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Production Scheduling of William, Reeve Rattan, and Methuzella Rattan Wall Décor in Detalia Aurora Incorporated

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***Abstract*: Furniture manufacturing is a thriving industry that creates a wide range of goods for the customer, and it is also a significant area of concern for manufacturers and their customers around the world, with the common furniture production risks of it involves delivery delays, supply chain disruptions, changing user tastes, material price changes, cost overruns, labor shortages, or strikes. This study aims to identify and address potential production problems while manufacturing wall decors, such as delays, long production lead time, and dissatisfied consumers in Detalia Aurora Incorporated. The method addresses the organization's production bottleneck using a qualitative research methodology. It creates a systematic production schedule using various data sources, such as process flow, standard time, manpower, and industrial engineering tools. Based on the findings and the conclusion, it is recommended to implement the proposed production schedule in Detalia Aurora Inc. to enhance current production in the company.**

***Keywords*: production lead time, standard time, manpower, process, schedule.**

1. Introduction

A. Rationale of the Study

Furniture manufacturing is a thriving industry that creates a wide range of goods for customers around the globe. In order to remain competitive and satisfy customer expectations, furniture producers must address several issues, including pricing, shipping, and returns (Borris, 2022). Items of furniture are objects made from various materials or forms that play a part in human life by promoting social or individual well-being. They also fulfill social and cultural demands and immediately impact people's quality of life (Sahin, 2016).

Population growth, rising living standards, and an increase in the sector's export value, which directly impact the furniture industry, have led to an ongoing rise in demand for furniture (Ersen, 2021). From 2012 to 2016, the Philippines' furniture market expanded at a CAGR of 16.7%. The expansion of furniture producers and retail locations was a significant factor in the rise in market revenues. Additionally, the period saw a surge in demand for furniture from the residential, hotel, business, and industrial sectors due to urbanization (Sanjeev, 2022).

Common furniture production risks include delivery delays, supply chain disruptions, changing user tastes, material price changes, product recalls, cost overruns, labor shortages or strikes, seasonal issues, product faults, and financial mismanagement. Understanding these furniture manufacturing risks and how they affect production flow and revenues might help reduce them and their impact on the organization (Madnani, 2022). In the United States, supply chain constraints and shortages, rising commercial and retain demand, and labor issues are the most prevalent issues in the furniture manufacturing industry (Dominguez, 2022). In addition, the Philippines is known to have various inefficiencies in its logistics system, such as a lack of management systems, inappropriate product handling, and unmet delivery times, which can be viewed as an impediment to the furniture market (Research News Today, 2017).

One of the top export goods from the Philippines that receive support and assistance from the government is furniture. The last five years have seen a CAGR of 17.4% for exports (Gupta, 2017). For its rattan-based furniture goods, it has achieved great strides in the worldwide furniture market. Furthermore, Research News Today (2017) stated that industrial developments have resulted in more production facilities, highly skilled craftspeople, and workers, supporting the sector's explosive growth. Meanwhile, Cebu's furniture artisans are renowned for their artisanal skill, characterized by skillfully created items produced from local materials (Taguchi, 2018).

Detalia Aurora, Inc. is a hand-craft and material-driven business committed to producing furniture and home decor of the finest quality. It serves all retail, wholesale, or hospitality clients in high-end and high sectors worldwide. Moreover, it combines cutting-edge technology, traditional Filipino craftsmanship, and the creative application of local materials to create goods of the best quality in transitional and contemporary styles. Detalia Aurora found its enthusiasm for product development and collaboration after more than 30 years in the furniture and home accessories production business. It continues to showcase Filipino craftsmanship and skills using natural materials and innovative designs. With discerning

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customers worldwide, it has accumulated a large selection of indoor/outdoor furniture home accessories that are profitable on the international market.

Since the mid-1950s, scheduling has been an essential method for optimizing production systems that have experienced continuous evolution. Its progress benefits from advanced theories and technologies in several fields, such as the technical perspective. On the other hand, it conforms to market demand and changes in production patterns, such as the economic perspective (Jiang et al., 2021). Scheduling also refers to the procedure by which a time target for all production operations is established. It is all about determining the timing and order of operations in the production and its assembly in order to calculate the total time required for its completion, which includes both set-up time and preparation time in implementing a production order in the unit (Surbhi, 2022). In production scheduling, the time distribution of technological processes and the selection of production resources for their execution are the criteria that are determined. In the event of such a conflict or problem with product transfer, the production schedule will no longer be viable (Cieplinski et al., 2022).

