

A Framework for Evaluating the Performance of Supply Chain Risk in E-commerce

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Abstract

The perceived risk is found to be a barrier for e-commerce application. It has been widely demonstrated in previous studies that the e-commerce is closely related with risk assessment. With regard to the rapid growth of e-commerce, there is no formal model which shows supply chain risk in the e-commerce system, regarded as the research gap. This study is conducted to develop a framework about SCRM in the e-commerce area. The SCRM framework is developed incorporating 8 perceived risk model in e-commerce: such as financial, social, time, performance, physical, privacy, security, and psychological risk into the performance indicator model in e-commerce: such as competence, integrity, and benevolence. The expected contribution in theory is discussed.

Keywords

Supply Chain Risk Management, framework, e-commerce

1. Introduction

At the moment, global competition is tight and supply chain be continues to be long and more complex (Tummala & Schoenherr, 2011). Not achieving the desired supply chain performance is expected to increase, especially because the risks. Supply chain risk can be defined as an explanation in terms of the causes of abnormality that affect the management of the supply chain efficiently (Ghadge *et al.*, 2012).Companies are important to adapt the strategy of abnormalities especially on their network. Risk involved in supply chain as well as the relative the damage can be seen from the recalls and lawsuits for car toy (Story, 2007), animal food (FDA, 2008), and recently withdrawal one of the Samsung's products in 2016.

According Djojosoedarso (2003) risk management is the implementation of management functions in risk reduction, especially the risks faced by organizations / companies, family and social. Its management functions include planning, organizing, composing, leading, and overseeing (including evaluating) risk reduction programs. Risk management identifies processes, establishes risks, and shapes strategies for managing them through existing resources. Strategies that can be used include: transferring risk to others, avoiding risks, mitigating adverse effects of risk, and accepting some or all consequences of certain risks. Supply Chain Risk Management (SCRM) is an integrated concept between supply chain and risk management where collaboration between supply chain partners in

the application of process risk management (Brindley, 2004). Supply chain risk management currently requires serious attention as it often occurs and has a long-term impact on the performance of the company's management. SCRM's activities include systematic identification of activity, assessment and mitigation of system logistics disruptions to reduce negative impact on network supply chain performance (Paul, 2014). SCRM requires companies to perform well, especially in reliability. , in response to speed, accuracy in procurement, precision in the fulfillment of needs, flexibility, cost, and timely delivery of logistics activities (Zaroni, 2015)..

E-commerce plays an important role in everyday business strategies, and will continue to increase every year (Reinsch, 2005). E-commerce involves electronic transfers, electronic data exchange, automated inventory management systems, and automated data collection systems. According to Wong (2010), e-commerce is the buying, selling, and marketing of goods and services through electronic systems. With the development of e-commerce which is quite rapid, existing risk will be identified.

The best way to analyze and develop a complex system is to set it in meaningful structure (Zwass , 1996). The development framework is expected to help mapping out complex issues such as e-commerce risks. From various studies on risk management have been conducted, it was found that the risk management framework is still limited, especially if it is associated with e-commerce. The SCRM framework is developed by combining eight perceived risk models in e-commerce: such as financial, social, time, performance, physical, privacy, security, and psychological risks (Xiao, 2004). This research was conducted to develop a framework about SCRM in the field of e-commerce.

2. Literature review and hypotheses development

Hypotheses about E-commerce Performance will be proposed according to research on the relationship between SCRM and E-commerce

