Influence of Internal and External Factors on Supply Chain Information System Risk Management Implementation

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Abstract--- Risk management is major part of every enterprise. Proper risk management in all the department of an organization is one of the guaranties of success. However, Indonesian supply chain companies are lacking in information system (IS) risk management implementation. These companies are facing internal and external issues due to which the performance of Indonesian supply chain companies is not up to the mark. Thus, the objective of this study is to examine the role of internal and external factors in supply chain IS risk management implementation. Thus, the data is collected by collaborating with supply chain employees in Indonesia. Accordingly, primary data is used in this study to approach end results. Results of the study highlighted that various internal and external factors have important relationship with supply chain IS risk management implementation. Internal factor namely; organization culture and management commitment have positive effect on IS risk management implementation. External factor, namely; competitive pressure also has important role. Additionally, organization structure is one of the factors which strengthen the positive relationship of management commitment and supply chain IS risk management implementation.

Keywords: Supply chain, organization culture, organization structure, management commitment, information system, risk management.

1. Introduction

Information system (IS) has vital role in the success of every organization [1-3] as external and internal information expediate innovation process [4] which has major role in organization success. Now a days, companies are focusing to introduce better and better IS system because it has important role in business success and competitive advantage [5, 6]. IS has major important in various supply chain related companies.

However, Indonesian supply chain companies are struggling with various issues of IS implementation [7]. Due to these issues, companies are unable to apply better risk management system. It is major element of supply chain companies [8] performance which is decreasing due to IS risk management issues. Logistic ranking of various countries is shown in the below Figure 1 in which Indonesia has lower performance.

Figure 1. Logistic Performance Ranking
Source: Doktoralina and Apollo [9]

These issues can be resolved with focusing on various internal and external factors which effect on IS risk management implementation. Internal factor such as management commitment and organization culture is positive effect on IS risk management implementation [10]. Moreover, external factors like competitive pressure also influence on IS risk management implementation. Thus, companies should focus on these internal and external factors to cope IS risk management issues.
Internal and external factors are only helpful in case if the organizational structure is supportive. The organization structure should be flexible for implementation of various required strategies. Flexible organization structure has important contribution in organization [11-14]. Therefore, in the current study, organization structure is taken a moderating variable between internal factors, external factors and supply chain IS risk management implementation. Thus, the objective of this study is to examine the role of internal and external factors in supply chain IS risk management implementation.

Various researchers work on supply chain and risk management activities [15-17], however, these studies are missing with the role of internal and external factors to handle the issues of IS risk management implementation. Thus, this study filled the literature gap by examining the role of internal and external factors on supply chain IS risk management. Theoretical framework of the current study is shown in Figure 2.

2. Literature Review

Risk is a likelihood that how frequent something unfavourable is going to occur, and how much lose is probably going to result. The likelihood of loss can emerge out from combination of small risks and vulnerability factors. Supervisory Policy Manual (2000) mentions that risk is a circumstance that has a likelihood of occurring negative result of the business. Literature portray risk as any uncommon event that is probably going to influence the accomplishment of organizational targets.

In the current society, innovation considered a vital to achieve targets, which empowers the firm to utilize computerized IT to process data to help the firm in achieving the main goal and targets. Accordingly, an organization needs to secure its data resources, along these lines automatically shielding its central goal from IT-related risk [10]. IS risk management assuming an effective job to the accomplishment of goals. A productive IS risk management task is exceptionally required for fruitful IT security in company.

Hereafter IS risk management should not be viewed as a specialized activity that should be take care by IT specialists; it should be viewed as a critical management work.
Figure 2. Theoretical Framework of the Current Study

Figure 3. Risk Management
Organizations use various strategies in risk management to avoid unfavourable events. As the risk management is most important element of any organization [21]. Most common risk management techniques are shown in Figure 3. First step is risk identification, second step is risk assessment, third step is risk analysis and fourth step are planning implementation. This study only focused on fourth step, namely; risk implementation within the domain of IS.

Risk implementation is most crucial part of risk management strategy [22-24]. Because, risk management implementation is most crucial as compared to the identification and assessment. Most of the supply chain companies are focusing to proper implementation of risk management strategies to avoid future unfavourable events.