In this study, the researchers aim to determine and analyze the needed resources of the company, Detalia Aurora Inc. and use them in production scheduling. Production scheduling will help the company to increase productivity, optimize processes and resources, prevent delays, and improve customer satisfaction. The analytical data generated by this study will contribute to the enhancement of the workstations at the company. This makes the conclusion of this study extremely important.

B. Review of Related Literature

Furniture plays a vital role inside all buildings, as it contributes to the overall design and feel of the room (Brooks, 2019). The word "wall decor" covers a wide range of ornamental objects that hang on a wall, including canvases, framed prints, and other unique accents. The theme, color palette, and distinctive home-style determine which wall decor is best. There are many options for wall art, such as canvas prints, art prints, metal prints, wood prints, acrylic prints, calendars, pictures, and clocks (Yaser, 2021). When redecorating a new place, wall art does not have to be the final component of the puzzle. In actuality, one essential factor of interior design is wall art. When used appropriately, wall hangings may offer a great foundation to build a design for the rest of the space (Mastroeni, 2022).

There are multiple phases involved in the production cycle of furniture, and it may differ based on the type of furniture manufactured. To maximize the product's demand, quality, and durability, which are the primary determinants of customer satisfaction, furniture-making procedures must be followed precisely (Csanady et al., 2019). As specified by the U.S. Bureau of Labor Statistics (2018), furniture manufacturing commonly involves cutting, bending, molding, laminating, and assembling materials such as wood, metal, glass, plastics, and rattan. Nevertheless, furniture creation does not consist merely of bending metal, cutting and shaping wood, or extruding and molding polymers. The integrated design of the item for aesthetic, fashion trends and functional aspects is also a significant aspect of the production process. Even the slightest process deviation could result in the scrapping of whole product lines due to quality issues affecting anything from the item's safety to its appearance (Evans, 2021).