2.1 Perceived risk as E-commerce barriers

The perceived risk is found to be a barrier for e-commerce usage (Yehoshua & Shmuel, 2002). Researchers in psychology and other disciplines have widely studied the risk theory. Bauer (1967) introduced the notion of perceived risk. He suggested, "Consumer behavior involves risk in the sense that any action of a consumer will produce consequences that he cannot anticipate with anything approximating certainty, and some of which are likely to be unpleasant" (Bauer, 1967). Stone and Gronhaug (1993), in their studies on perceived risk, showed the existence of an important difference between how the risk concept is introduced and adopted in consumer behavior research and how risk concept is conceived and used in other disciplines such as economics, psychology, statistical decision theory and game theory. They pointed out that, in other disciplines, "the concept of risk is related to choice situations involving both potentially positive and potential negative outcomes" (Weber and Bottom, 1989; Stone and Gronhaug, 1993) while in studying perceived risk in consumer behavior, however, "the focus has primarily been on potentially negative outcomes only" (Stone and Gronhaug, 1993). In the context of E-commerce adoption, when studying perceived risk, the focus is primarily on potentially negative outcomes or potential losses/harms. The need for an e-commerce site is becoming more apparent day after day, but so is the potential risk (Pathak, 2004). Perceived risk is defined as a person's perception on the possibility of having negative outcomes or suffering harm or losses associated with E-commerce.

2.2 Perceived SCRM development

Currently, perceived risk has been understood as an influential factor on a person's willingness to make choice, including adopting a new technology such as online shopping (Yung-Shen, 2015). Taking into account of the scope of supply chain management, E-commerce is a part of SCM since the activities of e-commerce system mostly deal with information flow, rather than either product or service flows. Xiao (2004) have developed 8 perceived risk

model in e-commerce: such as financial, social, time, performance, physical, privacy, security, and psychological risk, it will be describe in Table 1. The framework will be developed to measure the perceived SCRM. In the following sections, the main consideration for each definition and code description refer to Table 2.

Table.1 Definition of Eight dimension of Risk in E-commerce (Xiao, 2004)

| | |
|--------------------|--|
| Financial Risk | The possibility of suffering monetary losses. |
| Social Risk | The possibility of having the losses related to the influences of social value and views from friends or family. |
| Time Risk | The possibility of having the feeling of losses of time as spending too much time in E-commerce. |
| Performance Risk | The possibility that the actual products or services are not performing as desired and are far from expected. |
| Physical Risk | The possibility of having potential physical harms. |
| Psychological Risk | The possibility of feeling psychological uncomfortable. |
| Privacy Risk | The possibility of suffering the losses due to the misuse of personal information by Internet stores. |
| Security Risk | The possibility of suffering the losses due to the misuse of personal information by third parties. |

Table.2 Code description

| Code | Code description | Code | Code description |
|------|----------------------|------|------------------|
| FR1 | Financial Risk 1 | PR2 | Privacy Risk 2 |
| FR2 | Financial Risk 2 | SE1 | Security Risk 1 |
| SR1 | Social Risk 1 | SE2 | Security Risk 2 |
| SR2 | Social Risk 2 | CM1 | Competence 1 |
| TR1 | Time Risk 1 | CM2 | Competence 2 |
| TR2 | Time Risk 2 | CM3 | Competence 3 |
| PF1 | Performance Risk 1 | IT1 | Integrity 1 |
| PF2 | Performance Risk 2 | IT2 | Integrity 2 |
| PH1 | Physical Risk 1 | IT3 | Integrity 3 |
| PH2 | Physical Risk 2 | BN1 | Benevolence 1 |
| PS1 | Psychological Risk 1 | BN2 | Benevolence 2 |
| PS2 | Psychological Risk 2 | BN3 | Benevolence 3 |
| PR1 | Privacy Risk 1 | | |

2.3 Customer trust as E-commerce Performance indicator

Trust has direct effect on intention to purchase online (Oliveira *et al.*, 2017). Building trust in the digital age is very important. By building trust in customers, they will gladly use the products or services they offer, in this case, help grow the company's business. Since the e-commerce business is hardly face-to-face, the e-commerce company's performance is strongly influenced by trust. How well their growth will be influenced by consumer trust, it will be an indicator of its performance. There are 3 sources that influence the dimension of consumer trust: competence, integrity and benevolence (Oliveira *et al.*, 2017). The main consideration in competence categories is sufficient capacity to do work (CM1), experience in marketing products/services (CM2), and resource to perform activity successfully (CM3). The main consideration in integrity categories is fulfill commitments (IT1), true and honest (IT2), and never make false statements (IT3). For benevolence categories, the main consideration is address user needs (BN1), concern about user (BN2), and not doing anything to harm the user intentionally (BN3) (Curras-Perez *et al.*, 2017).

