

Pressing Problems and Interim Solutions at DS Rubber Products Sdn. Bhd.

Lam Kok Wai¹, Gunalan Nadarajah²

¹ DBA Student Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Sintok, Malaysia. Lam Kok Wai, kokwai.kwlam@gmail.com

² Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, Sintok, Malaysia. Gunalan Nadarajah, gunalan@uum.edu.my

Corresponding author: Lam Kok Wai, kokwai.kwlam@gmail.com

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Abstract

Michael (General Manager) is having a weekly meeting with the team, the overall production process and flow are running smooth and in an orderly manner. When Sam (Factory Manager) informs Michael that few orders received unable to fulfil within the stipulated time monthly. Michael stunned with this none achieving number and worrying this rate is getting up. Ultimately, the company's objectives are to provide excellent customer experience and maximizing the shareholders' wealth will be impacted. He needs to find out the best solution to handle this none fulfilment of the order, interruption on the production processes, customer dissatisfaction or sourcing alternative suppliers, increase in the production cost and unforeseen impact on the total business. He does concern the existing 34 production lines need to be rearranged the layout, machines prioritization and output maximization, manpower allocation and commissioning. He needs to plan this well before the next meet up with the board of directors. Rubber product business is very competitive and high demanding locally and internationally. The company overseas orders (e.g. Europe, Southeast Asia, and Australasia) keep increasing from month to month. New customers are foreseen to be coming in (at 5% incremental by monthly) with referring to the previous year records. In 2005, the company has obtained ISO 9001:2000 certified by SIRIM QAS international. Eventually, the manufacturing and quality assurance procedures are certified by the ISO 9001:2008 Quality Management System. He shall make sure an excellent customer experience and maximization of the shareholders' wealth is achieved.

Keywords:

None Fulfilment Order, Customer Dissatisfaction, Competitive, New Customer, Shareholders Wealth

CASE OBJECTIVES

This case will allow readers to know the company DS Rubber Products Sdn Bhd (DSR) pressing problems and the way to apply the interim solutions. The newly promoted general manager needs to ensure all the customer orders are fulfilled, regardless of the order sizes are big or sample items for them to do the testing. DSR should foster their strength of custom-made for this business. DSR should grow and maximize the production level which is ready in place to cater more and more orders with demanding environmental conditions and challenging product specifications in the future.

DSR customer orders may come from locally and internationally. Their orders are back to back bases coming into the production for their custom-made designed and exceed the excellence services within the market. DSR should not turn away the customers' orders and allowing their customers to source from other competitors within similar industries. DSR may fine-tune their operational management, stock management, material requirement planning, logistic management, staff turnover as well as enhance the standard operating procedures and policies to excel the company incompatible with the competitors within the industries.

INTRODUCTION

Michael has graduated from Sunway University (in 2005) and joined DS Rubber Products Sdn Bhd (DSR) in 2010 as an operation manager and later promoted as general manager (GM) in June 2018. He has vast experience in production, operation management as well as sales and marketing. Timothy (CEO) has briefed Michael on the first day of his promotion. He has to achieve the company objectives to provide excellent customer experience and maximizing the shareholders' wealth from time to time. The company mission will include providing customers with **D**ynamic solutions, **S**upreme quality, and **R**eliable service.

Richard is the head of sales (HOS). He has worked with DSR for about 7 years. He knows all the customers in the company. He can work very well with the customers because all customers have unique specifications and requirements, different timelines to meet and shall not hiccup their processes. HOS always brings in the order with a clear detailed and well allocation of time for the production to complete the orders. In some instances, customers who need the products crucially for their organization, he will try to work it out with Sam (Factory Manager)

for the slot in time and fulfillment of the order. The finished goods need to be handled well, else they will be kept in the storeroom and pending for delivery.

Sales and orders surge may need to be monitored well. Material requirement planning may need to be closely monitored. DSR's previous sales records may be used to measure and benchmark with forecast sales. Pre-arrangement of raw-materials will always prepare DSR to stand a chance to take up all the opportunities come in from time to time, besides that this will also surpass the competitors for planning.

GM is well-experienced in operation management, he knows that the efficiencies of the supply chain depend very much on internal cooperation between multiple functions and levels and with external suppliers and never forget the most important component which is the customers. He would like the culture develops, relationships, cooperation and communications improve. He prefers the supply chain to become more efficient, streamlined and responsive to rapidly changing markets, technology, and customer needs and requirements.

THE ORGANIZATION, CUSTOMERS AND PRODUCTS, COMPETITORS AND INDUSTRY BACKGROUND

Organization

DS Rubber Product Sdn Bhd (DSR) was established in August 1997 and is based in Gopeng Industrial Park in Perak. DSR started with one factory and five workers. DSR started specializing in trading various rubber related products. Moving into the year 2000, they commenced its manufacturing operations for rubber related products.

Over the span of 15 years, DSR has grown into one of the major players in the rubber products manufacturing industry in Malaysia. They specialize in moulded and metal-bonded rubber products, custom-made to customers' requirements. The products consist of a wide range of rubber seals, gaskets, washers, mounting bushes, O-rings, moulded rubber parts, buffers, and supports. They also manufacture silicone, Polyurethane (PU) and engineering plastic components for industrial use. These products are widely distributed within Malaysia (which including Sabah and Sarawak) and exported to Europe, Southeast Asia, and Australasia.

The range of rubber compounds being used by the rubber products manufacturer includes Natural Rubber (NR), Styrene-Butadiene Rubber (SBR), Nitrile Rubber (NBR), Butyl Rubber (BR), EPDM Rubber, Silicone Rubber (Si) and Polyurethane Rubber (PU). The choice of

rubber that is used for the products are very much depending on the price willing to pay by the customers.

DSR Acronym

DSR stronghold benefit can cater and fulfill the customers' custom-made design with lower quantity as well as odd lots size. Customers who contact with DSR for their particulars custom-made design will be handled by DSR from initial till the end requirement being fulfilled. DSR will amend and redo the sample as per the customers' requirements and specifications. As the **DSR** name acronym, **D**ynamic Solutions, **S**upreme Quality, and **R**eliable Service.

DSR's existing customers, the salespeople have built a close relationship with them, the salespeople understand their needs and requirements. The salespeople even know their budget and costs for the product to be used into the industrial, automobile, electrical and electronics, computer peripherals, home appliances, construction, playground equipment, etc.; thus the products designed suited to their usage which can stand for different environments; excessive heat or cold, material hardness, vibration absorbance, cavity and so forth.