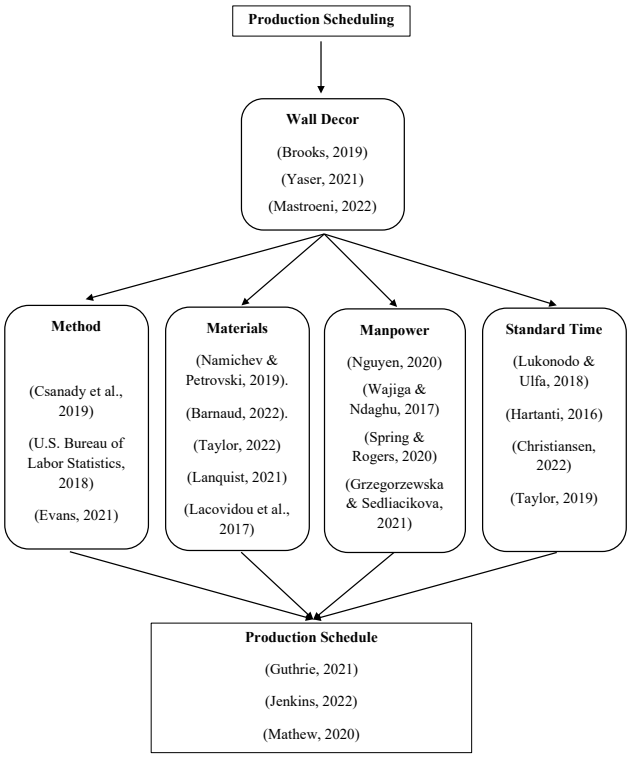

Fig. 1. Conceptual Framework of the Study

The types of raw materials used to manufacture furniture vary according to several criteria. Wood, stainless steel, cane, plastic, and fabric are all popular furniture materials. Priority is given to wood as a natural material when selecting materials for furniture creation. The features of wooden furniture include its longevity, hardness, and resilience to environmental conditions. Since wood is a natural material, it adds a sense of freshness to interior design. Still, it must avoid exposing wooden furniture to moisture, water, and dust, as these are his greatest enemies (Namichev & Petrovski, 2019). Rattan furniture is widespread, and nobody can get enough of this design trend (Barnaud, 2022). One of the most important providers of the plant in the Philippines. Rattan is a material that is lightweight, nearly impenetrable, and easy to move and manipulate. It can tolerate extreme humidity and temperature conditions and is naturally resistant to insects (Taylor, 2022). A wicker is a form of weaving. In addition, it defines the technique of weaving together plant-based materials. A wicker item can be crafted from rattan, but it can also be crafted from willows, reeds, or bamboo (Lanquist, 2021). The improper use of these natural resources or materials will generate production waste, resulting in the loss of the material's inherent economic worth, environmental deterioration, and adverse effects on the local community's health (Lacovidou et al., 2017).

Manpower is one of the organization's most valuable assets.

Manpower planning ensures adequate supply, good quality and quantity, and efficient utilization (Nguyen, 2020). Through the human resource planning approach, organizations can maximize the utilization of their current human resources and plan for the organization's future (Wajiga & Ndaghu, 2017). In January of 2000, more than 670,000 people were employed in the furniture manufacturing industry, but by 2010 that number had dropped to 360,000. In recent years, though, the figure has crept closer to the 400,000-employee threshold (Spring & Rogers, 2020). This occurs due to the instability of furniture producers and the industry's ups and downs. Labor productivity is one of the primary determinants of the wood-based industry's growth and competitiveness (Grzegorzewska & Sedliacikova, 2021).

Time is one of the elements used to evaluate an employee's utilization of available resources. The operator's task involves optimal use of time to maximize work output (Lukonodo & Ulfa, 2018). In a manufacturing setting, work measurement is performed to increase the efficiency of assembly workstations. A functional measurement approach called time study entails measuring the amount of time a worker spends performing tasks at a typical speed. Standard time is the average time a well-trained worker takes to accomplish a specific operation (Hartanti, 2016). It is used to uncover hidden defects and weaknesses in other elements of the plant floor, like sub-optimal layouts and positioning of machines and workstations. It can also locate inefficiencies in allocating personnel, machinery, and other production inputs (Christiansen, 2022). Through the implementation of time and motion studies, Frank and Lillian Gilbreth influenced the production process. Both works led to the development of industrial engineering, time studies, incentive criteria, and an ongoing quest for efficiency in factories and offices (Taylor, 2019).

Understanding the production schedule has the advantage of enhancing production and manufacturing knowledge. A production schedule details every product that will be created, from the raw materials used to the logistics involved. In addition, it comprises several processes meant to make production smoothly operate while assisting managers in identifying possible problems, such as bottlenecks, and preventing them from escalating (Guthrie, 2021). The production schedule details the timing of each step of the production plan, as well as the employees, equipment, and other resources allotted to the project. It can be not easy, primarily when numerous interdependent manufacturing phases and the business simultaneously produce multiple items (Jenkins, 2022). A corporation must have accurate production scheduling to reduce changeover time between production cycles, minimize material waste, and implement successful manufacturing methods (Mathew, 2020).

Production management work that involves resource and job scheduling commonly uses Gantt Chart. A Gantt chart is a tool that facilitates planning, scheduling, and monitoring. It can enhance planning and scheduling, remote collaboration, resource allocation, and task delegation (Shweta et al., 2022). Gantt charts allow the scheduler to be adaptable, react fast to unanticipated occurrences, and adjust the schedule. It also enables the creation of visual scenarios for rapid response to unforeseen events (Manale, 2016). Organizations utilize Gantt charts to monitor the status of activities and identify scheduling restrictions. Managers may utilize them before production to divide duties into smaller jobs (Ramos, 2021). Mega infrastructure projects, including dams and roadways, utilized Gantt charts at that time. They are currently utilized in virtually every sector and area. Gantt charts provide a visual depiction of the production at any stage, including task dependencies, priorities, and ownership, which makes it easier to understand the production's scope and requirements (Hakoune, 2022).

