Supply Risk Management: The Effect of Electronic Component’s End-of-Life (EOL) on a Consumer Electronics Company

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Abstract

The recent mergers of Electronic Component Manufacturers are a global trend that has brought uncertainty to their customers (inclusive of Consumer Electronics Companies [CECs]). The purpose of this study is to examine the importance of implementing Supply Risk Management to selected CECs in Metro Cebu and the effective strategy in reducing the effect of electronic component’s EOL. This study is important in preventing the occurrence of production downtime that will invariably result to financial loss among companies in the supply chain. The research informants included key supply chain personnel. This study utilized the descriptive research method and documentary analysis. The results revealed the following: (1) The implementation of Supply Risk Management is a very important part of the supply chain management, and (2) Selected CECs in Metro Cebu practiced risk transfer as the leading mitigation strategy. The study concluded that risk transfer is the most effective strategy in reducing the effect of electronic component’s EOL. Moreover, the study discovered that not all respondents agree that supply risk management is communicated to all employees. The study recommended that other industries in Metro Cebu may benchmark CEC’s supply risk management implementation, using basic standard for risk management process but the tools may differ.

Key Words: Supply chain management, risk management, end-of-life (EOL), electronic components, Philippines

JEL Classification: M 110, L 630, M 160

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1. Introduction

The recent mergers of Electronic Component Manufacturers (ECMs) created a tsunami effect on the Consumer Electronics Companies (CECs). ECMs, which include Semiconductor firms and Chipmakers, recently announced more than $150 billion of acquisition deals closed in 2016 (Sperling 2016), a figure higher compared to $100 billion in 2015 and $37 billion in 2014, something that has been going on annually since the early 2000s. The slow industry growth and rising costs are driving historic acquisitions among semiconductor firms looking to streamline their organization and product lines (Don Clark & Dealogic 2015). This global trend of acquisition and merging of ECMs brought uncertainty to their customers, mainly CECs. End-of-Life (EOL), defined as the end of support or selling of the product lines, is one of the after-effects of this event. For this reason, a CEC will likely be forced to review existing sourcing strategies and adapt countermeasures in stabilizing the supply chain. At its most basic definition, the supply chain is viewed simply as the process by which products or services are brought to market (Camerinelli 2009). This unpredictability is one of the many global events that a CEC’s supply chain management must anticipate and prepare for. They are largely viewed as such since no one knows which specific area will be affected the most and in what magnitude it could disturb. The detrimental effect to the CEC’s supply chain is comparable to events like natural disasters, international compliances and the rise of a new market such as the mobile industry.

The difference between a supplier’s and their customer’s product lifecycles sometimes creates two types of gaps that result in excess supply or unmet demand (Martin 2015).

In the first lifecycle gap, the supplier quickly ramps production to take advantage of the customer’s demand at the time of peak profitability for the new product lines. This happens if the forecasts of the two industries are not aligned, thus supply surpasses demand, resulting to product excess in the marketplace. The second lifecycle gap happens if the supplier’s sales decline and the product reach the end of its lifecycle; the supplier scales down the production and the product enters the EOL product lifecycle phase as illustrated in figure 1.

Figure 1: The two lifecycle gaps (Indicelectronics.com)
Thus, a CEC, as a customer, can no longer secure the volumes needed for production, or the ECM, as the supplier, will be forced to add premium price for EOL products from the cost of continuing the old production line. The effects of EOL electronic component to the CECs are the supplies’ premium price, cost in production rescheduling, or worse, the production line stoppage due to supply depletion. All boil down to financial losses as the bottom-line effect.

Both industries are aware of the effects and relationship implication of products in an EOL lifecycle phase. It is inevitable that ECMs cannot keep the cost of retaining the older production line. Oftentimes, a CEC seeks for alternate suppliers or buy the remaining supply in the black market to address the lifecycle gap. The waves of consolidation of ECMs may push the second lifecycle gap into a much-earlier time period, thus, generating higher financial losses to CECs as illustrated in figure 2.

Figure 2: The possible two lifecycle gaps after the merger of Electronic Component Manufacturers

In the figure above, it becomes evident that a CEC must reassess its business strategy in order to focus on the core functions that are critical to the company’s growth, overcoming non-core activities and challenges that drain more resources (JJS Manufacturing).