DSR potential customers, they prefer to know the solution, quality, and services provided by the company. DSR may not provide the best solution for the potential customers or the customers may not describe the exact products' specifications and requirements to the salespeople. The salespeople will conduct primary understanding onto the customers' requirement which inclusive of getting the product sample, usage pattern, elasticity, heat resistance, hardness, vibration absorbance, and others; salespeople will even go extra miles which include going over to the customers site and study the purpose of the products being part of the production process. They can give the full picture onto the customers' specifications and requirements, the usage and expectation by the customers. DSR research and development will conduct the test onto the products for the customers who require the reports. They may work very closely with the customers to provide the best dynamic solutions, no doubt this solution may take months for the testing and rectification.

The potential customers may also consider the services provided by DSR. The customers may prefer services like reasonable order sizes, priority processing order, prompt delivery, priority customers' preference, attractive bulk pricing, etc. They will continue to improve the services provided from time to time. DSR always maintain a good supply chain with the supplier, logistic, customers, and employees; with this network of businesses and people the overall

performance of the company will be improved. DSR will be able to provide the most reliable services to all its customers within the business and in the industries.

Customers and Products

DSR does provide solutions to various industries which include engineering, industrial machineries, automotive, construction, materials handling, recreational equipment, water, and sewerage utility industries.

In an engineering and industrial machineries may need high-quality rubber parts which are crucial for the heavy machineries to ensure the enduring performance of the entire machine. The relevant product may include large oil seals, metal bonded couplings and mounting. These products will undergo internal testing for metal bonding, tensile strength, and vibration and shock impact, to ensure the quality and durability are at the lasting period.

Whereas in automotive parts and assembly, DSR will secure it by exporting various rubber and metal bonded bush. DSR will custom-made rubber and polyurethane (PU) parts which are used for the automobile assembly plant, to hold doors, fenders and engine parts for assembly lines. Most of these customers are from Europe and Southeast Asia.

In the field of construction, they will demand o-ring in various sizes used for sealing in cement pipes, metal bonded rubber bung, and mold attachment to facilitate cement moulding. These products will enhance the work done and make the concrete to become more solid and lasting.

In the materials handling area, the products required will be rubber fenders, metal bonded rubber and polyurethane buffers used for cushioning impact during transportation as well as material handling.

In the recreational equipment, the custom moulding will include products used in children's playgrounds such as rubberized swing seat belts, grips for climbing wall, rubberized seats for sea-saw and decks for playground towers. These products shall fully rubberize providing rust-free, heat resistance and cushioning properties. These products and parts are reinforced with metal to ensure durability, strength, and safety of the playground equipment. The colour appearance also can be customized to customers' preferences.

In the water and sewerage utility industries, the products required will include long-standing manufacture of rubber seals, washers, connectors, plugs and gaskets in support of the water

and sewerage solution providers in Malaysia and internationally. These quality rubber parts are the keys to ensuring a leak-proof piping system.

DSR will assist all their existing and potential customers to design and handle their tooling from the inclusion until the conclusion. These custom-made products will have different life-span and durability, they depend on the customers' specifications and requirements. Customers who are willing to pay for the higher price will obtain a better quality of raw material and vice versa. Almost every single product can be made with different raw materials e.g. rubber, silicone, polyurethane, metal, and plastic. Different raw materials can last and/ or stand for the different environments, heat resistance, vibration absorbance, and hardness.

Competitors

The competitors include AE Rubber is a subsidiary of Amtek Engineering Ltd with manufacturing facilities located in the Ulu Tiram area, Johor. This AE Rubber has great expertise and extensive know-how in rubber, managed by experienced professionals. This company offers a total product solution to its customers, from design consultation to tool fabrication, from prototype development to mass production. The company with modern facilities and a dedicated workforce, they are committed to being a reliable supplier of precision rubber components in the region and worldwide. They always maintain a corporate posture that facilitates the manufacturing of high-quality products and ensures customers with top quality service. The company is engaged in the manufacturing of customized moulded rubber components. The products manufacture span a broad spectrum of fields, particularly in electrical, electronics, computer peripherals, automotive, home appliances, construction, and other industries.

AE Rubber does have its advantages in doing this rubber product business. Their location is close to the Johor and Tanjung Pelepas ports for them to do the export. They also provide an attractive pricing for the products being produced with minimal transportation cost and logistics management cost. They may import all those relevant raw materials from Japan, Europe and United States with better average cost, continuous improvement by allocating ample area for the laboratory to do their research from time to time as well quality control department plus personnel to conduct their inspection; inspect properly before the products are allowed to leave the company.

The next competitor will include M-Pol Precision Products Sdn Bhd which is a wholly-owned subsidiary of natural rubber producer, Mardec Bhd, with manufacturing facilities located in Bayan Lepas Industrial Area, close to Penang port. They specialize in the manufacturing of rubber products to customers' design, requirements, and specifications. The types of MPOL finish rubber products are widely used in General, Consumer, Medical, Oil & Gas, Locomotive, Automotive, Trucking, Transportation, Utilities, Marine, Food & Agriculture Product Range, etc. The M-Pol does have its advantages in doing this rubber products business with its strategic location; enjoy minimal transportation cost and logistics management cost.

Table 1: Competitors and Products Category/ Range

	Competitors Name	Products Category/ Range
1	AE Rubber Sdn Bhd	Rubber-metal bonded, Electrical & Electronic, Home appliances, Generic Product, Automobile, Gifts and Souvenirs
2	M-Pol Precision Products Sdn Bhd	Rubber exhaust hanger, Coupling seals, Grommets, Swab cups, O-Rings, Rubber seat valve, Swim Fins, Rubber mats, hoses and automotive parts.
3	Kossan Rubber Industries Bhd	Engineered Products, Extrusion Product, Moulded Products, Roller Products, PU Products, EVA Products, Gloves,
4	Q-Flex Industries (M) Sdn Bhd	Extrusion and Moulded articles, Moulded expansion joints, Handbuilt expansion joints, Rubber Lining
5	UKO Rubber Industries Sdn Bhd	Industrial Roller, Mould Rubber, Polyurethane Part, Accessories, Printing Roller
6	CKS Rubber Industrial Sdn Bhd	Rubber Roller, Rubber Bushes & Rubber Couplings, Trucks & Trailers Rubber Parts, Rubber Bonded Metal Units, Mount Bushes, Stop Bumpers, Buffers, Machine Mountings, Engine Mountings, Rubber Extrusion, Customize Compound Mixing
7	N.K Rubber (M) Sdn Bhd	Rubber Keypad, Rubber molded product, Rubber + plastic assembly part, Extruded tubing and profiles, Electrical appliances part, Electronic Parts, Automobile parts, Metal Dome assembly
8	Ningbo Newanton Rubber & Plastics Products Co., Ltd	Rubber Strips, Hosepipes, Tarp Straps, Gaskets and Other Molded Rubber Products, Rubber Sponge
9	Seasons Fast Rubber Industries Sdn Bhd	Gaskets, Washers, O-Rings, Rollers, PU Solid, PU Bonding with metal, Injected thermoplastic with rubber parts, Silicone