2. The Problem

A. Statement of the Problem

This study aimed to create a production schedule that can meet the production lead time given by the customer. Specifically, it seeks answers to the following questions:

1. What is the process flow of the following products:
   - 1.1 William Wall Décor,
   - 1.2 Reeve Rattan Wall Décor, and
   - 1.3 Methuzella Rattan Wall Décor?
2. What is the standard time for producing wall decors in terms of:
   - 2.1 carcass making,
   - 2.2 fiber/stone casting,
   - 2.3 inlaying,
   - 2.4 sanding,
   - 2.5 painting,
   - 2.6 retouch/assembly,
   - 2.7 final checking,
   - 2.8 agent quality control, and
   - 2.9 packaging?
3. What is the demand for each product?
4. What are the materials needed to produce wall decors?
5. When is the due date for each product?
6. Based on the findings, what is the production schedule?

B. Significance of the Study

The result of the study aims to benefit the following people:

The Company Owner. The result of this study will demonstrate an increase in the company's productivity. This will give the owner the basis to set new methods and rules to implement in order to achieve this result.

The Company Management and Workers. This study will give them a set of new methods to use in order to enhance their working skills to perform their work more effectively and refrain from human errors.

The School. This study will give benefits to schools for their accreditation purposes.

The Researcher. This will give students a chance to apply skills and knowledge attained from school using theories and statistical approaches in this study.

The Future Researcher. This study is an added reference and guide in making or conducting similar research for future purposes.

C. Scope and Limitation of the Study

The researcher's scope prioritized the production scheduling of Detalia Aurora Incorporated. Current data of the company and observations were used to create a new production schedule that would optimize the whole company's production. Moreover, the study focuses on William, Reeve Rattan, and Methuzella Rattan Wall Decor, which started its production in November and December 2022 and is limited to the available data offered by the company.

3. Research Methodology

This study used a qualitative research approach to address the production bottleneck within the company. It uses various data resources to construct a systematic production schedule, including standard time, product layouts, and industrial engineering tools.

A. Research Process Flow

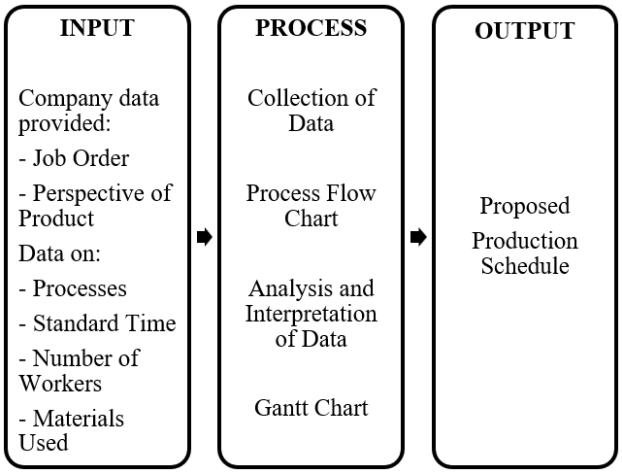

Fig. 2. Research Process Flow

The figure shows the research process flow of the study. It includes the input, process, and output design utilized in analyzing the data. The flow shows how the researchers gathered the needed data using respondents' interviews and further information the company provided. All the data collected comprises the product description, job order, standard time, number of workers, and materials needed. With the information on the manufacturing process of each product, a process flow chart was constructed. This depicts a visual display of a process' specific steps in chronological order. Given all the input, analysis, and interpretation of data were made to create the current production schedule and proposed a new feasible one using Gantt Chart. With the support of industrial engineering tools, the desired output of the study will be obtained.

B. Research Environment

Data and information were gathered in Detalia Aurora Incorporated, located in Zone Paliya, Paknaan, Mandaue City, Cebu, which lies in the center of the province, around 11 kilometers from Cebu City. The company is committed to producing furniture and home decor of the finest quality. It combines cutting-edge technology, traditional Filipino craftsmanship, and the creative application of local materials to create goods of the best quality in transitional and contemporary styles.

