

Impact of Supply Chain and Risk Management in Information Systems

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ABSTRACT: *The two essential components in Information Systems (IS) are the supply chain (SC) and risk management. This study is an effort to treat the deficiency related to customer satisfaction implications of SC strategy and risk management. The first phase will establish the theoretical background and the second phase will collect real data and analysis the result.*

Keywords: SC Strategy, Trust, Customer Power, Communication, Relationship Commitment, Customer Satisfaction

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1. Introduction

Nowadays, the purpose of any company is not only to retain customers but also to satisfy them as a key motive to gain a competitive advantage. Measuring customer satisfaction provides an indication about how successful the company is at providing products or services to the customer. The higher the customer's expectations, the harder those expectations are satisfied through any products and services. Though, it is essential to note that the degree of expectations of any customers will depend on SC strategy and effective risk management. Ellram, Lisa, Martha and Cooper (1990) suggest that effective SC management is made up of a series of partnerships among companies working together and mutually sharing information, risks, and rewards that yield a competitive advantage. According to Vickery, Jayaram, Droge and Calantone (2003) SC should be strategically managed as a single unit by the integration of activities and functions throughout the supply chain. The remainder of the paper is organized as follows. Section 2, 3 and 4 contains a discussion on the SC strategy, risk management and customer satisfaction respectively. Section 5 presents the research hypotheses. Section 6 presents the research design.

2. Supply Chain Strategy

2.1 Lean Supply Chain

Olhager (2003) stated that the origins of the lean SC can be traced to Toyota Production System which focuses on the efficient use of resources through level scheduling. He adds that lean thinking from a SC perspective means "developing a value stream to eliminate all waste, including time, and to enable a level schedule". Lean SC focuses on reducing waste through inventory reduction, lean manufacturing, and a just-in-time approach. This approach is said to be suitable for markets characterized by predictable demand, high volume and low requirements for product variety (Jüttner et al., 2007).

2.2 Agile SC

Agile SC is designed for flexibility, emphasizing the supply chain's ability to respond rapidly to changes in demand, both in

terms of volume and variety (Jüttner et al., 2007). Braunscheidel and Suresh cited in Narasimhan and Talluri (2009) stated that SC agility “not only allows firms to respond efficiently and effectively to unanticipated changes in the marketplace but also works as risk mitigation strategy in managing anticipated and actual disruptions in a supply chain”. Agility is primarily concerned with responsiveness, and the ability to match supply and demand in volatile and unpredictable markets. The main idea in this strategy is that companies should be demand-driven rather than forecast-driven (Zhang, Vonderembse and Lim, 2002).

2.3 Leagile Supply Chain

Leagile SC is the combination of lean and agile paradigms within a total SC strategy. Although lean and agile approaches are often discussed as opposing paradigms, they share a common objective: meeting customer demands at the least total cost (Hilletoft, 2009).

2.4 Efficient Consumer Response

Efficient Consumer Response (ECR) is an innovative strategy developed by the grocery industry for streamlining the grocery supply chain. The main objective of this strategy is to reduce channel costs and improve inventory controls within, and between, all levels of the grocery distribution channel while simultaneously improving customer satisfaction (Hoffman, 2000).

2.5 Risk Management dimensions

2.6 Trust

Rauyreuen (2007) cited in Curtis (2009) defined trust as “the belief that a party’s word or promise is reliable, and the party will fulfill his or her obligation in an exchange relationship”. Belaya et al. (2008) classified trust into five kinds according to their origins: (1) Calculus-based trust, which is based on both the fear of punishment for violating trust and rewards for preserving it (2) Experience-based trust, which can be originated from experience that has developed into a routine behavior (3) Cognitionbased or economic trust, which may evolve from knowledge and inference of the partner’s abilities, traits, goals, norms, values (4) Goodwill trust, which forms out of an initial value based on willingness to trust. This willingness may be determined by survival conditions, experience and socialization, traits of people and/or firm culture, or institutional environment. Furthermore, the cooperation attitude is heavily influenced by this type of trust. At the moment of entering a trustful relationship, firms already possess the willingness to trust each other (5) Affect-based trust, which is based on loyalty, care, warmth, friendship or empathy for the other partner. This type of trust can also originate from kinship. Chen, Chen, and Meindl (1998) cited in Morris (2005) classified trust into two types: (1) Cognition-based trust which is built on role performance knowledge (e.g., performance behaviors conveying competence and reliability) (2) Affect-based trust, which is built on emotional bonds between the actors (especially non-task relational activities that convey personal concern for the other rather than self-interest). Therefore, trust is a feeling of security held by the consumer that the other party will meet his or her expectation. (Dixon et al., 2005 cited in Curtis, 2009).