Member of Associations

All the rubber products manufacturers are the members of the Malaysian Rubber Product Manufacturers' Association (MRPMA). The members of MRPMA encourage cooperation between the manufacturers of rubber products, protect their interests together, promote their welfare and provide the industry the means to formulate, influence and carry out policies and programs concerning industrial, economic, fiscal, commercial and technical issues. MRPMA will disseminate market intelligence and information to member companies. They will organize inward and outward sales as well as business missions and encourage participation in trade fairs abroad. They also organize management and other seminars for the industries as at going on. They do liaise with similar associations in other countries and participate in regional and international forums. The members can keep an up to date information, request support as well as take part in all the relevant programs/ fairs which may help them to expand their business.

The rubber products manufacturers also the members of the Federation of Malaysian Manufacturers (FMM). The benefits of being the members of FMM, assist to promote export and business networking opportunities, international trade fairs and seminars, organization of joint venture and business matching.

The rubber products manufacturers can refer to the Malaysian Rubber Board or Lembaga Getah Malaysia (LGM) for the global environment through focused research and development, technical and quality support services. The pricing of the rubber will maintain a certain level and the rubber producers can't easily increase the prices as they want, thus the rubber products manufacturer can ensure the costing will not run away from the basic.

Custom-made and Tooling

DSR custom-made products consist of 70% of the total production. The remaining 30% of the total production will be allocated to the normal production for the routine orders monthly. DSR custom-made includes building the mold of tooling for the products; every new product will require the mold of tooling; this tooling needs to be built; the product produced from this tooling will go through the internal testing; eventually, the sample product will be sent to the customers for testing/ using; modification of the sample will be carried out until approval is granted; finally the mass production will go on. DSR will help all the customers to keep their tooling within the warehouse, and this tooling will wear-out over time as the more it is used into the production, the sooner it will be not useable for future production. Therefore, the

customers may need to in-calculate tooling cost into their costing for all the products need that are ordered from DSR.

Quality Control and Assurance Procedures

DSR's quality assurance and control team are well-trained and well-experienced to do the inspection onto the products. The sample size of the products produced which are selected from the lot size will be inspected for quality control and/ or assurance.

Table 2: Sampling Plan for Normal Inspection

Lot Size	Sample Size	Accept (\leq)	Reject (\geq)	Remarks
1 To 25	Every Piece	0	0	
26 To 50	20%	0	0	
51 To 100	20%	0	1	
101 To 150	15%	0	1	
151 To 200	15%	0	1	
201 To 250	10%	1	2	
251 To 300	10%	2	3	
301 To 500	10%	4	5	
501 To 1,000	10%	9	10	
1,001 To 1,500	5%	14	15	
1,501 To 2,000	5%	19	20	

Based on table 2: Sampling Plan for Normal Inspection, the lot size which is between 1 to 25, every single piece will be inspected, and the quality control inspector will accept zero pieces of defective. For the lot size between 26 to 50, the total of 20% sample size will be randomly selected from the lot size and conducting the inspection, the quality control only accept the zero piece of defective. For lot size between 51 to 100, the total of 20% sample size will be randomly selected from the lot size and carried out the inspection, the quality control inspector will reject the products if they found more than 1 piece of rejection product.

The lot size will move up as per the sampling plan, for lot size between 1,501 to 2,000, the total of 5% sample size will be randomly selected from the lot size and conducting the inspection, the quality control inspector will accept the products (e.g. not more than 19 defective) and will reject the products (e.g. 20 and/ or more than 20 defective pieces).

Upon the rejection, the production will need to redo the rejection piece, recheck on the product produced and give a reason for the defective work. The quality control inspector will document the defective and refer to this issue for future improvement. Defectives are due to human errors,

the staff who handle these products, will be reminded to carefully handle the production moving forward, and if this is recurring, the involved staff is required to go for the training and improvement programme. Defectives are due to material qualities, the purchasing executive will need to refer back to the suppliers for the raw material report. If this incident persistence, the suppliers will need to bear for the cost incurred for the waste of production.

DSR needs to ensure quality assurance and control remains at a high standard. The customers' requirements and expectations will always be placed at the highest rank. They know customers' satisfaction and continuous support are crucial for the company growth and propel within the industries in the long run. The quality control inspector will need to adhere to this sampling plan. This sampling plan for normal inspection needs to be followed from time to time. The quality control inspector shall not change and amend the figures without the prior approval from the top management. Any changes and amendments to the sampling plan for normal inspection should obtain an approved signature from the GM.

BUSINESS ISSUES/ CHALLENGES

DSR has incorporated with one factory which initially runs the trading business, as at now they have twelve factories to do the manufacturing, sales and marketing, research and development, logistics management, operation, and human resource management. The expansion over the years is supported by business growth and market demand. The business begins with 5 local customers, as to date the total number has grown and touched 500 customers (both locally and internationally). The number of new customers shall increase month by month (at least 5% of incremental rate); to seek expert advice, to obtain solutions, to ask for better pricing, etc.

Operational Excellence Challenges

Richard has assigned all these customers with the respective salespeople to be taken care of. They are 6 salespeople, each salesperson will take care of 90 (or lesser) customers, and HOS will take care of certain key accounts for the company. Each salesperson will have their portfolio to take care; the customers' consumption pattern, repeating order, budget and costing, specifications and requirements will be handled and managed within the salesperson's fingertips. This batch of salespersons has worked with the company for a few years. HOS is a good leader and doing the team-building with the team. They have good relationship management amongst the team and with the customers, the sales team can cover each other

when any one of them is on leaves. HOS may deal with all the customers during the contingency period (e.g. the stock shipment is not in order).

Staff Penalization

Sam will need to plan and organize the production processes, workflow, factory, and store management. FM will ensure all the tasks allocated to various departmental heads or supervisors, executives, workers, personnel are carried out in accordance with their jobs specification. Every staff will be given the key performance indexes (e.g. KPI's) to follow and performance measurement will be evaluated for their future increment and performance bonuses. Staff who did not achieve the KPI's will be penalized.