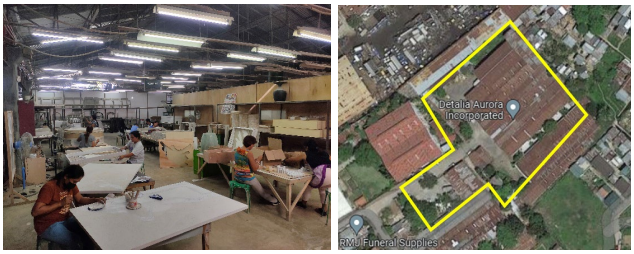

Fig. 3. Detalia Aurora Incorporated Setting

C. Research Respondents

The study respondents were the four skilled workers, ten job-order workers, and the company's team of managers consisting of the supervisor, product development engineer, operation manager, human resource manager, and the owner. There was a total of 19 respondents. Some of the data and information were taken and gathered from their responses during direct interviews.

D. Research Instrument

This study applied observation techniques and involved all the information given by the management and information from interviews as the foundation of the data. The researcher prepared and used a set of guide questions to gather exact and appropriate data from the respondents' responses, including the performance and issues in the company. The need to design a suitable data collection device was considered when creating the instrument.

E. Data Gathering Procedure

The study was based on primary data. Primary data were gathered during the researcher's visit to Detalia Aurora Inc., during the observations around the company, and during interviews with the team of managers, particularly those assigned in the production department, who provided information on the company's production performance and the impact of their existing production scheduling. Observations start by determining specific products the company is producing, its processes, the number of workers, materials used, and the overall production performance. All the data were recorded, tabulated, and analyzed.

F. Treatment of Data

This study applied the qualitative tool to subject the analysis regarding production scheduling. Researchers use the Gantt Chart as the primary analytical tool to determine the production schedule that best suits the company. Data needed in creating the chart include the process flow, standard time, materials, job order release date, and due date. These data were obtained from the company through the help of this tool.

4. Definition of Terms

The following terms are being defined according to their uses

in this study.

- Carcass Making – is the process of creating the wall decors' fundamental framework or body.
- Constraints – refers to anything that directly affects the quantity and quality of the production in Detalia Aurora Inc. from achieving their goals.
- Furniture – consists of things like tables, chairs, and wall decors manufactured and sold by Detalia Aurora Inc.
- Furniture Market – refers to the overall sales of furniture products worldwide.
- Inlaying – refers to the procedure that includes methods such as layout, texturing, and attached rattan of the wall decors.
- Manpower – is the total number of people who works to produce the wall decors.
- Production – entails the creation of wall decors from raw materials such as plywood and wicker.
- Production Lead Time – refers to the time between the start of manufacturing wall decors and when the product packing ends.
- Production Process – entails the utilization of economic inputs or resources, such as manpower, raw materials, or land, in manufacturing the wall decors.
- Production Risk – refers to anything that directly impacts the amount and quality of the wall decor production.
- Production Waste – refers to scraps generated during production processes in Detalia Aurora Inc.
- Raw Materials – are the materials like wood, plywood, and wicker that can be transformed into wall decor through manufacturing.
- Scheduling – is the planning, coordinating, and regulating the utilization of resources to execute a production process in producing wall decors. It entails determining when to begin and end each activity, the resources to employ for each task, and the order in which to do the activities.
- Standard time – is the amount of time that should be allotted for a worker to make one unit of wall decor using the standard method and at a normal pace.

5. Data Presentation, Interpretation, and Analysis of Data

This chapter presents the data, interpretation, and analysis of the data gathered in Detalia Aurora Inc.

A. Products and its Description

Detalia Aurora Inc. manufactures three distinct wall décors, William Wall Décor, Reeve Rattan Wall Décor, and Methuzella Rattan Wall Décor. Each wall décor has its own unique design, style, and size. All wall décors are mainly made up of ¾ California Air Resource Board (CARB) Plywood. These products followed almost the same process. William Rattan Wall Décor has its rattan patterned-based design (See Figure 4). In addition, the Reeve Rattan Wall Décor has a combination of rattan and fiber, which completes its design. On the other hand, Methuzella Rattan Wall Décor has three different panels (A, B, C) as a furniture set and a design that looks like raindrops. All wall decors use rattan wickers as a signature design in which the rattan is planted or attached to each surface to create an aesthetic look. Wiliam Wall Décor has a dimension of 40" width x 60" height with a thickness of $1\frac{3}{8}$". For Reeve Rattan Wall Décor has a dimension of an overall 45" width and 60' overall height with a thickness of $3\frac{3}{4}$ ". For Methuzella Rattan Wall Décor has a dimension of 15" width x 39" height with a thickness of $3\frac{1}{4}$''.