The decision of many CECs to outsource some of their business operations and non-core activities, such as manufacturing to low-cost countries like the Philippines, specifically in Metro Cebu, began as early as the 1970s. Metro Cebu’s economic processing zones catered CEC locators from Japan, Asia and later from other Western countries as strategic alternative to China’s manufacturing prowess. Subsequently, the local manufacturing industry has grown dramatically and extended their services not only as a contract manufacturer, but also in supply chain management. In the recent years, multinational CECs opened their regional sites catering research and development, and back offices to take advantage of the lower labor cost. However, it is important for these CECs to gain control of the global supply chain.
management while maximizing the experience of the local sites and contract manufacturers in Metro Cebu.

This research study is conducted to examine the importance of supply risk management in easing the uncertainty caused by the consolidation of the ECM industry and to find out the effective strategy in mitigating the effect of EOL electronic components heightened by the latter event.

2. Literature Review

The International Standard Organization 31000: 2009 is the basic standard for risk management that identifies, assesses, mitigates and monitors risks. It is widely used in all types of organization needs to understand all the risks incorporated within their processes. It is important for an organization to identify and prioritize risks and employ the appropriate controls.

Supply chain is viewed simply as the process by which products or services are brought to market. It is an important part in the companies’ competitive advantage and their leading edge to the marketplace. As defined by Martin Christopher, professor of marketing and logistics at the Cranfield School of Management, Supply Chain Management encompasses both the internal management of the logistics processes that support the flow of products and related information, as well as the upstream and downstream linkages with suppliers and customers. The role of supply chain management is rapidly expanding as the stakeholders are coming from all over the world. They coordinate with contract partners for manufacturing, distribution and sourcing supplier in order to aim all efforts to core activities without losing control of the supply chain. However, many companies realized that the competitive advantage is focusing on the core activities that includes product research and development, and marketing and sales. In recent past, the future growth of any company is determined by the strength of its business strategy, including outsourcing decisions. It is important not to underestimate the time needed to plan for a successful outsourcing along with addressing identified risks and uncertainties.

Figure 3. The Supply Chain Risk Management cycle (Zwißler & Hermann 2012)
Phase 1: Risk Identification

The first phase is risk identification, which often requires the longest time in the whole course. The literature provides several methods in identifying and assessing risks. Supplier risk identification primarily focuses on the monitoring of suppliers’ performance, however, with the global structure of CECs and its current business strategy, that may be difficult without the participation of offshore sites and contract manufacturers. There are several tools in identifying and analyzing risks and uncertainties; one of them is the Pareto chart. According to the American Society of Quality, a Pareto chart is a bar graph that is also called Pareto analysis. The lengths of the bar represent frequency and are arranged with the longest bars on the left and the shortest to the right. This way, the chart visually depicts which situations are more significant. The following below are the uses of a Pareto chart:

- Focusing on the most significant problems or causes.
- Analyzing data about the frequency of problems or causes in a process.
- Communicating with others about your data.

Figure 4: Pareto diagram of electronic component’s supply risks

Phase 2: Risk Analysis

Risk identification is followed by risk assessment. The risks are evaluated as to their probability of occurrence and the potential severity of impact. The two dimensions can be defined both in qualitative and in quantitative terms. Qualitative techniques assess the probability of occurrence, including expert estimates, while quantitative techniques assess the severity of past data or on simulation models. Qualitative techniques assess the severity of impact to cover expert estimates, while quantitative techniques use past data to calculate adverse variances in sales, profit margin or operational cost (Ziegenbein 2007).
Failure Mode Effects Analysis (FMEA)

FMEA is a common tool in electronic manufacturing industry used in identifying and analyzing risk. It is a model used to prioritize potential defects based on their severity, expected frequency and likelihood of detection, according to Moresteam Lean Six Sigma online training (www.moresteam.com). The FMEA highlights weaknesses in the process and is an excellent instrument to prioritize and organize continuous improvement efforts on areas that offer the greatest return. It can be performed on a design or a process, and is used to prompt actions to improve robustness.

How to Start

The process begins by identifying all of the probable failure modes. This analysis is based on experience, review and brainstorming, and should use actual data if possible.

New designs or processes may not have actual historical data to draw from, but “proxy” data may be available from similar designs or processes. The next step is to assign a value on a 1–10 scale for the (a) severity, (b) probability of occurrence and (c) probability of detection for each of the potential failure modes. After assigning a value, the three numbers for each failure mode are multiplied together to yield a Risk Priority Number (RPN). The RPN becomes a priority value to rank the failure modes, with the highest number demanding the most urgent improvement activity.