Table 3: Staff's penalization

**Period	Penalization/ Consequences
For a month	Interview and verbal warning
For a quarter	Interview and written warning
For 4 months	Performance improvement plan e.g. training
For 6 months	Subject to termination

** throughout the period of services within the company.

Table 3 Staff penalization must be proved from the staff that did not achieve the KPI's. The company shortfall e.g. delaying material arrival, power failure, slowdown in product chain, etc. cannot be pushed to the staff for any achieving the KPI's.

Staff penalization will create unhappiness in the staff's morale. The penalized staff will try to sabotage their friends within the factory. The infected staff will follow the penalized staff footsteps or they may not focus on the work assigned. Eventually, the production output rate will slow down. Production supervisors need to monitor and motivate the staff from time to time.

Purchasing of Materials

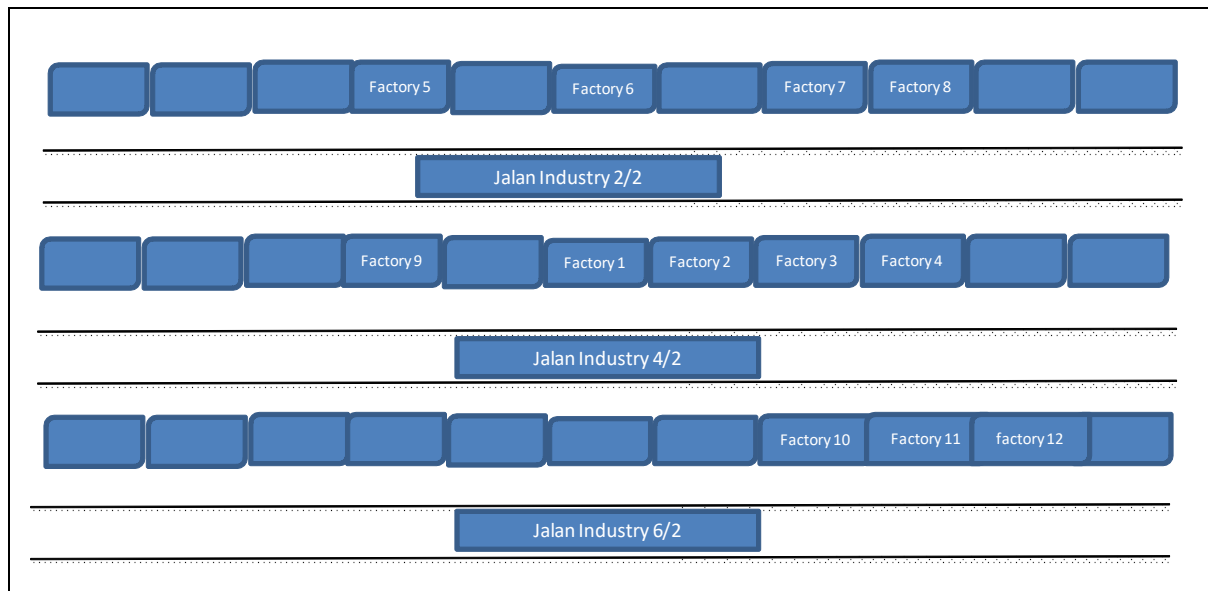
Purchasing executives are very crucial to ensure all the material requirements are planned in order. The raw materials which are required for the production have to be planned and scheduled arriving at the factory. The raw materials which arrive one day before the production date will be better to reduce the holding cost. DSR will have better cash flow management with minimum credit facilities that need to be arranged from the financial institutions and/ or banks.

Meanwhile, the purchasing executive still uses Microsoft Office (e.g. Microsoft Excel) to compute and update the records for the materials planning; there are incidents of not fully recorded the order, urgent order leaving out, none urgent order being produced and long waiting for the delivery.

Factory Unorganized Layout

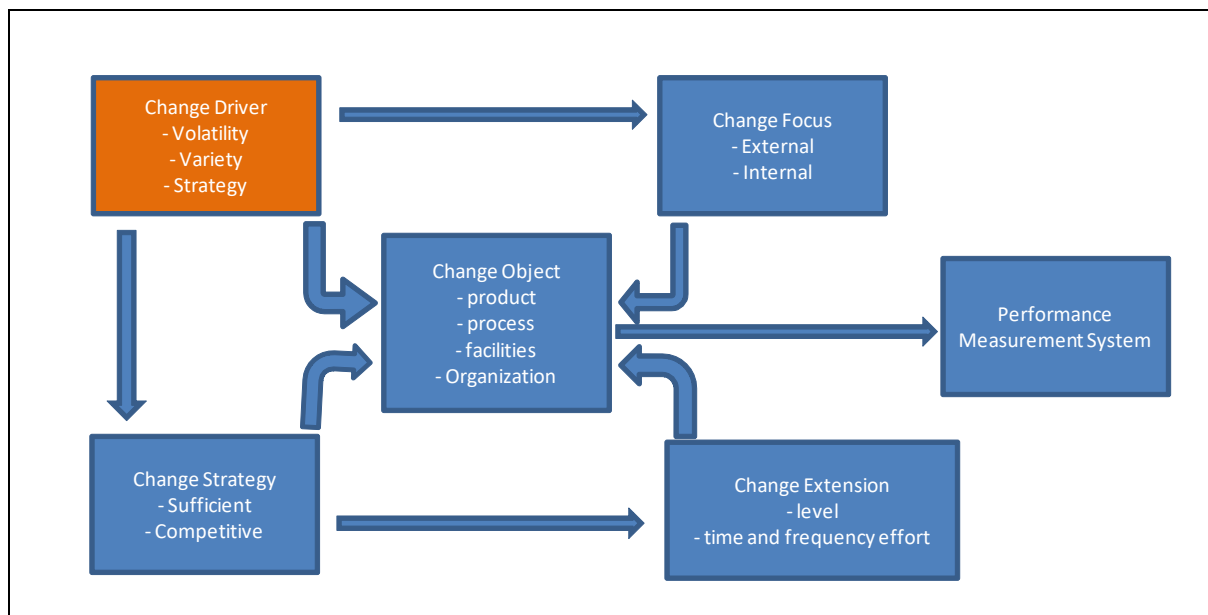
Michael faces the problem with the layout of the factory sometimes. The management and team do acknowledge that they are unable to organize the factory layout within the close circle. They have tried to keep all the relevant functional departments as close as possible, which assist to enhance their workflow and processes.

