



## **Faculty of Manufacturing Engineering**



### **HOSHIN KANRI STRATEGY FOR PRODUCTIVITY IMPROVEMENT IN AERO COMPOSITE**

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**Master of Manufacturing Engineering  
(Quality System Engineering)**

**2023**

## DECLARATION

I declare that this thesis entitled "Hoshin Kanri strategy for productivity improvemet in aero composite" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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## APPROVAL

I hereby declare that I have read this dissertation/report and in my opinion this dissertation/report is sufficient in terms of scope and quality as a partial fulfillment of Master of Manufacturing Engineering (Quality System Engineering).

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## ABSTRAK

Hoshin kanri adalah merupakan salah satu alat strategi yang digunakan untuk membantu pengurusan kilang mencapai objektif yang ditetapkan dan meningkatkan tahap komunikasi antara pekerja dan pengurusan. Ia juga dapat membantu kilang mencapai produktiviti yang diinginkan. Cara perlaksanaannya adalah dengan menggunakan 7 jenis polisi yang telah ditetapkan oleh para pengkaji sebelum ini. Kesemua elemen ini yang ditetapkan tersebut adalah standard di mana ia sesuai diaplikasikan di mana-mana jenis industri. Penggunaan pemangkin seperti PDCA dan catchball dapat membantu penggunaan kaedah Hoshin kanri ini dengan lebih berkesan. CTRM iaitu syarikat pembuatan komponen kapal terbang berasaskan komposit yang bertempat di Melaka telah dipilih sebagai syarikat lapangan kajian untuk projek ini. Projek ini berkisarkan tentang pengaplikasian Hoshin kanri strategi di dalam industri aero composites dengan merujuk khusus pada kilang CTRM. Maklumat berkaitan tentang amalan pengurusan di dalam kilang ini akan diambil dan dikumpulkan.. Kemudian, maklumat yang diperoleh akan dianalisis dengan menggunakan kaedah “framework” analisis. Di sini, kriteria dan polisi berkaitan hoshin kanri akan dikenalpasti dan disenaraikan di dalam jadual “framework” analisis. Ini bertujuan untuk menganalisis sama ada CTRM telah menggunakan elemen Hoshin kanri di dalam amalan pengurusan mereka selama ini atau pun tidak.. Selepas itu, kaedah S.W.O.T analisis akan digunakan untuk mengenalpasti kekuatan, kelemahan, peluang dan ancaman yang wujud di dalam CTRM. Satu model baharu hoshin kanri baharu akan dikeluarkan berdasarkan kajian yang telah dilakukan di mana model ini dibina berdasarkan maklumat yang diperoleh di dalam kajian ini. Model tersebut akan dicadangkan kepada pihak pengurusan kilang untuk mendapatkan pandangan mereka akan model hoshin kanri yang dibina. Secara keseluruhannya, kajian ini akan menunjukkan hasil kefahaman yang menyeluruh terhadap dasar hoshin kanri dan kaedah yang digunakan oleh industri pembuatan aero komposit bagi menjayakan objektif syarikat dan pembangunan serta cadangan model berdasarkan kriteria dan dasar hoshin kanri.

## **ABSTRACT**

Hoshin kanri is a strategic tool used to help factory management achieve set objectives and improve the level of communication between workers and management. It can also help the factory achieve the desired productivity. The implementation method is to use 7 types of policies that have been set by the researchers before. All of these elements that are set are standards where they are suitable to be applied in any type of industry. The use of catalysts such as PDCA and catchball can help the use of the Hoshin kanri method more effectively. CTRM, which is a composite-based aircraft component manufacturing company located in Melaka, has been selected as the research field company for this project. This project revolves around the application of Hoshin kanri strategy in the aero composites industry with specific reference to the CTRM factory. Relevant information about management practices in this factory will be taken and collected. Then, the information obtained will be analyzed using the "framework" method of analysis. Here, criteria and policies related to hoshin kanri will be identified and listed in the "framework" analysis table. This aims to analyze whether CTRM has used elements of Hoshin kanri in their management practices over the years or not. After that, the S.W.O.T analysis method will be used to identify the strengths, weaknesses, opportunities and threats that exist in CTRM. A new model of the new hoshin kanri will be released based on the research that has been done where this model is built based on the information obtained in this study. The model will be proposed to the factory management to get their views on the built hoshin kanri model. Overall, this study will show the results of a comprehensive understanding of hoshin kanri policy and the methods used by the aero composite manufacturing industry to succeed in company objectives and development as well as model recommendations based on hoshin kanri criteria and policy.