Table 1: FMEA for the Top 4 supply risks from figure 4

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>End-of-Life (EOL)</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>648</td>
</tr>
<tr>
<td>Part Change Notice (PCN)</td>
<td>6</td>
<td>10</td>
<td>9</td>
<td>540</td>
</tr>
<tr>
<td>Single Sourced</td>
<td>10</td>
<td>4</td>
<td>7</td>
<td>280</td>
</tr>
<tr>
<td>Part Number Modification</td>
<td>5</td>
<td>10</td>
<td>9</td>
<td>450</td>
</tr>
</tbody>
</table>

Phase 3: Risk Mitigation

The ultimate purpose of risk identification and analysis is to prepare for risk mitigation. Mitigation includes reduction of the likelihood that a risk event will occur and/or reduction of the effect of a risk even if it does occur (National Research Council of NAP). The most common strategies mentioned from several references are risk transfer and contracting, risk buffering, risk avoidance, risk control and risk acceptance.
1. **Risk Transfer and Contracting.** There is a common practice in the CECs to transfer risk to their stakeholders capable of handling them. However, contract manufacturers generally agree to take the risks only if there is a significant compensation or rewards.

2. **Risk Buffering.** This is the installation of the contingency plan to absorb all the effects of supply risks without compromising the project schedule. The contract manufacturer’s strength is their purchasing power and the capability to pool sourcing requirement from several customers. This allows them to overestimate production quantities, manpower, production lead time and other costs. Their investment in production storage areas capable of handling thousands of volumes in anticipating all types of supply risks is a holding ability that many CECs take advantage.

3. **Risk Avoidance.** This is a risk mitigation strategy that is not commonly utilized because most CECs are more likely to think of how to transfer the risk to other stakeholders rather than how to reevaluate internal processes to avoid risk. The nature of the strategy may be technical innovation, financial adjustment, political power and other means of countering the cause of the risk. A good example is the decision to launch a Project A with the higher cost expenditure over a much-cheaper Project B but with a much-riskier approach.

4. **Risk Control.** This refers to assuming a risk but taking steps to lessen or otherwise alleviate its impact or likelihood. Risk Control can take the form of installing data-gathering or early warning systems that provide information to assess more accurately the impact, likelihood or timing of a risk. If the warning of a risk can be obtained early enough to take action against it, then information gathering may be preferable to more tangible and possibly more expensive actions (National Research Council of NAP). An example of a risk control method is monitoring technology trend and market intelligence both vital to electronic sectors.

5. **Risk Acceptance.** This is the last option. If the risks cannot be transferred, buffered, avoided or controlled, then they must be accepted ahead of time so that production schedule can proceed, assuming that the decision to go ahead with the production schedule is more acceptable rather than not going. This should be clearly communicated to all stakeholders.

**Phase 4: Risk Monitoring and Review**

Risk monitoring and review continuously happens at each step along the way, not just at the end of the process. ISO 31000 emphasizes that monitoring and review assures that the countermeasures taken are effective, that the lessons are learned and that risk will be
appropriately controlled and that the organization will be ready for the change. It is equally important to communicate and consult collaborators to every step taken.

**Supply Risk Management as Part of Supply Chain Risk Management**

Supply Chain Risk Management is to collaboratively with partners in a supply chain apply risk management process tools to deal with risks and uncertainties caused by, or impacting on, logistics-related activities or resources (Zwißler & Hermann 2012). This includes three elements: (1) internal risk management, (2) marketing risk management, and finally, (3) supply risk management. This study focused on the supply risk management centered on supply-related risks.

### 3. Methodology

#### 3.1 Research Questions

The two major research questions are the following; first is to examine the importance of implementing supply risk management to the selected CECs in Metro Cebu; and second is to find out the effective strategy in reducing the effect of electronic component’s EOL as the main supply risk. As mentioned in introduction, cost implication to the supply chain is the end effect.

#### 3.2 Research Design

This study utilized the descriptive research method. It attempts to look into the situation and collect information without changing the environment and nothing is manipulated. The literature mentioned three types of descriptive research methods: the observational method, case study and survey method (Hale 2011). This study used the survey method in collecting the primary data. Moreover, it is not limited to the survey as it used documentary analysis from selected CECs in Metro Cebu related to supply risk management.