Figure 1: Layout of the factory



Administration and accounts, human resource department and management offices are located at Factory 1. The factory manager's office is located at Factory 2. The storeroom and storekeeper are located at Factory 3. One-third of the spaces for factories 1, 2 and 3 are where machineries and production go on. The rest of the factories (e.g. factory 4, 5, 6, 8, 9, 10, 11 & 12) are actively running with production. Quality control and assurance, research and development department and the remaining one-third of the factory is used to keep all the relevant mold of tooling which is located at Factory 7.

Figure 2: Steps to define change objects



The impulse for a change is triggered by change drivers, the first category is the demand volatility measured by volume fluctuation over time. Variety is the span width of the product's variants both in basic models as well as invariants within the models concerning size, material, and additional features required by the customers. A major change driver is DSR company strategy e.g. to enter a new market, to be the market leader, to operate a special product line, etc.

The changing focus, which can be external or internal. The external focus targets the added value for the customers e.g. a product with lower life cycle cost or faster delivery. The internal focus is the performance of the firm not only satisfied with respect to the profit and loss caused by badly organized business processes.

The change strategy also needs to take note of the operational level. These changes should be the manageability of the tactical and fulfill the needs of the foreseeable future, more proactive in business processes like order fulfillment or service and strategic investment for new machineries by DSR.

The change extension is the level of the factory on which the changeability has to be determined, expected change frequency and the time allowed for each change has to be

estimated for the production of order, necessary effort in equipment, manpower, knowledge and time taken for the fulfillment of the order.

After all, these determinants of changeability will affect the change objects. It can be a product or product family (both can change concerning the type, volume or mix), logistical processes, smaller or larger parts of the manufacturing facilities or the organization of the firm.

Finally, a performance measurement system has to be installed to measure the impact of the implemented changeability on the output performance of the factory. Typical performance indicators are delivery time, due date performance, turn around rate, inventory, and days of supply of stocks to the customers.

Machines Disorganized Layout

Michael acknowledges the machines are mobility but the spacious is limited within the same factory. GM has tried to work closely with FM to arrange and rearrange all the relevant machineries (e.g. moulding, compression, injection, cutter, tensile tester, computerized mixing grader, computerized rheometers, computerized quick scope, mooney viscometer, densimeter, geer ovens, universal tester, fully automatic precision hot press, oxygen index tester, laboratory kneader, etc.) within the closed-circuit which may ease up the production flow.

Unfortunately, these machineries can't be arranged in an organized manner as the factories are located in an unorganized order. The unorganized factory order is due to the organization's expansion and cash flow is not planned well for the purchase of fixed assets (e.g. factories, machineries, etc.). The machineries set needs to be tuned under the customers' specifications and requirements before the production process take place. The mold of the tooling also must be in place for the production to run smoothly. At least one skilled worker is required to take care of the machine to ensure the order is running as per specification. The production supervisor needs to monitor this work schedule very closely.

The customers' orders received need to be handled in sequence. All the order sizes are different from customer to customer. Existing customers with repeated orders and/ or new testing samples; potential customers with new odd lot sizes and testing samples. All the orders need to be managed well and in an orderly manner; every day the factory manager should generate a fresh working schedule for the production line to follow.

All these relevant production flows must be managed carefully, the sequence of orders; the urgent orders, the orders which are approaching the due date, the orders which are pending with complete raw materials, the orders which require further process and/ or touch up (e.g. painting, sandblasting, defrosting and curing) and become finished goods.

The frequency of not following the work schedule has increased; and causing the similar/ same orders has processed two or three times. This duplication of orders has taken up the raw materials and time consuming on the work done. This miscommunication will delay other orders within the queuing line. Production staff overtime may not be able to recover the short if the raw materials are not in place to complete the production, the wastage of raw materials has aggregated. Therefore, the production supervisor must look into this miscommunication issue very closely.

Quality Control and Assurance Workflow

The quality control and assurance inspectors need to be synchronized to handle the odd orders and all orders from time to time. Most of the time, the orders that are readied are waiting for the quality control and assurance inspectors to carry out the inspection. The complete orders need to be sent to the Factory 7 for the quality control and assurance inspectors to inspect as per the sampling plan. The quality control inspector does not accept the sample products being sent for the inspection, the quality control inspector must receive all the products being produced. They prefer to select the sample products (e.g. from the lot size) for the normal inspection; this action will enhance their quality control role as fairness as possible, no bias onto any parties and tip-top condition of the company products.

The quality control and assurance must ensure these inspections should be managed in an orderly manner; the complete orders (e.g. products) sent in will take up their factory space while waiting for the inspection to be carried out, these complete orders cannot be mixed up, the complete orders which were inspected need to be returned to the production line for rectification, packaging and/ or further processes require, otherwise the completed orders that were sent to the wrong department will delay the whole process.

The quality control and assurance must synchronize and manage their work with all the production lines who send them the products for inspection. The non-proper arrangement and follow up will take up lots of time (i.e. to locate the missing order, inspect the urgent order and returning it) as well as a waste of resources.

Lack of Priority Production Line

In some instances, DSR does receive last-minute orders which come in late and require the soonest delivery. They do have the intention to take up this order and charge more for the prices. Even though the customers are willing to pay for the higher prices, but DSR should have ready raw materials and machine capacities to produce the products. Most of the time, DSR is not able to allocate the resources to take up the last-minute orders. The expansion of the factories is depending on the company's financial stability. The growth has taken up twelve factories in total, and the factories are not in a close circle. The owner has decided not to buy/rent anymore factory from the existing location. Michael needs to come up with the best solution for the unorganized factory layout.

Worker Wandering Around

Some of the time the production workers may be assigned to different factories to work and cover up the shortage. Initially, these posting and relieving will enhance the production work processes, but eventually, the production workers may take things for granted. The jobs and task performance need to be monitored closely to deter them from moving around and do not get the assigned work done as per the schedule.

SOLUTIONS/ RECOMMENDATIONS

SWOT Analysis

a. Strengths

Experience in custom-made and design of rubber products that provide dynamic solutions for the customers.

Expert to provide a free consultation and feasible study together with the customers.

Owner participation in the business; can obtain expedite decision making.

Experience management and staff to build a good relationship with stakeholders as well as the supply chain.

Skilled worker to handle and to carry out the troubleshooting onto the machineries.

b. Weaknesses

The layout of the factory is not within a close circle.

Staff turnover rates are increasing, difficult to retain the semi-skilled workers.

Aging workers getting increased.

Unable to group all the related production line machines together at the same factory.

Lots of mold of tooling need to be kept on behalf of the customers, occupying the spaces and need to clearly label it.

Tooling has life-span and customers may not be willing to bear this cost.

c. Opportunities

Huge and variety market for penetration with rubber products.