IS risk management implementation is the way toward recognizing vulnerabilities in the company IS and finding a way to guarantee privacy, and accessibility of the considerable elements in the IS. Halliday, et al. [25] explained that the major concern of IS risk management is to help the mission of the company. However, in the success of supply chain IS risk implementation, various factors are much critical which are the responsible of supply chain IS risk implementation. These factors include; organization culture, organization commitment and competitive pressure. Competitive pressure is an external factor; however, organization culture and organization commitment are internal factors.

2.1 Organization Culture and Supply Chain IS Risk Management Implementation

Grabowski and Roberts [26] carried out research about the issue of risk mitigation and turned out with a procedure to assist an organization. The analysts recognized organizational culture as a basic achievement factors for supply chain IS risk management implementation. Galorath [27], Galorath [28] considered the significance of risk management and assesses forms which are required for the successful implementation of IS risk management in SMEs. The investigation considered the basic achievement factors that impacts the IS risk management implementation as whole management of structure and procedures, social objective, and an example for estimation. Avison and Torkzadeh [29] work on organization's product advancement in New York and presumed that the achievement of the framework programming relies upon correspondence and culture. Thus, culture has important role in supply chain risk handling. Huang and Trauth [30] directed a meeting on twelve IS programming authority from U.S., China about programming advancement and implementation. They found organizational culture as the major basic achievement factor that impacts organizational programming risk management implementation, and that culture likewise diminishes clashes and enhances group effectiveness. Rai, et al. [31] recognized culture among other basic achievement factors as a determinant of IS programming venture implementation. Moreover, Remus and Wiener [32] examined basic achievement factors for risk implementation, they distinguished basic achievement factors with models comprise of both inside and outside management factors incorporating culture. Raisinghani, et al. [33] in their own commitment to learning recognized five basic achievement factors for software project implementation, such as risk investigation, culture, risk control implementation, legal control, and contracts.

Therefore, organization culture has important role in supply chain IS risk management. Risk mitigation culture engage the employees in risk identification and risk handling. Various studies mentioned that organization culture has significant association with risk implementation [34-36].

H1: Organization culture has a relationship with supply chain IS risk management implementation.

2.2 Management Commitment and Supply Chain IS Risk Management Implementation

Apart from organization culture, organization commitment is also most crucial in supply chain IS risk implementation. Dembo and Freeman [37] directed their investigation in U.S. to look at the idea of basic achievement elements to be implemented in a business situation. The variables considered in their examination incorporate top management support, coordinating risk management into basic leadership process, making efficiencies in techniques, and controls. Therefore, management commitment has relationship with supply chain IS risk implementation. Galorath [27] examined the significance of risk management and measures which are required for the successful implementation of IS risk management in SMEs. Moreover, management commitment increases the employees satisfaction [38] which effect positively on risk management.

Literature proved a significant relationship between management commitment and risk
management implementation [10]. Management commitment motivates the lower employees to work for risk identification, risk handling, risk planning and finally risk implementation.

H2: Management commitment has a relationship with supply chain IS risk management implementation.

2.3 Competitive Pressure and Supply Chain IS Risk Management Implementation

Mahilum-Tapay, et al. [39] considered IT as an essential factor for IS risk management implementation so as to accomplish highly competitive position, which incorporates higher performance levels, globalization, and organizational advancement. Competitive perfection is possibly far and wide utilized term in management, yet it is insufficiently expressed and prepared. Literature shows three relationship designs between competitive edge and company's performance, namely; unique advantage important to advance performance, unique advantage without better performance, and greater performance without unique advantage. Ordóñez de Pablos [40] clarified the competitive favourable position of a worldwide organization. He examined that competitive advantage misleads an organization. In this direction competitive pressure reduces the ability to implement supply chain IS risk management. Sometime competitive pressure leads towards better supply chain IS risk management. Therefore, competitive pressure has a relationship with supply chain IS risk management.

H3: Competitive pressure has a relationship with supply chain IS risk management implementation.

2.4 Organization Structure

Organization structure has important role in any organization [14, 41-43] as it has important role in strategy making. Better organization structure supports the strategies for supply chain IS risk implementation. However, ineffective organization structure can be a constraint in the way of supply chain IS risk management implementation.