2.7 Power

Power is the ability of a customer to influence the decisions of a manufacturer in a SC (Goodman et al., 2001). French and Raven (1959) and Raven and Kruglanski (1970) cited in Liu et al., (2007) have identified six types of power sources: (1) Coercion, the perception that the source has the ability to mediate punishment to target. (Hsiao et al., 2003) (2) Reward, the perception that the source retains ability to mediate rewards to target. (Hsiao et al., 2003) (3) Traditional Legitimate, the perception that the target believes source retains natural right to influence. (Hsiao et al., 2003) (4) Expert, the perception that the source has access to information or expertise knowledge and skills desired by target. (Hsiao et al., 2003) (5) Referent, the perception that the target desires a sense of identification and association with the source. (Hsiao et al., 2003) (6) Legal Legitimate, the perception that the source retains judiciary right to influence target. (Hsiao et al., 2003) Brown et al (1995) cited in Liu et al., (2007) classify power sources into two sources: (1) Mediated power sources, which include reward, coercive, and legal legitimate. In reward power, a customer has the ability to mediate rewards to manufacturer, where in coercive power customer has the ability to mediate punishment to manufacturer. (Benton and Maloni, 2000) (2) Non-mediated power sources, which are more relational and positive in orientation, include expert, referent, and traditional legitimate (Benton and Maloni, 2000).

2.8 Communication

Communication is central part to the SC philosophy. Clow and Baack (2004) cited in Change (2010) defined communication as “transmitting, receiving and processing information”. Leingpibul (2006) classified communication into two types: (1) Non-

action oriented communication, those strategies which a source does not specify what action consequence the focal target will be subjected to if it does not comply. The communication can involve either verbal or written messages directly from the source to the target. (2) Action-oriented communication, the strategy in which the source specifies the consequences the focal target can expect if the source wishes are met or not met. Communication can involve either verbal or written messages made directly from the source to the target.

2.9 Relationship Commitment

Relationship commitment usually refers to “an implicit or explicit pledge of relational continuity between exchange partners” Chang (2010). Moreover, Curtis (2009) defined commitment as the “The degree to which a consumer is willing to make sacrifices to maintain the relationship with the particular brand, product or the service provider. Chang (2010) argues that commitment has been classified into two dimensions: (a) Affective commitment defined by Lievens and De Corte (2008) cited in Grawe (2010) as “the desire for a relationship to continue which reflects a feeling of emotional attachment to an organization”. Curtis (2009) stated that “affective commitment is from values, identification, and attachment”. (2) Calculative or continuance commitment. Fullerton (2005) cited in Curtis (2009) stated that continuance commitment “has its roots in scarcity of alternatives, side-bets, and switching costs. Consumers might stay with their partner because of difficulty to get out of the relationship, or because only few alternatives outside the existing relationship are available”. He added that “affective commitment, which includes feelings of attachment and identification, is very different from continuance commitment, which includes feelings of dependence and entrapment”.

3. Customer Satisfaction

Customer Satisfaction involves keeping customers happy both in daily interactions and from a more global, long-term perspective. Competitive pressures mandate that firms identify customer requirements and develop strategies that allow them to meet the service levels provided by other vendors. Such customer-oriented contacts typically focus on determining relevant dimensions of service and products as well as an assessment of the customers’ perceptions of how well the selling firm is doing in meeting those expectations. (Ellinger et al., 1999)

4. Research Hypotheses

There has been very little empirical research related to the impact of SC strategy upon customer satisfaction under some dimensions of risk management. The independent variable was tested to investigate its relationship with the dependent variable (customer satisfaction). In addition, the mediator variable dimensions were tested to explore its relationship with customer satisfaction. figure (1.1) shows the theoretical model of the research.