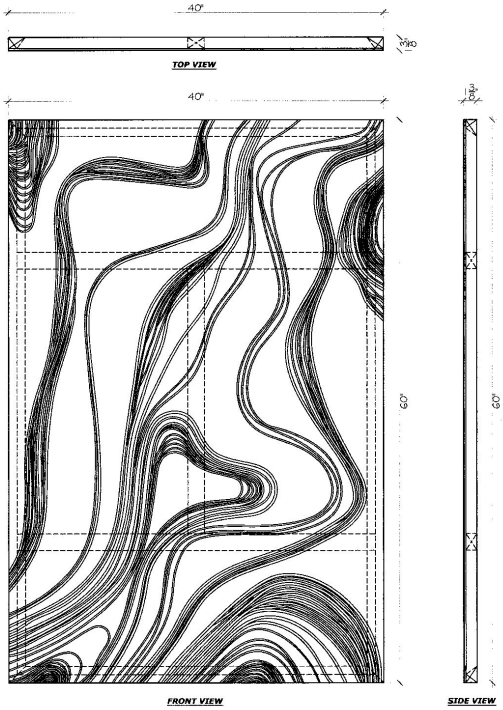

Fig. 4. William Wall Décor

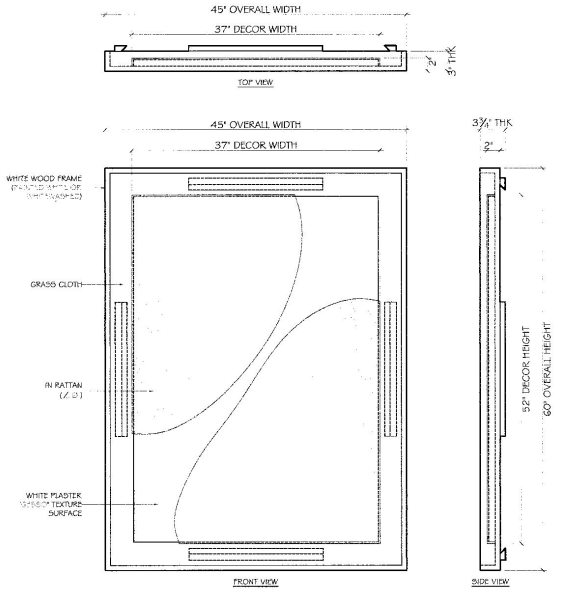

Fig. 5. Reeve Rattan Wall Décor

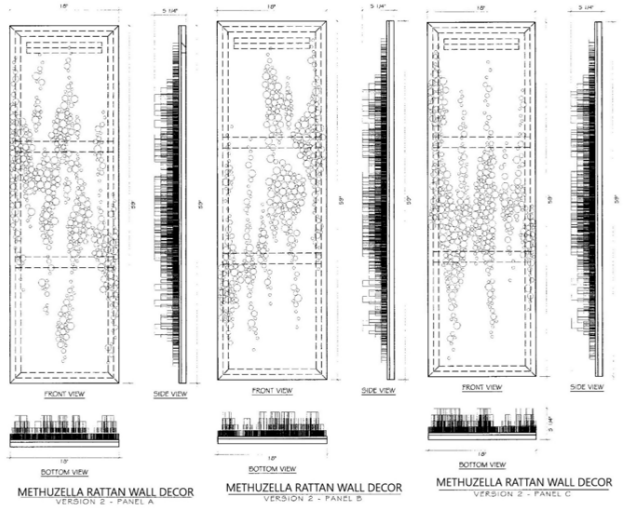

Fig. 6. Methuzella Rattan Wall Décor

B. *Process Flow*

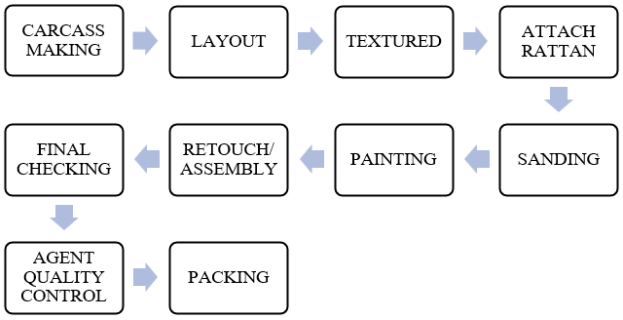

Fig. 7. William Wall Décor Process Flow Chart

Figure 7 shows the William Wall Décor process flow chart. The manufacturing process starts with carcass making, followed by layout and textured processes. After that, rattan wickers are attached to the board. Then the product is moved to the sanding process for smoothing and grooving. The next process is painting and retouching/assembly. Final checking is then implemented to examine if there are a problem or defects. Then move to agent quality control to ensure the product's quality before it arrives to the customer. The last process in the production of William Wall Décor is packing. There are a total of 10 processes in making the William Wall Décor.

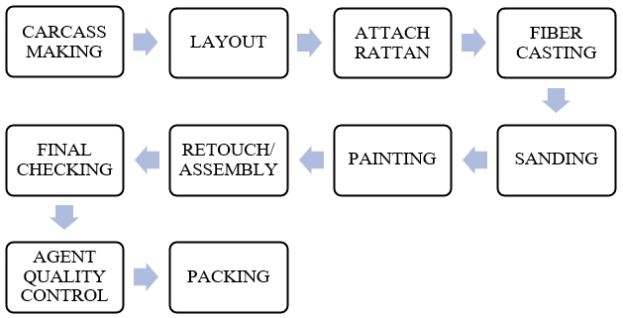

Fig. 8. Reeve Rattan Wall Décor Process Flow Chart

Presented in Figure 8 is the process flow chart of producing Reeve Rattan Wall Décor. It includes the following chronological processes: carcass making, layout, attaching rattan, fiber casting, sanding, painting, retouching/assembly, final checking, agent quality control, and packing. Compared to William Wall Décor, this product does not undergo a textured process but has a fiber casting process. Overall, ten processes are being followed to complete the production of Reeve Rattan Wall Décor.

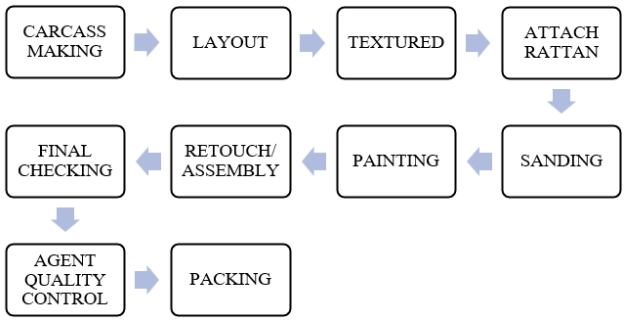

Fig. 9. Methuzella Rattan Wall Décor Process Flow Chart