#### 3.3 Research Instrument

The essence of the survey method can be explained as “questioning individuals on topics and then describing their responses” (Jackson 2011). The survey questionnaires utilized closed questions that provide possible answers that target respondents must choose from. The advantage of closed questions is the answers can be more easily compared and that the evaluation is more objective (Raithel 2008).

This research paper focused on the idea that electronic component’s EOL is the main supply risk in recent years. A data from a CEC in Metro Cebu revealed that electronic component’s EOL is the highest supply risk encountered from year 2011 to 2016 (Lexmark International Inc.). The consolidation of ECMs for the past years heightens not only EOL, but also the other supply risks as identified in figure 4. Using FMEA to analyze the list of supply risk identified, the researcher concluded that EOL as the highest risk in electronic components as shown in table 1.
The first portion of the survey contains closed questions to examine the importance of implementing supply risk management to the selected CECs in Metro Cebu. The idea is to capture how these companies deal with the uncertainty brought by the consolidation of the global ECM industry and the increasing number of EOL electronic components as a repercussion. When asking the respondent to assess the importance of certain statements, a Likert scale was used as shown in table 2.

Table 2: Level of importance in Likert scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
</table>
| 4 = Very Important (VI) | - The supply chain organization understands the impact of supply risks.  
- The company and staff had several experience in handling supply risk.  
- The staff is trained in risk management, such as ISO or other industry standards. |
| 3 = Important (I)     | - The supply chain organization understands the impact of supply risks.  
- The company and staff had some experience in handling supply risk.  
- The staff is not trained in risk management but applied some solutions. |
| 2 = Less Important (LI) | - The supply chain organization understands the impact of supply risks.  
- The company and staff had very little experience in handling supply risk.  
- The staff is not trained in risk management. |
| 1 = Not at all Important (NI) | - The supply chain organization does not understand the impact of supply risks.  
- The company and staff had no experience in handling supply risk.  
- The staff is not trained in risk management. |

The second portion of the survey contains closed questions to find out the effective strategy in reducing the effect of electronic component’s EOL as the main supply risk. When asking the respondent to assess the effectiveness on certain statements, a Likert scale was used as shown in table 3.

Table 3: Level of effectiveness in Likert scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 = Very Effective (VE)</td>
<td>It is very effective if it is easy to implement, it is cost efficient and there is 100% support from the management and supply chain organization.</td>
</tr>
<tr>
<td>3 = Effective (E)</td>
<td>It is effective if it is easy to implement, it is cost efficient, and there is greater number of support from the supply chain organization.</td>
</tr>
<tr>
<td>2 = Less Effective (LE)</td>
<td>It is less effective if it is easy to implement, it is expensive, and there is less number of support from the supply chain organization.</td>
</tr>
<tr>
<td>1 = Not Effective (NE)</td>
<td>It is not effective if it is hard to implement, it is expensive, and there is no support from the supply chain organization.</td>
</tr>
</tbody>
</table>

3.4 Research Respondents

The target respondents to this study are the people behind the supply chain operations and involved in the supply risk management of the CECs. This is the population working on the
procurement, sourcing, or production or the people working in identifying and analyzing possible supply risks and uncertainties. They hold the positions such as supply chain managers, sourcing managers, procurement managers, planners, buyers and associates, or any personnel working on supply risk management such as administrators, accountants, engineers, consultants, etc.. The target companies are the selected CECs that include outsource production, contract manufacturers and research and development sites in Metro Cebu located in various economic zones in the metropolis. Metro Cebu is composed of the cities of Cebu, Mandaue, Lapu-Lapu, Talisay, Naga and Danao, and municipalities of Consolacion, Liloan and Minglanilla. However, the concentration of the respondents is located in 3 economic zones in Lapu-Lapu City.

3.5 Data

The Study on Supply Risk Management in Selected CECs in Metro Cebu

This study used convenience sampling technique. A convenience sample is specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in study (Research Methodology).

There were 26 CECs identified to participate in this study. 10 CECs gladly participated, and 5 CECs without any local supply chain organization agreed not to participate because it will not provide the correct respondents. Unfortunately, 6 CECs declined to participate due to proprietary information that needs to be protected, and 5 CECs were undecided to participate as of this writing. For this reason, this study opted to use convenience sampling because the CECs’ consent created the limitation to produce probability sampling to the target respondents. Nevertheless, the 10 CECs participated distinctly represented the CEC industry in Metro Cebu.