4.1 SC Strategy and Risk Management

The anticipated outcome of implementing an effective SC strategy is customer satisfaction in case of effective risk management. Thus the following hypothesis was drawn. **H1**: SC strategy is positively associated with risk management. Four SC strategies (lean, agile, leagile and ECR) and four risk management dimensions (trust, power, communication and relationship commitment) were employed in this research. SCstrategy is related to risk management dimensions and will enhance the relationships with customers and improving customer satisfaction. Thus the following hypotheses were drawn: **H1₁**: Lean SC is positively associated with cognition-based trust.**H1₂**: Agile SC is positively associated with cognition-based trust.**H1₃**: Leagile SC is positively associated with cognition-based trust.**H1₄**: ECR SC is positively associated cognition-based trust.**H1₅**: Lean SC is positively associated with affect-based trust.**H1₆**: Agile SC is positively associated with affect-based trust.**H1₇**: Leagile SC is positively associated with affect-based trust.**H1₈**: ECR SC is positively associated affect-based trust.**H1₉**: Lean SC is positively associated with mediate power.**H1₁₀**: Agile SC is positively associated with mediate power.**H1₁₁**: Leagile SC is positively associated with mediate power.**H1₁₂**: ECR SC is positively associated with mediate power.**H1₁₃**: Lean SC is positively associated with non-mediate power.**H1₁₄**: Agile SC is positively associated with non-mediate power.**H1₁₅**: Leagile SC is positively associated with non-mediate power.**H1₁₆**: ECR SC is positively associated with non-mediate power.**H1₁₇**: Lean SC is positively associated with action-oriented communication.**H1₁₈**: Agile SC is positively associated with action-oriented communication. **H1₁₉**: Leagile SC is positively associated with actionoriented communication.**H1₂₀**: ECR SC is positively associated with action-oriented communication.**H1₂₁**: Lean SC is positively associated with non-action-oriented communication.**H1₂₂**: Agile SC is positively associated with non-action-oriented communication. **H1₂₃**: Leagile SC is positively

associated with non-action-oriented communication. **H1₂₄**: ECR SC is positively associated with non-action-oriented communication. **H1₂₅**: Lean SC is positively associated with affective relationship commitment. **H1₂₆**: Agile SC is positively associated with affective relationship commitment. **H1₂₇**: Leagile SC is positively associated with affective relationship commitment. **H1₂₈**: ECR SC is positively associated with affective relationship commitment. **H1₂₉**: Lean SC is positively associated with calculative relationship commitment. **H1₃₀**: Agile SC is positively associated with calculative relationship commitment. **H1₃₁**: Leagile SC is positively associated with calculative relationship commitment. **H1₃₂**: ECR SC is positively associated with calculative relationship commitment.

4.2 Risk Management and Customer Satisfaction

The anticipated outcome of implementing an effective risk management is customer satisfaction. Thus the following hypothesis was drawn: **H2**: risk management is positively associated with customer satisfaction. To explore the impact of risk management dimensions on customer satisfaction; eight sub-hypotheses were drawn: **H2₁**: cognition-based trust is positively associated with customer satisfaction. **H2₂**: affect-based trust is positively associated with customer satisfaction. **H2₃**: mediate power is positively associated with customer satisfaction. **H2₄**: non-mediate power is positively associated with customer satisfaction. **H2₅**: action-oriented communication is positively associated with customer satisfaction. **H2₆**: non-action-oriented communication is positively associated with customer satisfaction. **H2₇**: Affective relationship commitment is positively associated with customer satisfaction. **H2₈**: Calculative relationship commitment is positively associated with customer satisfaction.

4.3 SC Strategy and Customer Satisfaction

It is suggested that the anticipated outcome of implementing an effective SC strategy is customer satisfaction. Thus the following hypothesis was drawn: **H3**: SC strategy is positively associated with customer Satisfaction. To investigate the nature of relationship between SC strategy and customer satisfaction; four subhypotheses were drawn: **H3₁**: Lean SC is positively associated with customer satisfaction. **H3₂**: Agile SC is positively associated with customer satisfaction. **H3₃**: Leagile SC is positively associated with customer satisfaction. **H3₄**: ECR SC is positively associated with customer satisfaction.