Figure 9 shows the Methuzella Rattan Wall Décor process flow chart. This wall decor has the same process as the William Wall Décor. It first undergoes carcass making, then after that is the layout process. Next is texturing and preparing for the following step, the attach rattan process. The rattan wickers are then attached to the board, followed by sanding in order to smoothen the surfaces and edges. The next process is applying paint and retouching/assembly. When the work is done in the retouch/assembly process, it moves to the final checking before it reaches agent quality control. The last process is to prepare the product for shipment.

C. *Process, Standard Time, Number of Workers*

Table 1 shows the standard time of each process in making William Wall Décor given by the company. The demand for making William Wall Décor is 20 items, and each process has its corresponding number of workers assigned to the company. In carcass making, the standard time is 5 hours, and the assigned workers are four. In the inlay process, there are three processes involved in it. The layout has a standard time of 3.5 hours and two assigned workers. Textured has a standard time of 3.25 hours, and two workers are assigned, for attached rattan has a standard time of 6 hours and four assigned workers. Next is the sanding process. It has a standard time of 3 hours and two workers assigned. Then, painting has a standard time of 5 hours, and one worker is assigned. For retouch/ assembly, it has 2.5 hours, and the assigned worker of 1. Final checking has a standard time of 0.75 hours, and the assigned worker in this process is 1. Agent Quality Control has a standard time of 0.33 hrs with the assigned of 1 worker. Lastly, packing has a standard time of 1.5 hours, and the assigned worker was 2. Overall, there are 30.83 hours to make the William Wall Décor, with 20 workers assigned to work.