Grabowski and Roberts [26] carried out a research in united states about the risk mitigation problem and found a procedure to support high performance measures in an organization. The study recognised organizational structure as one of the most critical success elements for IS risk management implementation. Silver [44] inspected critical success elements in complex industrial projects and findings of study acknowledged organizational structure as a serious success factor. Moreover, another study carried out by DeLoach [45] in united states on risk imperative, found that organizational structure is the key critical success factor while implementing IS risk management. Additionally, it is also found by various studies that organization structural is important in IS risk management [26].

H4: Organization structure moderates the relationship between management commitment and supply chain IS risk management implementation.

H5: Organization structure moderates the relationship between management commitment and supply chain IS risk management implementation.

H6: Organization structure moderates the relationship between competitive pressure and supply chain IS risk management implementation.

Additionally, it is found that

H7: Organization structure has a relationship with supply chain IS risk management implementation.

3. Methodology

Research design is the process which is required to complete all essential data on the research and satisfactory investigation of results. Research design can be grouped into various research designs. The present examination utilizes cross-sectional research designs. With the end goal of the present investigation, surveys are utilized to acquire information. The present study, questionnaires are used to obtain data. For this purpose, a cross-sectional research design is used to observe the association between both independent as well as dependent variables.

<table>
<thead>
<tr>
<th>Table 1. Multicollinearity</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization Culture</td>
<td>3.016</td>
</tr>
<tr>
<td>Management Commitment</td>
<td>2.025</td>
</tr>
<tr>
<td>Competitive Pressure</td>
<td>4.010</td>
</tr>
<tr>
<td>Organization Structure</td>
<td>1.023</td>
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</table>

Focus of this study is Indonesian supply chain companies. As this study investigated the role of internal and external organizational factors on supply chain IS risk management implementation, therefore, data were collected from the employees of supply chain companies in Indonesia. A questionnaires survey was carried out to collect the
opinion of supply chain employees about IS risk management implementation.

Table 2. Confirmatory Factor Analysis

<table>
<thead>
<tr>
<th></th>
<th>CP</th>
<th>MC</th>
<th>OC</th>
<th>OS</th>
<th>SCISRMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP1</td>
<td>0.869</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP2</td>
<td>0.893</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP3</td>
<td>0.919</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP4</td>
<td>0.518</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP5</td>
<td>0.868</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP6</td>
<td>0.888</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP7</td>
<td>0.877</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP8</td>
<td>0.888</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC2</td>
<td></td>
<td>0.906</td>
<td></td>
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<tr>
<td>MC3</td>
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<tr>
<td>MC4</td>
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<td>0.888</td>
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<tr>
<td>MC6</td>
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<tr>
<td>OC6</td>
<td></td>
<td></td>
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</table>

Figure 4. Measurement Model Assessment
### Table 3. Cronbach alpha, CR and Convergent Validity

<table>
<thead>
<tr>
<th></th>
<th>Cronbach's Alpha</th>
<th>rho_A</th>
<th>CR</th>
<th>(AVE)</th>
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<tr>
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<td>0.941</td>
<td>0.955</td>
<td>0.953</td>
<td>0.721</td>
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<tr>
<td>MC</td>
<td>0.931</td>
<td>0.936</td>
<td>0.948</td>
<td>0.784</td>
</tr>
<tr>
<td>OC</td>
<td>0.899</td>
<td>0.9</td>
<td>0.926</td>
<td>0.714</td>
</tr>
<tr>
<td>OS</td>
<td>0.901</td>
<td>0.923</td>
<td>0.93</td>
<td>0.767</td>
</tr>
<tr>
<td>SCISRMI</td>
<td>0.952</td>
<td>0.952</td>
<td>0.96</td>
<td>0.776</td>
</tr>
</tbody>
</table>