Participate in the trade fairs, programs and seminars organized by the relevant authority e.g. locally and internationally.

Develop and update the company online portal; attracts more international and local customers to surf conveniently and to exchange knowhow and do business with the company.

d. Treats

Competitors' located at the prime areas near the port, cost-saving, and fast delivery.

Competitors with good and organized factory layout may offer competitive prices and speed of delivery time.

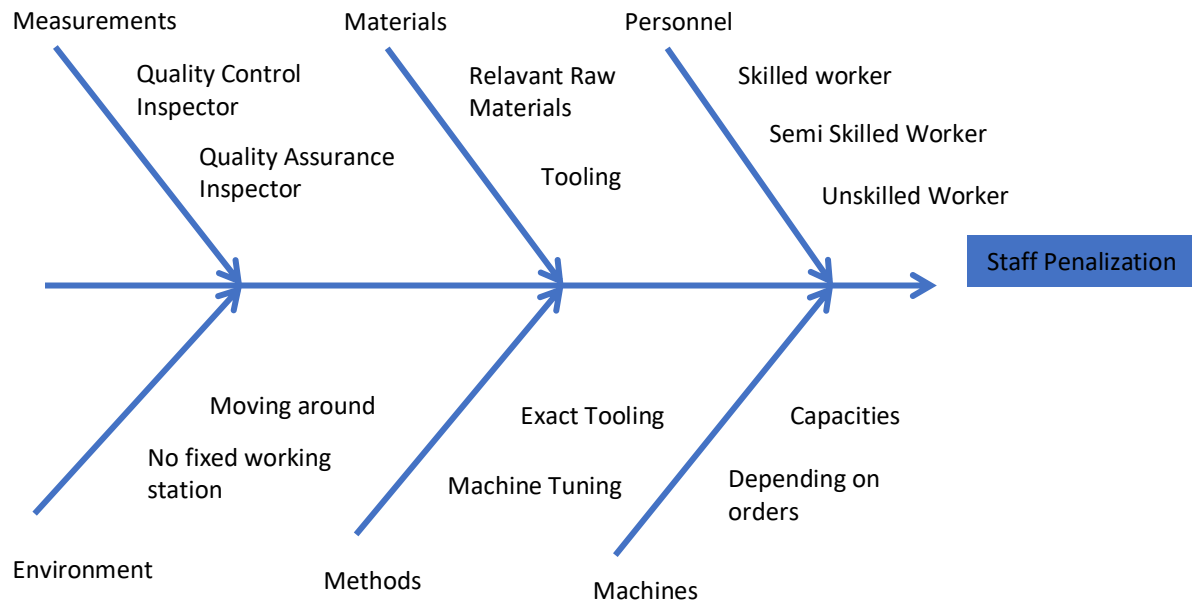
Competitors with wider products category; medical, oil and gas.

Internet businesses and platforms are getting very advanced and convenient for the customers to locate and seeking for assistance. Internationally lots of rivalry in the market.

Fishbone Diagram - Staff Penalization

This fishbone diagram, also classified as the cause and effect diagram or Ishikawa diagram, is a visualization tool to categorize the potential causes of a problem in order to identify its root causes.

Figure 3: Fishbone Diagram - Staff Penalization



Based on the diagram (Figure 3), the measurements involved in the work are carried out by the quality control and/ or assurance inspectors, they will quantify the piece work completed by the workers/ staff. The staff should use the relevant raw materials and tools in place to produce the orders. The supervisors would need to ensure the materials are in order, one day before the production running date. If the materials are not in place, the daily work schedule should reflect it and staff should be assigned to other orders in the queuing list. The right people; skilled or semi-skilled workers should ensure the right machine has been tune as per the customers' order specification. The working environment should be informed and assigned to the workers. They should be guided very well and not confusing with the moving around or no fixed working station. A clear work schedule and direction shall be given to the staff every morning before the start of works. The methods used should follow according to the respective order specification, the machine tuning, and the right tooling. The staff may not be able to determine the machine to be used, the skilled worker or supervisor should decide which machine and this depends on the specification of the order, and sometimes it does depend on the machine's capacities to produce.

If all the above measurements, materials, personnel, environment, methods and machines are in a proper manner the staff who did not compliance will have to encounter the staff's penalization. The staff will suffer from loss of income and difficult to find a job immediately to cover up their expenses. The staff morale will be impacted and create none healthy social norms within the company.

DSR should handle this problematic staff carefully. The staff should be explained thoroughly and acknowledged the penalization by signing on the letters of warning and/ or termination. This can prevent them from making havoc to the company in the near future.

Material Requirements Planning

Michael is very experienced in operation management. He agrees that the current purchasing executive who manages the materials need to have a standard and systematic way. Thus, the Material Requirements Planning (MRP) is a computer-based production planning and inventory control system that will be suitable for helping DSR. MRP is concerned with both production scheduling and inventory control. This is a material control system that attempts to keep adequate inventory levels to assure that the required materials are available when needed. MRP is applicable in situations of multiple items with complex bills of materials.

The main objectives of the MRP system are to simultaneously:

- + Ensure the availability of materials, components, and products for planned production and for customer delivery,
- + Maintain the lowest possible level of inventory all the time,
- + Pre-arrange manufacturing activities, delivery schedules and purchasing activities.

MRP is especially suited to manufacturing settings where the demand for many of the components and sub-assemblies depends on the demands of items that face external demands. The demand for end items is independent. The demand for components used to manufacture the order depends on the demands for the end items. By referring to the MRP, DSR will have a better and solid system to manage all the incoming orders. DSR will not worry about the materials shortage, production hiccup due to raw material not sufficient or other related materials not in stock.

Factory and Machines Layout

Michael should concentrate on three objectives of flexibility as defined by the researcher Chryssolouris, G. (2005). Although the flexibility of manufacturing systems they are also applicable as changeability objectives for assembly systems and the whole factory.