2.4 Relationship between Perceived SCRM and E-commerce Performance

The bigger risk perception the greater the consumer the potential involvement on the purchase (Engel *et al.*, 1995). Consumers were being in an arena thought of the risks that may be will be faced when consume a product. Risk contemplated by consumers because consume a product or service will coloring behavior buying them .In other words, risk to be wrong or factor under consideration by the consumer for decryption the purchase of a product .When perception to high risk, is motivation whether to avoid purchase and use or risk to minimize through the search for and evaluation alternative after purchase in the decision making. Consumer perceptions of products and their risk perceptions of online shopping will significantly affect consumer online shopping decisions when they are considering buying certain physical goods (Xiao, 2004). Thus, companies must improve consumer perceptions about the product and reduce the perceived risk consumers in e-commerce environments. Risk reduction activities in perceived SCRM conclusion will help companies gain consumer trust.

3. Research methodology

This theoretical research will focus on develop framework about SCRM in e-commerce area. In the following section, a framework is proposed to measure the influence of perceived risk on company's performance. The framework will develop the relationship between the 8 perceived risk in e-commerce area i.e. financial, social, time, performance, physical, privacy, security, and psychological risk, into 3 performance indicator model i.e. competence, integrity, and benevolence. The model will shows how perceived risk as e-commerce barrier can have an effect on e-commerce performance.

4. Analysis and result

Modeling for perceived SCRM and e-commerce performance has been illustrated in the model. Indicators of each construct based on the relationship will be described.

4.1 Construct between framework

Perceived SCRM in e-commerce consist of 8 constructs. Construct of Perceived SCRM will be describe in Table 3.

Table 3. Perceived SCRM in E-commerce

| Construct | Code | Description |
|------------------|------|---|
| Financial Risk | FR1 | E-commerce would be a bad way to manage my money as it may cause me some monetary losses |
| | FR2 | If I accepted E-commerce methods, I would be not safe and I would be concerned that I may have financial losses through this service. |
| Social Risk | SR1 | The thought of E-commerce causes me concern because some friends would think I was just being showy. |
| | SR2 | My experience of E-commerce action would cause me to be thought of as being foolish by some people whose opinion I value. |
| Time Risk | TR1 | I am concerned that I would have to spend too much time searching the information I need on E-commerce website. |
| | TR2 | I am concerned that I would have to spend too much time learning how to use the systems on E-commerce website. |
| Performance Risk | PF1 | I worry about whether the E-commerce will really perform as well as it is supposed to. |
| | PF2 | I worry about whether the E-commerce will guaranteed that I will get the right products at the right time. |
| Physical Risk | PH1 | It may do harm to me physically if I spend too much time in front of computer. |
| | PH2 | I become concerned about some uncomfortable physical side-effects associated with this E-commerce. |

Table 3. Perceived SCRM in E-commerce

| | | |
|--------------------|-----|---|
| Psychological Risk | PS1 | The thought of E-commerce makes me feel psychologically uncomfortable |
| | PS2 | The thought of E-commerce causes me to experience unnecessary tension. |
| Privacy Risk | PR1 | I may suffer from privacy risk. |
| | PR2 | I worry that E-commerce platform share my private information without my consent in the future. |
| Security Risk | SE1 | I do not have confidence in the security of my online transaction. |
| | SE2 | I worry that the information I provide during my transaction will reach inappropriate parties during storage in E-commerce databases. |

E-commerce Performance Indicator consist of 3 Constructs. Construct of E-commerce Performance Indicator will be describe in Table 4.