### Table 4. Discriminant Validity

<table>
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<th>MC</th>
<th>OC</th>
<th>OS</th>
<th>SCISRMI</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td></td>
<td>0.886</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OC</td>
<td>0.624</td>
<td>0.883</td>
<td>0.845</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS</td>
<td>0.804</td>
<td>0.598</td>
<td>0.620</td>
<td>0.876</td>
<td></td>
</tr>
<tr>
<td>SCISRMI</td>
<td>0.722</td>
<td>0.545</td>
<td>0.578</td>
<td>0.828</td>
<td>0.881</td>
</tr>
</tbody>
</table>
Table 5. PLS bootstrapping

|                  | Original Sample Mean (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (|O/STDEV|) | P Values |
|------------------|--------------------------|-----------------|-----------------------------|--------------------------|----------|
| CP -> SCISRMI    | 0.191                    | 0.19            | 0.091                       | 2.024                    | 0.041    |
| MC -> SCISRMI    | 0.009                    | 0.018           | 0.004                       | 2.105                    | 0.035    |
| OC -> SCISRMI    | 0.133                    | 0.137           | 0.053                       | 2.526                    | 0.011    |
| OS -> SCISRMI    | 0.924                    | 0.929           | 0.16                        | 5.769                    | 0.000    |

Table 6. PLS bootstrapping (Moderation)

|                  | Original Sample Mean (O) | Standard Deviation (STDEV) | T Statistics (|O/STDEV|) | P Values | Decision          |
|------------------|--------------------------|-----------------------------|--------------------------|----------|-------------------|
| CP* OS -> SCISRMI| 0.213                    | 0.131                       | 1.601                    | 0.071    | No Moderation     |
| MC* OS -> SCISRMI| 0.029                    | 0.012                       | 2.395                    | 0.029    | Moderation        |
| OC* OS -> SCISRMI| 0.213                    | 0.013                       | 1.556                    | 0.068    | No Moderation     |
Figure 6. Moderation effect between management commitment and supply chain IS risk management implementation

Total 500 questionnaires were distributed among the employees. All the items for this study are adapted from various previous studies. Therefore, a scale was developed to collect the data. Moreover, preliminary analysis was carried out with the help of statistical software SPSS version 21. It is found that data has no missing value and outlier. Multicollinearity is examined with the help of VIF as given in Table 1. VIF value should not be above 5.0 [46].

4. Results

Each item that is planned to measure a construct should have higher loading in their construct, rather than to their loadings in various construct. Table 2 exhibits that every item has a loading more than .40 as proposed by Hulland (1999). However, few items are expelled from the data set.

Moreover, the elements of measurement model such as composite reliability (CR) and AVE have values above minimum level. It is found that CR for all constructs is above 0.7 and AVE is above 0.5 as suggested by Hair, et al. [47], shown in Table 3. Finally, discriminant validity is also given in Table 4.

Significance of path coefficient was examined with the help of bootstrapping technique. It is carried out with the help of PLS. Significance of path coefficient determined that whether hypotheses are supported or not supported by the study. In this direction, t-value and p-value is considered. Table 5 shows all the results of bootstrapping. It is found that all the direct hypotheses are significant as the t-value is above 1.96 and p-value is below 0.05.

Moreover, moderation effect is given in Table 6. It is evident that moderation effect is significant in case of management commitment and supply chain IS risk management implementation. However, it is not significant in other two cases. Therefore, H5 is accepted, however, H4 and H6 are not accepted.

Finally, r-square value is shown in Figure 4 which is 0.699. It means that all the variables are expected to bring 69.9% change in dependent variable which is substantial [48-55]. This is strong r-square values.

5. Discussion and Conclusion

Results of the study highlighted that various internal and external factors have important relationship with supply chain IS risk management implementation. Internal factor namely; organisation culture has significant relationship with supply chain IS risk management implementation. Better organization culture increases the risk management strategies.

The internal factor namely; management commitment also has significant role in risk management among Indonesian supply chain companies. Better organization commitment towards risk mitigation is positive role in supply chain IS risk management. Committed management
always make efforts to develop strategies to mitigate risk and motivate their employees for risk management. Moreover, the external factor, namely; competitive pressure also has important role in risk management. Competitive pressure assists the organization to make strategies for risk management and effect positively on risk management implementation. Moreover, the moderation effect of organization structure is given in Figure 6.

It is found that organization structure is one of the factors which strengthen the positive relationship of management commitment and supply chain IS risk management implementation. Thus, Indonesian supply chain companies should focus on internal and external factors to promote supply chain IS risk management implementation.

References