There were 21 respondents from 10 CECs who participated in the research survey. Managers were the highest respondents at 38% of the population, followed by supply chain staff and buyers/purchasers both at 19%, administration at 14% and engineers at 10%. The 90% of the CECs had their production site located in Metro Cebu, while the rest (10%) had their contract manufacturers located in China. On the other hand, the CECs who allowed the research study were initially hesitant and asked more information about the affiliated organization of the researcher for the fear of revealing vital information to competitors. The research questionnaires went through stringent approval process from the management before it reached the target respondents.
The Importance of Supply Risk Management Implementation

As shown in table 5, majority agreed that the implementation of supply risk management is very important to the selected Consumer Electronics Companies in Metro Cebu. All of the supply risk management concept statements are all within the 3.5 to 4.0 range, resulting to 3.7 computed total mean which is equivalent to “very important” scale. This means that the local CEC industry understands the impact of supply risks to the business. The companies and staff had the experiences and are trained to deal the uncertainties from global suppliers.

Table 5: Supply risk management concept

<table>
<thead>
<tr>
<th>Supply Risk Management Concept</th>
<th>Respondents’ Assessment (VI)</th>
<th>(I)</th>
<th>(LI)</th>
<th>(NI)</th>
<th>μ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Implementation of supply risk management as part of the supply chain management.</td>
<td>19</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3.9</td>
</tr>
<tr>
<td>2.) Top management fully supports the implementation of supply risk management.</td>
<td>19</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3.9</td>
</tr>
<tr>
<td>3.) Customers and suppliers are committed to the implementation of the company’s supply risk management.</td>
<td>12</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>3.6</td>
</tr>
<tr>
<td>4.) The implementation of supply risk management is communicated to employees in all level.</td>
<td>12</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td>5.) Process steps and responsibilities are clearly outlined during the implementation of supply risk management.</td>
<td>18</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3.7</td>
</tr>
<tr>
<td>6.) Tools and methods in identifying and analyzing supply risk are provided during the implementation of supply risk management.</td>
<td>15</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>3.7</td>
</tr>
<tr>
<td>7.) Risk mitigation plans are discussed and implemented.</td>
<td>14</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>3.7</td>
</tr>
<tr>
<td>8.) Risk monitoring and documentation are conducted during and after the implementation of supply risk management.</td>
<td>14</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>3.7</td>
</tr>
<tr>
<td>9.) Implementation of supply risk management is a continuous and never-ending process.</td>
<td>11</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>3.7</strong></td>
</tr>
</tbody>
</table>
Furthermore, when the respondents were asked to assess the level of importance of the implementation of supply risk management communicated to employees in all levels, an interesting spread-out of data revealed that 10% of the informants indicated that the implementation of supply risk management as less important. However, 57% emphasized that it is very important, and 33% indicated it is important. Notwithstanding, the computed mean of 3.5 indicated that the communication of the implementation of supply risk management to employees in all levels is very important as illustrated in figure 5.

**Figure 5: Communication to employees in all levels**

The Effectiveness of Risk Mitigation Strategies in Reducing the Effect of Electronic Component’s EOL

Table 6 shows the respondents’ assessment of the level of effectiveness of the five risk mitigation strategies. All of the strategies are within the 2.5 to 3.4 range scale which means they are all identified by respondents as effective strategies. “Risk transfer” leads at 3.38 value scale and came out as the most effective strategy in reducing the effect of electronic component’s EOL.
Table 6: Risk mitigation strategies

<table>
<thead>
<tr>
<th>Risk Mitigation Strategies</th>
<th>Respondents’ Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(VE)</td>
</tr>
<tr>
<td>1.) Reducing the effect of Electronic Component’s EOL by implementing the “Risk transfer” strategy.</td>
<td>8</td>
</tr>
<tr>
<td>2.) Reducing the effect of Electronic Component’s EOL by implementing the “Risk avoidance” strategy.</td>
<td>7</td>
</tr>
<tr>
<td>3.) Reducing the effect of Electronic Component’s EOL by implementing the “Risk buffering” strategy.</td>
<td>5</td>
</tr>
<tr>
<td>4.) Reducing the effect of Electronic Component’s EOL by implementing the “Risk control” strategy.</td>
<td>6</td>
</tr>
<tr>
<td>5.) Reducing the effect of Electronic Component’s EOL by implementing the “Risk acceptance” strategy.</td>
<td>4</td>
</tr>
</tbody>
</table>

Legend:

<table>
<thead>
<tr>
<th>Range</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5–4.0</td>
<td>Very Effective</td>
</tr>
<tr>
<td>2.5–3.4</td>
<td>Effective</td>
</tr>
<tr>
<td>1.5–2.4</td>
<td>Less Effective</td>
</tr>
<tr>
<td>0–1.4</td>
<td>Not Effective</td>
</tr>
</tbody>
</table>

Moreover, the table shows another interesting data: three respondents believed that “Risk buffering” is a less-effective strategy, while “Risk control” had two respondents indicated as such. It is interesting to note that three respondents identified “Risk acceptance” as less effective and another one thought it is not an effective strategy.

