INVENTORY MANAGEMENT STRATEGIES PROPENSITY TOWARD SUPPLY CHAIN MANAGEMENT IN THE AEROSPACE INDUSTRY IN MALAYSIA. THE MODERATING EFFECT OF FINANCIAL RISK CONSIDERATION.

By

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ABSTRACT

This thesis examined the relationship between inventory management strategies (IMS) and supply chain management (SCM) performance in the aerospace industry, an advanced and high technology industry that is characterized by a high working capital with potential huge losses if something goes wrong. The IMS dimensions of stock holding, safety stock, storage policy and inventory risk were tested against the SCM performance dimensions of on-time delivery (OTD), balance score card (BSC), inventory turn and factors related to inventory-financial risks. The quantitative research methodology was opted for this study. Data collection was performed from January to May 2016, involving 81 respondents related to the aerospace industry in Malaysia. This accounted for 40.5% of the population in the country. The Statistical Package for the Social Sciences (SPSS) was used to assist in the analysis. The findings indicated that only two dimensions of the IMS are used as predictors for the SCM performance. It also revealed that every dimension of the SCM performance is significant with only one dimension of the IMS. The most important dimension of SCM performance is the inventory risk dimension. Contrary to the initial expectation, storage policy is found to be insignificant for the theoretical relationship in this industry and the financial risk factor is found to be a weak moderator in the proposed relationship. The findings also suggested the need to examine financial risk consideration as the independent variable when examining the SCM performance in the aerospace industry. Moreover, these findings can be considered unique as they offer different contributing dimensions to the SCM performance and these should be the eye- opener to the organizations that have different attributes, in particular the high technology industry that involves high working capital.

Keywords: Inventory management strategies, supply chain management, financial risk, organization performance, on-time delivery, aerospace industry.

ABSTRAK

Tesis ini mengkaji hubungan antara strategi pengurusan inventori (IMS) dan pengurusan rantaian bekalan (SCM) dalam industri aeroangkasa, industri teknologi lanjutan dan tinggi. Hal ini dicirikan oleh modal kerja yang tinggi dengan potensi kerugian yang besar sekiranya berlaku sesuatu yang salah. Dimensi IMS melibatkan pegangan stok, stok keselamatan, dasar penyimpanan dan risiko inventori yang diuji terhadap dimensi prestasi SCM pada masa penghantaran (OTD), kad skor imbangan (BSC), giliran inventori dan faktor yang berkaitan dengan risiko inventori-kewangan. Kajian ini menggunakan metodologi penyelidikan kuantitatif. Pengumpulan data dilakukan dari Januari hingga Mei 2016 yang melibatkan 81 orang responden yang berkaitan dengan industri aeroangkasa di Malaysia. Jumlah ini mengambil kira 40.5% populasi penduduk di negara ini. Pakej Statistik untuk Sains Sosial (SPSS) digunakan untuk membantu dalam analisis. Penemuan menunjukkan bahawa hanya dua dimensi IMS digunakan sebagai peramal bagi prestasi SCM. Selain itu, ini juga mendedahkan bahawa setiap dimensi prestasi SCM adalah signifikan. Dimensi IMS yang paling penting dalam prestasi SCM adalah dimensi risiko inventori. Ini berbeza dengan jangkaan awal, iaitu dasar penyimpanan didapati tidak signifikan untuk hubungan teoritis dalam industri ini. Di samping itu, faktor risiko kewangan didapati menjadi moderator lemah dalam hubungan yang dicadangkan. Penemuan ini juga mencadangkan keperluan untuk meneliti pertimbangan risiko kewangan sebagai pemboleh ubah bebas ketika mengkaji prestasi SCM dalam industri aeroangkasa. Selain itu, penemuan ini boleh dianggap sebagai unik kerana menemukan dimensi yang menyumbang kepada prestasi SCM yang berbeza dan ini harus menjadi pembuka mata kepada organisasi yang mempunyai atribut yang berbeza. Ini khususnya bagi industri teknologi tinggi yang melibatkan modal kerja yang tinggi.