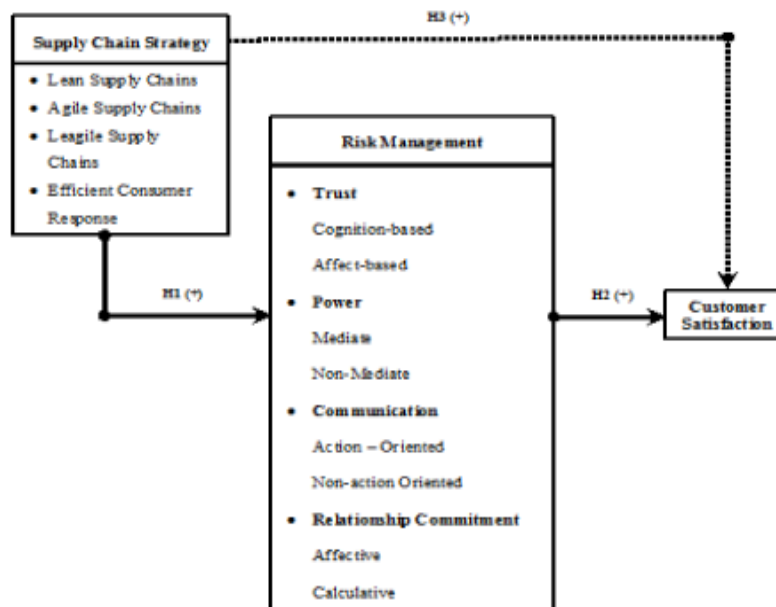


Figure 1.1 Theoretical Model

5. Research Design:

5.1 Population and Sample

Creswell (2005) cited in Change (2010) defined target participants or sampling frame as “a group of people or organizations

with certain common characteristics that the researcher wants to study and identify". Those people are managers who are responsible for the effective usage of organizations' resources. They play an important role in SC management. Therefore, target participants or the accessible population of this study is limited to managers of JCCs. This study conducted in 2010 using a sample of JCCs in Amman (Jordan). Therefore, the population of this study consists of all computer companies inside Amman, whether in the field of manufacturing, trading services or retailing. To obtain a representative sample of JCCs, The companies chosen for the investigation based on engagement in a supply chains. The sampling frame of the study was based on a government agency database. Since the unit of analysis for this study is the relationship between SC strategy and customer satisfaction; managers of JCCs report their perceptions about this relationship. The key informant approach for this study is adopted from Charvet (2008); following his criteria for key informant selection, JCCs managers are deemed appropriate since they able to identify the SC to which their firms belong, and responsible for SC management. In addition, an additional measure adopted from Charvet (2008) was used to minimize any risk related to single informant bias. First, all the managers are pre-qualified before responding to the survey instrument. This will ensure that those managers are working with the selected company and are able to provide valid response to our research. Second, the survey instrument includes specific measures to assess the quality of the respondents such as experience in dealing with SC management. The specific measure asks them to rate how knowledge they are about their company's overall relationships with their customers.

5.2 Data collection

After the sampling frame was decided, the questionnaire method will be used to collect the data. Before the full-scale study was launched, the researcher pilot-tested the questionnaire using a sample of 15 companies. The survey includes the whole population which consists of 170 companies. Total of 150 questionnaires were distributed to practicing managers drawn from a list of JCCs. After eliminating non-valid questionnaires, total of 102 usable responses were received. Missing values on some of the variables reduced this number to 99 responses acceptable for analysis, representing a response rate of (66%). The following relation will be targeted (a) relationship between SC strategy and risk management (b) relationship between risk management and customer satisfaction (c) relationship between SC strategy and customer satisfaction.

6. Research Quality Standards

6.1 Validity

Validity defined by Sudrajat (2007) as "the degree to which a study accurately reflects the specific concept that it attempts to measure". In addition, Curtis (2009) defined validity as "the extent to which the scale measures what is supposed to measure. Liao (2008) in a study about SC capability generated the definition and items of each construct from a broad literature review, then the potential items were given to five academicians for a pre-test, whose purpose is to clarify the instructions and the questions in the questionnaire. In addition, Charvet (2008) pretested the final draft of instrument with three practitioners and three academic experts in the area of SC management. Pettit (2008) used a pre-test and pilot test of the assessment tool, and then five academics completed the entire assessment and provided comments to the research team. In this study validity of items was established by five academic experts familiar with this topic.

6.2 Reliability

Sudrajat (2007) defined reliability as "the extent to which any measuring procedure yields the same result in repeated trials under similar conditions". It is the consistency with which a scale achieves a certain result (Curtis, 2009). The most commonly used measure of reliability is internal consistency and the most accepted measure of a measure's internal consistency is the Cronbach's alpha (α). Change (2010) examined this approach to provide estimates of internal consistency reliability for each construct. Sudrajat (2007) used Cronbach's alpha (α) to test the internal consistency of the item on each scale for reliability assessment. The results for this study indicate that the scale has good internal consistency with Cronbach's alpha coefficient which is considered satisfactory for basic research were above the recommended minimum standard of (0.75).

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