Table 4. E-commerce Performance Indicator

| Constructs | Code | Description |
|------------------|------|---|
| Competence (CM) | CM1 | Company has sufficient capacity to do their work |
| | CM2 | Company has sufficient experience in marketing the products/services they offer |
| | CM3 | Company has all the resources necessary to perform their activity successfully |
| Integrity (IT) | IT1 | Company usually fulfill its commitments |
| | IT2 | Company offer is true and honest |
| | IT3 | Company never make false statements |
| Benevolence (BN) | BN1 | Company address their user needs |
| | BN2 | Company is concerned about their users present and future interest/benefits |
| | BN3 | Company wouldn't doing anything to harm their user intentionally |

4.2 Proposed model

The relationship between SCRM and e-commerce is presented based on the relationship between several literature review indicators. The proposed model is shown in Figure 1.

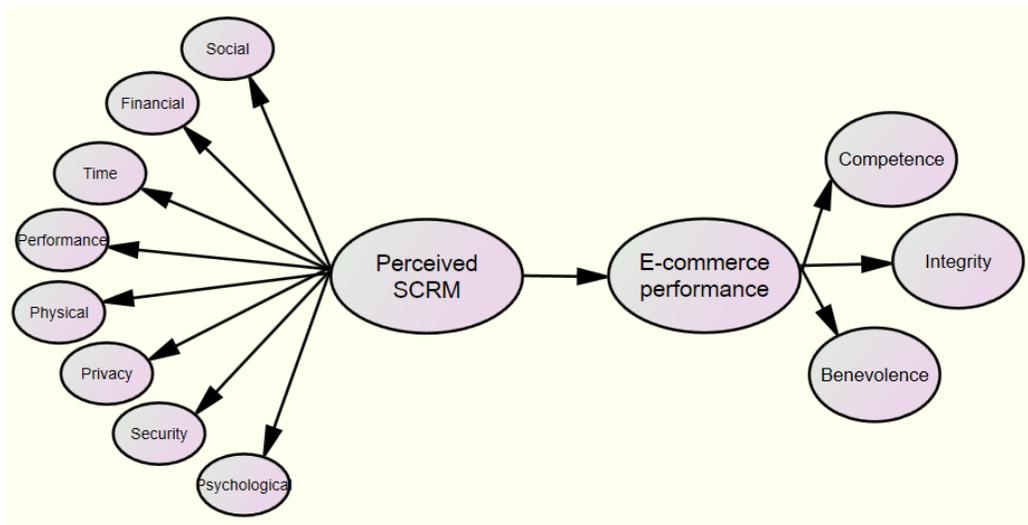


Figure 1. Proposed Model

5. Conclusions and Further research

This study shows how perceived risk as e-commerce barrier can have an effect on e-commerce performance. E-commerce performance is assessed from consumer trust. It is obvious that consumers would have to look for evidence of the quality in means other than the physical inspection of the goods on offer to gain trust. In this aspect, perceived risk as e-commerce barrier is given particular attention. E-commerce Performance Indicators consist of 3 constructs: competence, integrity, and benevolence and there are 9 indicators for measuring those constructs; 3 indicators to measure competence constructs, 3 indicators to measure integrity constructs, and 3 indicators to measure benevolence constructs. For future research suggestion, the model should be tested empirically in case study. The empirical can be done by spreading the questionnaire to customer ask factors within the model and relate the construction through SEM analysis. Variety of methodologies and development on the relationship between SCRM and e-commerce is expected.

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Biographies

Abraham Stefanus is currently a master degree's student majoring in Industrial Engineering, Universitas Surabaya. He holds a degree S.T., (Bachelor of Engineering) from the Universitas Surabaya in 2016.

Markus Hartono is a permanent lecturer in Industrial Engineering Department at Universitas Surabaya since 2001. Obtained his Industrial Bachelor Degree from Universitas Surabaya with CumLaude degree in 2000, then completed his Master's degree (2005) and Doctorate (2012) at National University of Singapore (NUS) with a full prestigious scholarship from Scholarship Asean, and NUS Research Scholarship. He has a Certified Human Factors Professional (CHFP) and Associate Professional Engineer (IPM).