Kata kunci: Strategi pengurusan inventori, sengurusan rantaian pembekalan, risiko pkewangan, prestasi organisasi, pengiriman pada Masa, industri aeroangkasa.

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LIST OF ABBREVIATIONS

ACM	Asian Composite Manufacturing (ACM) Sdn Bhd (now known as Aerospace Composite of Malaysia)
AOG	Aircraft on ground
APICS	American Production and Inventory Control Society
ASEAN	Association of Southeast Asian Nations
ATP	Analytic network processor
BSC	Balance Score Card
CIA	Central Intelligence Agency
CPU	Central processing unit
CTRM	Composite Technology Research Malaysia
DOM	Distribution Management
EM	Expectation Maximisation
EOQ	Economic order quantity
ERP	Enterprise Requirement Planning
FG	Finished Goods
FMEA	Failure mode effect analysis
FR	Financial Risk
FRF	Financial Risk Factors
GDP	Gross Domestic Product
GM	General Motors Company
HIRARC	Hazard identification, risk assessment and risk control
IFR	Inventory Financial Risk

IMS	Inventory management strategy
Incoterm	International Commercial Terms
INT	Inventory Turn
IO	Inventory optimization
IT	Information Technology
JIT	Just In Time
KMO	The Kaiser Meyer-Olkin
MIGHT	Malaysian Industry-Government Group for High Technology
MOQ	Minimum order quantity
MRO	Maintenance, repair and overhaul
MRP	Material Requirement Planning or Manufacturing Resource Planning
MV-FRSCM	Moderating Variable – Supply Chain Management risk
MVSCMCost	Moderating Variable – Supply chain management cost
OEM	Priginal equipment manufacturer
OTD	On-time delivery
RBA	Risk benefit analysis
S&OP	Sales and Operation Planning
SAE	Society of Automotive Engineers
SCM	Supply chain management
SCOR	Supply Chain Operational Reference
SIOP	Sales, Inventory & Operations Planning
SKU	Stock keeping unit
SMEC	Small Medium Enterprise Corporation

SME	Subject matter expert
SOP	Standard operating procedures
SPSS	Statistical Package for the Social Sciences
TOC	Theory of constraints
TPS	Toyota Production System
USD	United States Dollar
VMI	Vendor managed inventory
WHO	World Health Organization
WIP	Work-in-progress

CHAPTER ONE

RESEARCH BACKGROUND

1.1 Introduction

Today, the industry sector in Malaysia is the main contributor to the national gross domestic product (GDP) and, has contributed 40.6% of which is envisioned to continue to lead the country economic development (CIA World Factbook, 2014). This similar trend also existed in most countries in the world, especially in Asia, for examples, 45.6% in 2010 in Thailand, 31.3% in 2010 in the Philippines and 47.1% in 2008 in Indonesia (Economy Watch, 2015). For other sectors in Malaysia, the agriculture sector contributes 11.2% and the service sector contributes 48.1% (CIA World Factbook, 2014). With the statistics, it shows that a large percentage of the respective country's GDP is contributed from the industry sector.

Thus, it can be said that the contribution of the manufacturing sector to the national GDP is significant for the growth of the national development and therefore, the government needs to constantly monitor and focus on the progress. In South East Asia, the Asian countries are progressively competing with each other to attract foreign investments while also providing guidance and incentives for the local enterprise to start their manufacturing facility. To encourage further investment among the locals to venture into the export market and having their products sold overseas, the governments offer attractive financing to local companies, to create more employment opportunities, enable greater income in the country and increase the GDP.

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APPENDIX – QUESTIONNAIRE

QUESTIONNAIRE ON

INVENTORY MANAGEMENT STRATEGY, FINANCIAL RISK CONSIDERATION AND SUPPLY CHAIN MANAGEMENT PERFORMANCE

I am conducting a research project at the PhD level on the relationship between the inventory management strategies and supply chain management performance in manufacturing industry, with particular emphasis in high technology and aerospace sector. This research intends to address the effect of inventory management strategies on the supply chain management and also to look into the moderating effect of financial risks in the mentioned relationship (Berling & Rosling, 2005). This thesis provides importance reference to the manufacturing sector in dealing with high technology.