## DEDICATION

This report is dedicated to my parent especially to my father, Umar bin Abd. Hamid and mother, Kariya bte Musa that has given me the encouragement and motivation to succeed in the future. They taught me some of most valuable lessons, sometimes painfully, but always constructively and with fairness. Without their encouragement and support, this success would not have been possible. Besides that, high appreciated to my colleague in my workplace especially to my superior En. Johari Moh Shah who support and cover me along my studying period. Others than that, thanks a lot to my wife Nurul Hanin bte Husin, my daughter Nurfirzanah Husna binti Mohd Fuad who act as my 'backbone' and motivate me when I feel demotivated along the time to complete this report. Last but not least, I am dedicate this report to the person who are very special in my life which is my late son Faqih Rayyan bin Mohd Fuad who died due to mitral valve prolapse disease during my Semester 1.



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## LIST OF ABBREVIATION

CTRM	-	Composite Technology Research Malaysia
SDN. BHD	-	Sendirian Berhad
MIDA	-	Malaysia Industrial Development Authority
PMI	-	Purchasing Manager Index
HIS	-	Information Handling Services
MRO	-	Maintenance, Repair and Overhaul
HK	-	Hoshin Kanri
PDCA	-	Plan, Do, Check, and Actual
SWOT	-	Strength, Weakness, Opportunities, and Thread
E&E	-	Electric and Electronic
M&E	-	Machinery and Equipment
MPC	-	Malaysian Productivity Council
MP	-	Master Project
DOMAL	-	Daily Operation Meeting Action List
BPR	-	Business Performance review
CBPR	-	Company Business Performance Review
CQ	-	Customer Quality
MRB	-	Material Review Board
HK	-	Hoshin Kanri
EASA	-	European Aviation Safety Agency
NADCAP	-	National Aerospace and Defense Contractors Accreditation Program
QMS	-	Quality Management System
KPI	-	Key Performance Index
HMS	-	Hicom Management System
ISO	-	International Standard Organization

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# CHAPTER 1

## INTRODUCTION

Hoshin kanri can give a lot of meaning to an organization. This is a strategic planning method, and a tool for project management, and a quality management system that allows you to consider the needs and wants of the company when developing new products, and a company operating system, which ensures reliable profit and growth. It is also a method of cross-functional management and supply chain integration into lean manufacturing processes. But above all, Hoshin Kanri is an organizational learning method and system to create competitive resources. In Japanese the hieroglyph in the word "kanri" means management, control. The hieroglyphs in the word "hoshin" can be translated as directions and shining needles, and all together - as a compass. Usually, these elements are translated as policy, so we will be able to find the translation of this hoshin kanri is the method of policy management or the application of policy.

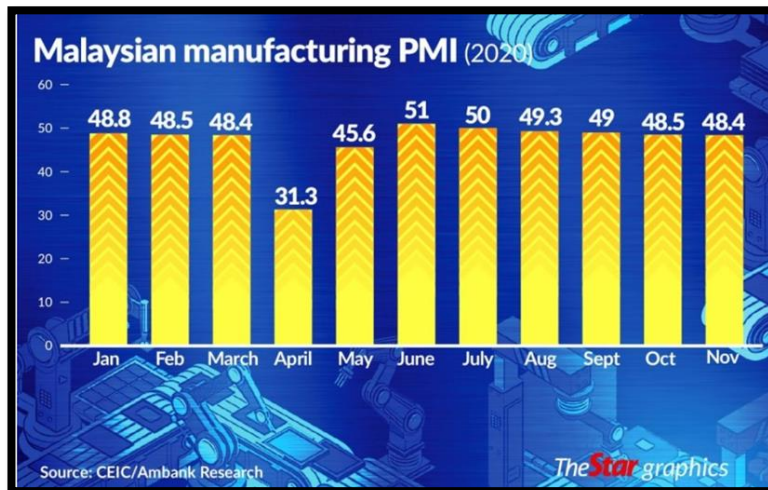
### 1.0 Background

Hoshin kanri appeared between the 1950s and 1960s. Currently, Japanese companies are experiencing post-war structural changes in an effort to increase their competitiveness in the open international market. Influenced by Peter Drucker's teachings on market direction and long-term planning, the Japanese Union of Scientists and Engineers (JUSE) in 1958 enrolled the Politics and Planning category into the annual Deming award. In 1964, Bridgestone Tire created the term Hoshin Kanri, and in 1965 they published the Hoshin Kanri Guide, which outlines the basic Hoshin principles highlighted in the Deming Award-winning work. Toyota and Komatsu have successfully completed Bridgestone's version of the hoshin kanri theory with their own innovations in cross-functional management and daily quality, cost and delivery (QCD - Quality, Cost, Delivery) disciplines. Since then, hoshin is a hallmark, lean