Figure 4: Flexibility aspects of Manufacturing Systems

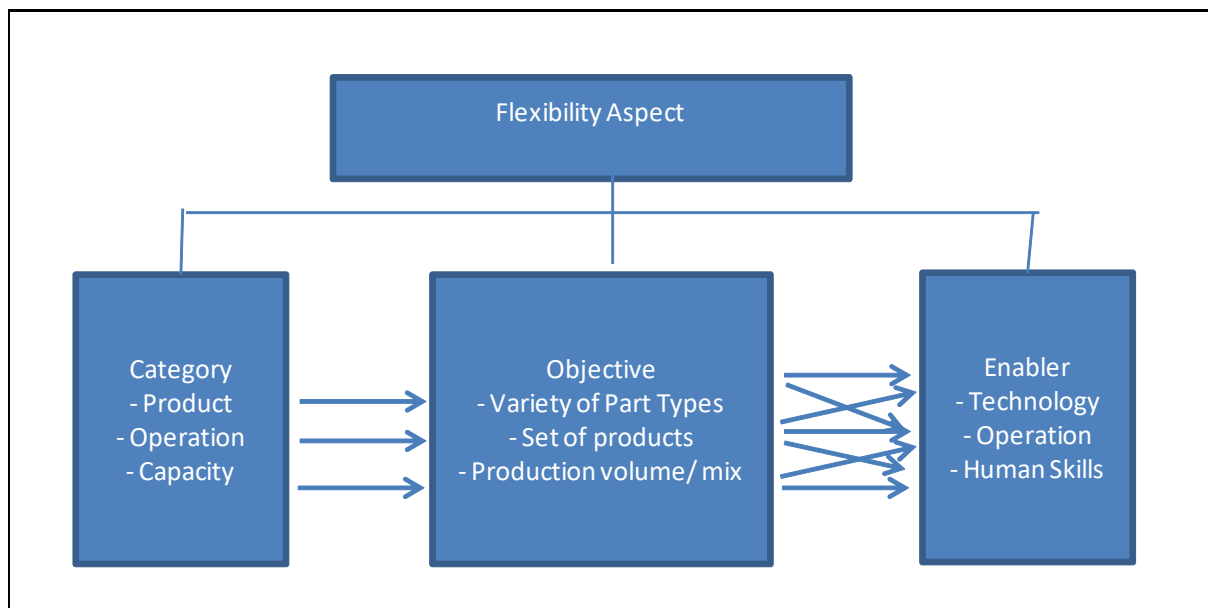


Figure 4 gives an overview of the manufacturing system -

+ Product flexibility enables a manufacturing system to make a variety of part types with the same equipment.

+ Operation flexibility refers to the ability to produce a set of products using different machines, materials, operations, and sequence of operations.

+ Capacity flexibility allows a manufacturing system to vary the production volumes of different products to accommodate changes in demand while remaining profitable. Not only the technology but also organization and human skills are necessary enablers for all objectives to be achieved.

The researcher Chryssolouris, G. (2005), discusses the flexibility of manufacturing systems, definitions and measurements. He indicates that the quantification of flexibility and industrial applications has been growing. These objectives are discussed in more detail in the manufacturing, assembly and factory level. These will help the production flow very well and easy to manage the drawback.

a. Manufacturing level

The early reviews on manufacturing flexibility can be found in Buzacott, J. A., & Yao, D. D. (1986), De Toni, A., & Tonchia, S. (1998), Sethi, A. K., & Sethi, S. P. (1990), Koste, L. L., &

Malhotra, M. K. (1999), and Chryssolouris, G. (2005), defines flexibility of a manufacturing system as its sensitivity to change and states: “The lower the sensitivity, the higher the flexibility”.

A literature survey which has performed by ElMaraghy, H. A. (2005), has identified the following ten types of manufacturing flexibility. These includes:

- + Machine flexibility: Various operations performed without set-up change.
- + Material handling flexibility: Number of used paths per total number of possible paths between all machines.
- + Operation Flexibility: Number of different processing plans available for part fabrication.
- + Process Flexibility: Set of part types that can be produced without major set-up changes, i.e. part-mix flexibility.
- + Product Flexibility: Ease (time and cost) of introducing products into an existing product mix.
- + Routing Flexibility: Number of feasible routes of all part types/Number of part types.
- + Volume Flexibility: The ability to vary production volume profitably within production capacity.
- + Expansion Flexibility: Ease (effort and cost) of augmenting capacity and/or capability, when needed, through physical changes to the system.
- + Control Program Flexibility: The ability of a system to run virtually uninterrupted (e.g. during the second and third shifts) due to the availability of intelligent machines and system control software.
- + Production Flexibility: Number of all part types that can be produced without adding major capital equipment.

b. Assembly level

The characteristics are used to group the flexibility types into the following;

Date-oriented flexibility has a short timeframe. If product variants change in a line and certain variants need to be processed at specific stations, routing flexibility is needed.

Operational flexibility is necessary when several assembly operations are performed on one object in a sequence in a short period, e.g. by changing tooling which incurs time spend.

Period-oriented flexibility has a longer timeframe. This is typically in situations where batches of various products are assembled for hours or even days and change-over flexibility is utilized, e.g. to exchange work piece carriers.

Conversion flexibility is very much like re-configurability. The full complete workstations are exchanged and replaced, e.g. from automatic stations to manual stations.

The other characteristic of flexibility is incident-oriented. The associated failure flexibility aims for a fast reaction if a station has a serious disruption and needs a quick replacement of a whole assembly unit. Production shall not encounter this hiccup which delaying the process.

c. Factory level

On the factory level, the changeability objectives include the objectives of the manufacturing and assembly levels. The following objectives are the most important for DSR:

- + Product transformability enables to produce a variety of different products/ orders.
- + Technology transformability is the ability to integrate and disintegrate specific product and production technologies for the 34 production lines
- + Capacity transformability allows a variation of the production volumes of each product (as per the order)
- + Logistical transformability enables a response to new logistical requirements like e.g. the need to deliver just-in-sequence or to deliver different lot-sizes.

+ Transformable degree of vertical integration is the ability to adapt to the degree of added value within the factory e.g. by out or in the sourcing of preceding or following production or logistical steps.

Standard Operating Procedures and Policies (Revised)

DSR should enhance standard operating procedures and policies need to be implemented. This may assist the workers to understand their job scope better. All the workers will obtain clear and direct objectives. They shall not go beyond the guidelines and will be punished if caught not abiding by the procedures and policies from time to time.

The company clear production flowchart will be able to reduce the leaving out of finished product not being handled and deliver to the respective customers within the timeline by the logistic department. Generally, every department including the quality control and/ or assurance department should follow the flowchart prepared and whoever caught of not abiding will have to face the consequences or action being taken against them.

Special/ Priority Production Line

DSR may assign a specific production line to handle the odd orders, small order with short dateline and custom design sample for testing. This production line shall be handled by the production supervisor with ready resources specifically allocated for these orders. This solution will curb the issue; of interrupting other production lines from producing the stock, well organize production lines with the planned schedule, workers do not need to rush and doing overtime without pre-informing, unnecessary wastage of resources.