The data collected is highly confidential and shall be used solely for the research purposes. The data reported will be in the summarized form and thus in no way personal information can be identified.

Your valuable time is very much appreciated. There is no absolute right or wrong answer to the questions and thus please take your time to answer the questions to the best of your knowledge.

SECTION A

This section intends to get information on the respondents' demographic background (the contextual factors). Tick the box which best describe about you.

1. Gender

☐ Male ☐ Female

2. Nationality

☐ Malaysian ☐ Others. Pls specify _____

3. Level of education

☐ High school ☐ College ☐ Degree & above

4. Employment

☐ Full time ☐ Part time

5. Position Level in the organization

☐ Executive & below ☐ Manager ☐ Top management

6. The organization that you work

☐ Non –High tech ☐ High tech Industry ☐ Aerospace and related

7. Is your Organization keep inventory /stock (of any nature) ?

☐ Yes ☐ No ☐ Not sure

8. Do your company have supply chain management or similar function or department ?

☐ Yes ☐ No

9. Have you been involved in Inventory directly or indirectly ?

☐ Yes ☐ No

10. Do you think Inventory management is important to your organization ?

☐ Yes ☐ No

If yes, (10a) then do you think Supply Chain Management performance is related to inventory ?

☐ Yes ☐ No

11. If there is financial risks involvement, do you think it will affect the decision on the Supply Chain Management decision in terms of inventory management ?

☐ Yes ☐ No

12. Will you be interested to have a copy of this research ?

☐ Yes ☐ No

If Yes, pls provide the following details :

Name :

Position :

Company :

Email :

Mobile No :

SECTION B

This section is to measure the performance of the **Supply Chain Management.** Please circle one answer in each line across.

Definition of scale:1 Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree.

On Time Delivery (OTD) Performance					
1. OTD measurement is very critical to your Customer(s).	1	2	3	4	5
2. OTD is company key KPI to measure performance and critical to management.	1	2	3	4	5
3. Customer can penalize your company for delay in shipment eg incurred additional cost of shipping via express air freight.	1	2	3	4	5
4. Continuous not meeting OTD will push customer to consider alternative supplier(s).	1	2	3	4	5
5. Inventory is necessary to meet Customer's delivery expectation	1	2	3	4	5
Balance Score Card (BSC) – Financial, Customer, Internal Business and Learning & growth					
6. Company performance is measure via BSC or similar, KPI matrix on monthly basis.	1	2	3	4	5
7. Financial Position in terms of Profit & Lost including Balance Sheet are main tools for management	1	2	3	4	5
8. Customer Satisfaction index is monitor and normally shared in meetings with employees	1	2	3	4	5
9. To stay competitive, Organization will seek cost improvements through internal processes eg Value Stream Mapping.	1	2	3	4	5
10. Organization will review the Training Need Analysis (TNA) of their workforce on yearly basis to encourage continuous learning	1	2	3	4	5

11. BSC or KPI performance is directly or indirectly affected by availability of inventory.	1	2	3	4	5
12. Lack of inventory will also lower the Customer service level in long run	1	2	3	4	5
Inventory Turns					
13. One of the most important measurements in terms of inventory is the inventory turn. The higher the value, the better is the performance.	1	2	3	4	5
14. Organization will normally set a maximum level of inventory for the different categories	1	2	3	4	5
15. Sales performance largely is depended on the level of inventory	1	2	3	4	5
16. Companies are always looking into alternatives to reduce inventory holding	1	2	3	4	5
17. Most companies are pushing the inventory management to their suppliers eg VMI	1	2	3	4	5
Financial Risk factors					
18. Companies will accrue amount which is equivalent to the risks of inventory holding	1	2	3	4	5
19. Companies will need to pay Air or Express Freight due to backlog in order fulfilment	1	2	3	4	5
20. Stock count variances will need to be adjusted to reflect the correct inventory in the system	1	2	3	4	5
21. Due to Financial risks aspect, Supply Chain Management decision may compromise	1	2	3	4	5
In relation to Inventory & Financial Risks					
22. Supply Chain Management performance is directly or indirectly affected by availability of inventory to fulfil the customer's order.	1	2	3	4	5
23. Inventory is needed for order fulfilment as well as to improve Customer service level	1	2	3	4	5