manufacturing criteria, as well as a total quality management system and its derivatives. In addition, hoshin kanri is the basis for the Toyota company's system in revenue management, as well as a closely related method for calculating target costs and calculating costs in a continuous production improvement system (kaizen costing). Hoshin kanri integrates the traditional budgeting process into the annual profit plan. Using an innovative method called catching the ball, the hoshin kanri method ensures that the management team at every level of the organization is involved in providing information about the company's current and planned activities before finalizing the annual budget. In doing so, financial targets are carefully matched to specific cost drivers and process improvement measures that will help achieve those targets. To a certain extent, the Hoshin Kanri system enabled the practice of open-book management (open-card management) decades before the term itself appeared in the West to refer to front-line employees who openly communicated the company's financial performance.

In Global scenario, world faces the critical virus COVID-19 attack started in December 2019. This situation has given a tremendous effect to all economic sectors. Manufacturing industry, especially in Malaysia, was one of the sectors affected. Pursuant to the data issued by Malaysian Industrial Development Authority (MIDA, 2020), There is light at the end of the tunnel for the manufacturing sector as it is set to stage a rebound next year after the latest relevant data indicated its lowest reading since May this year. Based on the IHS Markit data, the manufacturing purchasing managers' index (PMI) in November fell to 48.4 points from 48.5 in October. A reading above 50 signals expansion while less than 50 means a contraction. The manufacturing PMI is a measure of the prevailing direction of economic trends in manufacturing. It has remained in the contraction region for the fourth straight month.

According to Bloomberg, the index was down from 49.5 a year ago and it was the lowest reading since May 2020 year. (Malaysian Investment Development Authority, 30 December 2020)



**Figure 1.0: Malaysian manufacturing PMI (MIDA, 2020)**

The aerospace industry is also not left behind to receive the adverse effects of this pandemic attack. In Malaysia, aerospace industry contribute RM16.2 billion annual revenue as of fiscal year 2020 (MAIA, 2021). RM 8.81 billion for aircraft component export including composites panel and metallic part, RM 12.8 billion import. Others than that, RM 2.07 million of investment only for aerospace industry whether manufacturing or services sector. As of year 2020, Malaysia have 240 aerospace companies with 27,500 skilled workforce in order to help Malaysia achieve the target to be number one in SEA for aerospace parts & component sourcing by targeting to be large sub-assembly, Tier 1 and RSP (Risk Sharing Partner) (MAIA, 2021). However, during the pandemic attack, it has caused revenue for companies involved in the aerospace industry in Malaysia specifically to experience a negative impact. Senior Director of Spirit Aerosystems Malaysia, Datuk Zulkarnain Mohamed, said that COVID-19 had a negative impact on the industry with reduced demand in key sectors such as aerospace manufacturing, maintenance, repair and overhaul (MRO), systems integration, engineering services and education and training ( Daily News, 2021). The production rate of the supply chain for the aerospace industry also decreased by 40 percent when the COVID-19 pandemic hit the country (Daily News, 2021).

According to the chairman, Mr. Shamsudin Mohamad Yusof, since the world was hit by the Covid-19 pandemic last year, more than 16,000 planes have not been allowed to operate except for cargo planes. It can be said that this industry was almost paralyzed last year. However, our clients have the insight and strength to manage this situation (Utusan Malaysia, 2021). CTRM has formulated an effective management strategy with the help of

other subsidiary companies that are also under the umbrella of DRB-Hicom. This can minimize the impact of covid-19 on the company. The involvement and cooperation of each department in CTRM helps the company's management to carry out the covid-19 management strategy effectively (Utusan Malaysia, 2021)

In a nutshell, this study will cover the scope of how CTRM formulates effective strategies in company management during the covid-19 pandemic. The strategy used will be aligned with the Hoshin Kanri theory for us to see if the Hoshin Kanri theory is applied by the company or vice versa. Because we believe that the hoshin kanri policy has indeed been practiced by most companies, but the management terms used are different from the original theory of hoshin kanri itself.