Buffer Stock for Loyal Customers

DSR may need to manage the routine orders and key order for the existing customers. Based on the DSR records and close relationship with the customers, DSR may prearrange these orders in advance. The selected production lines may arrange, organize and occupy these productions to be going on. These will help to reduce the issue; changing the mold of tooling and tuning the machine for the customers' specifications, running out of raw materials during the production are going on, shortage of workers without proper arrangement and other unnecessary circumstances which might happen.

DSR also keep buffer stock for certain routine orders. They may not worry this buffer stock will be obsolete. Their products are not perishable and can keep for a long period. These buffers are based on their customers' past order records and consumption patterns. DSR may require their customers or work with their customers to plan the orders. Therefore, the customers need not have to worry that the stock out issue might happen in the near future.

Engage Reliable Courier Services

DSR may engage the reliable courier services (i.e. DHL Express, SkyNet Worldwide Express, Pos Laju Malaysia) with the contract, this will help to ensure all the orders are delivered on time and avoiding the missing of products upon delivery. Besides that, this will also reduce the handling issue and enhance the delivery speed. The logistic executive may work very closely with the courier service personnel. The finished goods which ready for delivery; will have different locations/ destinations, will have different forms of urgency and importance for testing as well as confirmation of orders, will have to compensate and/ or replace the short of supplying and so forth.

Staff Retention and Loyalty Program

Staff that work and stay with DSR for a period of time will be rewarded. The staff who acquire progression with DSR and retain with the company will get promotions and increments. Those staff who have work more than five years will obtain a watch worth RM500. Those staff who have work more than seven years will obtain free local travel for two pax (e.g. couple, husband and wife). Those who have work more than ten years will obtain free overseas travel for two pax (e.g. couple). Those staff who work and retire with DSR (serving at least fifteen years) will obtain cash RM10, 000 (with sign off ceremony).

Staff retention will include a promotion, job enlargement, and job specialization. The staff will have a chance to promote and upgrade themselves; depending on their capabilities. The staff who are talent will have chances to change from normal to specialized jobs. This will promote their interest to stay and work with DSR for the long term. Eventually, the unskilled worker will become a semi-skilled and skilled worker in one fine day. The staff will have a sense of belonging to the company, this will also build the trust and confidence to work with DSR. This may help to curb the staff turnover rate to become lower. The staff are always the long term assets for the company.

CONCLUSION

Michael will need to work closely with the team to ensure the flow of the production, order management, and quality control inspector, as well as logistic personnel, are to follow the latest standard operating procedures and policies. The operation management and flow will follow as per the standard and flowcharts.

Customers' satisfaction needs to be taken care or else the competitors will take care of the wise customers who are available in the market. Nowadays, the customers are very informative and knowledgeable, they can easily and conveniently opt for alternative suppliers in the market.

DSR has continuously kept improving its manufacturing and quality assurance procedures and they are certified by the ISO 9001:2015 Quality Management System (in 2018) instead of ISO 9001:2008 Quality Management System.

DSR has the plan to shift to the new plant at the surrounded heavy industries. The new plant with proper design factory layout; machineries and commissioning, administration and office, operation management which has improve from the existing drawbacks, logistics management which has modify in according to the supply chain management(SCM), meeting and training areas, staff amenities (e.g. rest area, canteen, pantry, small recreation area, locker, Wi-Fi area and etc.). Staff health and safety management will be very crucial for taking care of the new plant. The staff will prefer to work in the safest environment e.g. minimal accident rate, higher protection from hazardous and etc.).

REFERENCES

- Buzacott, J. A., & Yao, D. D. (1986). Flexible Manufacturing Systems: A Review of Analytical Models, *Management Science*.
- Chryssolouris, G. (2005). *Manufacturing Systems: Theory and Practice*, 2. Ed., Berlin / Heidelberg, Springer Verlag.
- De Toni, A., & Tonchia, S. (1998). Manufacturing flexibility: A literature review, *International Journal of Production Research*.
- ElMaraghy, H. A. (2005). Flexible and Reconfigurable Manufacturing Systems Paradigms, *International Journal of Flexible Manufacturing Systems*. Special Issue: Reconfigurable Manufacturing Systems.
- Koste, L. L., & Malhotra, M. K. (1999). A Theoretical Framework for Analyzing the Dimensions of Manufacturing Flexibility, *Journal of Operations Management*.
- Sethi, A. K., & Sethi, S. P. (1990). Flexibility in Manufacturing: A Survey, *International Journal of Flexible Manufacturing Systems*.
- AE Rubber Sdn Bhd. (2001). Retrieved from <http://www.aerubber.com/profile.htm>
- CKS Rubber Industrial Sdn Bhd. (2006-2009). Retrieved from <http://www.cksrubber.com/eAsia2u/english/template/template04/profile.jsp?co=1830>
- Ningbo Newanton Rubber & Plastics Products Co., Ltd. (2018). Retrieved from https://www.company list.org/ningbo_newanton_rubber_plastics_products_co_ltd.html
- Custom Rubber Products. (2019). Retrieved from <http://www.customrubber.com/products/molded-rubber-products/>
- DS Rubber Products Sdn Bhd. (2012). Retrieved from <http://www.dsrubber.com.my/industries.html>
- Ishikawa diagram. (2019). Retrieved from https://en.wikipedia.org/wiki/Ishikawa_diagram
- SWOT Analysis. (2019). Retrieved from https://en.wikipedia.org/wiki/SWOT_analysis
- Federation of Malaysian Manufacturers. (2019). Retrieved from <http://www.fmm.org.my/>

Kossan Rubber Industries Bhd. (2017). Retrieved from

<http://www.kossan.com.my/index.html>

Malaysian Rubber Board. (2011). Retrieved from <http://www.lgm.gov.my/>

Malaysian Rubber Products Manufacturers Association. Retrieved from

<http://mrpma.com.my/>

MREPC Marketplace. (2019) Retrieved from

<http://www.mrepc.com/marketplace/public/supplier/index.php?userid=131>

N. K Rubber (M) Sdn Bhd. (2015-2019). Retrieved from <https://www.nkrubber.com.my/>

Q-Flex Industries (M) Sdn Bhd. (2017). Retrieved from <http://www.q-flex.com.my/Home-3024-182379/>

The Rubber Group. (2019). Retrieved from <https://rubber-group.com/custom-products/>

SIRIM Bhd. (2019). Retrieved from <http://www.sirim.my/>

Seasons Fast Rubber Industries Sdn Bhd. Retrieved from

http://www.seasonsfast.com/about_us.html

UKO Rubber Industries Sdn Bhd. (2019). Retrieved from <https://ukorubber.com/>

APPENDICES