24. Inventory must always be available to support production and Supply Chains management	1	2	3	4	5
25. The level of inventory and the performance of SCM is affected by risk factor perceived by Financial controller or Accounting manager.	1	2	3	4	5

SECTION C

This section is to suvey the importance of **Inventory Management strategy** in relation to Supply Chain Management performance. Please circle one answer in each line across. *Definition of scale: Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree*.

Stock holding					
1. All companies have policy on the level of stock to maintain to ensure smooth operations	1	2	3	4	5
2. Companies will have least or optimum level of stock to fulfil customer requirements.	1	2	3	4	5
3. Companies are always looking into ways to reduce their stock holding level eg JIT	1	2	3	4	5
4. It is quite common in companies that storage space is limited	1	2	3	4	5
5. Variances between physical actual inventory and system/ book is common	1	2	3	4	5
Safety Stock					
6. Warehouse will always have safety stock level clearly indicated in their process	1	2	3	4	5
7. Safety Stock is necessary to cover incoming shipment delay	1	2	3	4	5
8. Safety Stock is necessary to cover Quality issuse	1	2	3	4	5
9. Safety Stock is necessary to cover supplier's inability to ship complete per requirements	1	2	3	4	5

Storage Practise					
10. Materials are categories to the type of storage type and condition eg open, close, coldroom and temperature/humidity controlled	1	2	3	4	5
11. FIFO implementation is very important for all warehouses	1	2	3	4	5
12. For temperature sensitive items, not storing at the right requirements will results in scraps	1	2	3	4	5
13. Intergrity of Inventory accuracy between actual physically inventory to the system can be a challenge	1	2	3	4	5
Inventory Risk					
14. Scrapping inventory due to absolescene, shelf life or overstock are possible occurrence	1	2	3	4	5
15. Organization always have materials with shelf-life and need special monitoring	1	2	3	4	5
16. Occurrence of no inventory and affected production and delivery is not unusual	1	2	3	4	5
17. Scrapping materials due to wrong storage condition is not unusual	1	2	3	4	5
18. The difference between the actual physical and the book/system figures can impact P&L	1	2	3	4	5
19. It is quite usual that 60 - 75% of the product cost come from material cost.	1	2	3	4	5

SECTION D

The following statements describe the impact of Financial Risks as moderator in the relation between Inventory Management Strategy and Supply Chain Management performance. Please circle one answer in each line across. *Definition of scale: Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree.*

1. Effective Supply Chain can ensure high percentage Order Fulfilment with least possible cost	1	2	3	4	5
2. Supply Chain processes maybe compromise if involved financial risk or high investment	1	2	3	4	5
3. Financial decision is normally included in any change of processes in the supply chain	1	2	3	4	5
4. Inventory policy decision eg level of stock normally include advice from Finance Dept	1	2	3	4	5
5. Finance in most cases make decision based on numbers instead of business needs	1	2	3	4	5
6. To scrap items from Store, Finance/ Accounting approval is required	1	2	3	4	5
7. Storage above the usual or targeted level normally create concerns to the Finance	1	2	3	4	5
8. Finance department may rate the inventory risk in terms of aging	1	2	3	4	5
9. Inventory needed to support production and order fulfilment but is influenced by availability of working capital.	1	2	3	4	5
10. Supply Chain performance can be affected with wrong decision from financial aspect.	1	2	3	4	5

THANK YOU