### **1.1 Problem Statement**

Malaysia's manufacturing sector continues to play an important role in the country's economic transformation. Its contribution to the country's export earnings and job creation ensures the country's economic growth despite the uncertainties in the global economy. Priority will continue to be given to efforts to increase the production of value added, diverse and complex products, especially in the catalyst sub-sectors such as electrical and electronics (E&E), machinery and equipment (M&E) as well as materials and chemical products. Two other sub-sectors with high growth potential such as aerospace and medical devices will also be given priority.

An issue affecting the performance of the manufacturing sector in Malaysia is low productivity. Productivity is the ability to produce output from a given set of inputs as well as measure efficiency and effectiveness in the optimal use of resources (such as employees, technology, systems and management etc.) and convert inputs into useful outputs. Higher productivity indicates the efficiency and effectiveness of the use of inputs which contributes towards lower costs in doing business and at the same time creates a better standard of living and increases competitiveness.

According to the Malaysia Productivity Council (MPC) report in 2011, Malaysian workers only record a productivity value of RM43, 952 per year where it still lower compare to the

countries like United Kingdom, Japan, Singapore, South Korea and United States, Malaysia. In percentage, this country still records an average productivity growth of 4.5% per annum, which is lower than Indonesia and India.

In a nutshell, in order to overcome the challenges in managing an industry and the low productivity issue due to improper strategy planning, the best strategy that can be implemented is the hoshin kanri policy management where it is one of the best strategies that can be applied either in the manufacturing or service industry. Therefore, this study will provide and gather all the data that can be use to develop a framework or model base on hoshin kanri policy in compliance with the problems that a company face. By using the right Hoshin Kanri model, it will help the company to review and provide support to their technical team to solve the problem and find corrective and preventive action in order to avoid the recurring issue for the same problem. It is up to the management team whether to review the issue in weekly, monthly, quarterly or yearly basis. Probably it is depends on the severity of the issue happen.

## 1.2 Objective

Objectives are the actual targets of the researcher that can be observed. In contrast to goals because objectives are more specific and used to achieve a research goal. Objectives become specific goals that need to be achieved and therefore the objective objectives need to be clearly stated in order to show what is to be achieved. There are three (3) objectives need to be achieve in this study first is to study the current scenario of Hoshin kanri in aero composites manufacturing company. First objstive is to study current scenario of Hoshin Kanri in aero composite manufacturing company. CTRM AC Sdn. Bhd. was selected as the company involved in this study. Then, the second objective is to investigate the relationship between hoshin kanri policy towards the productivity improvement. This is to ascertain whether CTRM management practices are in line with hohsin kanri's policy theory or not. The final objective in this study is to develop a hohsin kanri diagram model as a result of the information collected from the CTRM company. then this developed model will be proposed and presented to one of the CTRM management lines to get their response. This developed model will also include elements of CTRM management when the covid-19 pandemic hits. It should be noted that the model developed later is focused only on CTRM companies in



particular and the aerospace aero composite manufacturing industry in general. Those objective stated can be summarise as below:

### **1.3 Scope**

The scope of the study describes how the study is generally related to the variables studied, sample and population, instrumentation and generalization. The limitations of the study describe the limitations of the study carried out in detail. Limitations of the study include the possibility of weaknesses in the study that are out of control such as involving variables in the study methodology such as non-random sample selection, small sample size, the effect of external variables or identified moderators that may affect the study. The limitations of the study also include the study period, place limitations, methodology and so on. In this study, it involves the CTRM company as the field of study conducted. The model and hoshin kanri policy framework developed in this study are based on information obtained from the CTRM company. This includes the second and third scopes. The fourth scope involves an open-ended interview. It is done with the involvement of CTRM top, middle and bottom management and finally this study involved CTRM management practices when the pandemic situation hit.

### **1.4 Significant of study**

Basically, our study is significant when we test the theory we use in our study, build a new model, create a hypothesis, and test the hypothesis. This is among the aspects discussed in the significant study that is very objective and measurable. All of this has to go back to the objective of the study. So in this study, the researcher committed to identify the methods used by CTRM in increasing their production productivity. Apart from that, has CTRM used hoshin kanri policies without their knowledge. This will be proven through a framework of criteria and policies that will be developed based on the information obtained. The development of a new hoshin kanri model that is suitable for use in CTRM will be proposed to CTRM's top management to get a response about the developed model. The developed model can also be used as a reference by other organizations.