Figure 6 shows the distribution of the respondents’ assessment of the effectiveness of five risk mitigation strategies in reducing the effective of electronic component’s EOL. “Risk transfer” still leads the number of respondents who identified it as a very effective strategy. Another interesting finding: those who identified “Risk acceptance,” “Risk buffering,” and “Risk acceptance” as less/not effective were the four buyers/purchasers. It is essential to note that these are the people who work directly with suppliers and distributors and are immediately exposed to all types of supply risks. Finally, it is evident that majority of the respondents believed that all of the strategies are effective as the concentration of the distribution are in “effective” and “very effective” scales.
4. Results and Discussion

The findings of the study show that the selected CECs in Metro Cebu recognized the importance of the implementation of supply risk management. All respondents agreed that supply risk management should be part of the supply chain management and that all had the knowledge to implement it. These companies understand the impact of supply risks and had trained and experienced staff to manage them. There is no doubt that the top managements had the full support and that the customers and suppliers are committed. Although most respondents believed that communication to employees in all levels is very important, a few respondents in management roles believe it is less important. This is an opportunity for improvement on reviewing corporate communication strategies. Furthermore, majority indicated the importance of having clearly outlined process steps and responsibilities.

The study did not focus on the specifics of the process applied. Requiring details may touch on sensitive and confidential information. Notwithstanding this anticipated objection, a few still declined to participate. Again, the study did not dig deeper on the tools and methods used in identifying and analyzing supply risks. However, the researcher indicated to these respondents that more important than anything else was their availability during the implementation of the supply risk management and their willingness to supply information that pertains to the supply risk management implementation.

Companies may use different sets of tools and methods that could be business strategic advantages. This could be an opportunity for another research study to identify the commonly used tools and methods in CECs so that other industries may emulate them in their environment. Finally, all respondents agreed that it is very important that implementation of supply risk management is a continuous and never-ending process.
The second part of the study focused on the effectiveness of five risk mitigation strategies in reducing the effect of electronic component’s EOL. All respondents indicated that risk mitigation plans and discussions are very important in the implementation of supply risk management. Majority of the respondents indicated that the five strategies are effective in reducing the effect of electronic component’s EOL. The data unfolded that “Risk transfer” is the most effective risk mitigation strategy; however, the study was not conducted to identify the more popular risk mitigation strategies. To be able to discover which strategy is more effective, there exists the logical necessity of implementing all the five strategies, thus making available the opportunity of comparison based on actual observation. It was almost axiomatic that is there is no single strategy that will reduce the effect of electronic component’s EOL. All of them are important as companies tend to combine one or more of the strategies.

The relationship to the suppliers is another factor to consider before adopting any of them. Electronic components come in wide variety of types, and no single strategy will be effective enough to address the electronic component’s EOL.

5. Conclusion and Recommendations

The study concluded that all selected CECs in Metro Cebu recognized the importance of the implementation of supply risk management. “Risk transfer” is the most effective risk mitigation strategy in reducing the effect of electronic component’s EOL.

The study recommends that other sectors in Metro Cebu may benchmark the maturity level of CECs in implementing supply risk management. Like CECs, these industries have their raw materials and suppliers from all over the world. Food processing, mechanical works, plastic molding and garment industries are abundantly scattered in Metro Cebu. They may use the International Standard Organization 31000:2009 as the basic standard for risk management. The process may be the same, but the tools and methods in identifying and analyzing supply risks may differ depending on each industry’s application.

“Risk transfer” may come out as the most effective risk mitigation strategy, but it is best paired up with other risk mitigation strategies in this study.

Finally, CECs which declined to participate may find this research study as valuable information in the implementation of supply risk management to their respective companies. In future studies, the non-participating companies may find this study useful, and may later decide to participate in related studies in the future.

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