(4)Establish and improve customer satisfaction index system. It is important to establish a comprehensive customer satisfaction index system according to the market positioning characteristics of service providers themselves, it is helpful not only to determine management level changes on the vertical axis, but also to find out the potential demand of customers.

Acknowledgement

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En-lin Li, Associate professor. Main research fields：Information Service; E-commerce and E-government. This paper is sponsored by Heilongjiang Province philosophy social science research projects fund No. 13D031, Heilongjiang Provincial Department of Education Social Sciences Project No. 12532069, Financial Assistance under Heilongjiang Postdoctoral Fund No. LBH-Z12146, Phd Startup Project of Harbin University of Commerce, and National Natural Science Fund No. 61003036.