Table 2 shows the standard time of each process in making Reeve Rattan Wall Décor given by the company. The demand for making William Wall Décor is 25 items, and each process has its corresponding number of workers assigned to the

Table 1
William wall décor standard time and number of workers

Process	Standard Time	No. of Workers Assigned
1. Carcass Making	5 hrs.	4
2. Inlay		
• Layout	3.5 hrs.	2
• Textured	3.25 hrs.	2
• Attached Rattan	6 hrs.	4
3. Sanding	3 hrs.	2
4. Painting	5 hrs.	1
5. Retouch/ Assembly	2.5 hrs.	1
6. Final Checking	0.75 hr.	1
7. AQC	0.33 hrs.	1
8. Packing	1.5 hrs.	2
Total	30.83 hrs.	20

Table 2
Reeve Rattan wall décor standard time and number of workers

Process	Standard Time	No. of Workers Assigned
1. Carcass Making	8 hrs.	4
2. Fiber Casting	3 hrs.	2
3. Inlay		
• Layout	2 hrs.	2
• Attached Rattan	6 hrs.	4
4. Sanding	5 hrs.	4
5. Painting	3 hrs.	1
6. Retouched/Assembly	2 hrs.	1
7. Final Checking	0.75 min.	1
8. Agent Quality Control	0.33	1
9. Packing	1.5 hrs.	2
Total	31.58 hrs.	22

company. In carcass making, the standard time is 8 hours, and the assigned workers are 4. Unlike in William Wall Décor, there are only two (2) processes for the inlay process; the layout has a standard time of two hours and two assigned workers; for attached rattan, it has a standard time of 6 hours and four assigned workers. Next the sanding process. It has a standard time of 5 hours and two workers assigned. Then, in painting, it has a standard time of 3 hours and one worker assigned. For retouch/ assembly, it has 2 hours and the assigned worker of 1. Final checking has a standard time of 0.75 minutes, and the assigned worker in this process is 1. Agent Quality Control has a standard time of 0.33 hours with the assigned of 1 worker. Lastly, packing has a standard time of 1.5 hours, and the assigned worker was 2. Overall, there are 31.58 hours to make the Reeve Rattan Wall Décor, with 22 workers assigned to work.

Table 3
Methuzella Rattan Wall Décor standard time and number of workers

Process	Standard Time	No. of Workers Assigned
1. Carcass Making	18 hrs	4
2. Inlay		
• Layout	4.5 hrs.	2
• Textured	5 hrs.	2
• Attached Rattan	6.5 hrs.	4
3. Sanding	4 hrs.	2
4. Painting	9 hrs.	1
5. Retouch/ Assembly	7 hrs.	1
6. Final Checking	0.75 hrs.	1
7. Agent Quality Control	0.33	1
8. Packing	2.5 hrs.	2
Total	57.58 hrs.	20

Table 3 shows the standard time of each process in making Methuzella Rattan Wall Décor given by the company. The demand for making Methuzella Rattan Wall Décor is 15 sets, each with three panels (A, B, C). Each process has its corresponding number of workers assigned by the company. In carcass making, the standard time is 18 hours, and the assigned workers are 4. For the inlay process, it is the same with William Wall Décor. However, the standard time and the workers assigned are different. In layout, it has a standard time of 4.5 hours and two assigned workers. Textured has a standard time of 5 hours, and two workers are assigned, for attached rattan has a standard time of 6.5 hours and four assigned workers. Next the sanding process. It has a standard time of 4 hours and two workers assigned. Then, painting has a standard time of 9 hours, and one worker is assigned. For retouch/ assembly, it has 7 hours and an assigned worker of 1. Final checking has a standard time of 0.75 hours, and the assigned worker in this process is 1. Agent Quality Control has a standard time of 0.33 hours with the assigned of 1 worker. Lastly, packing has a standard time of 2.5 hours, and the assigned worker was 2. Overall, there are 57.58 hours to make the Methuzella Rattan Wall Décor, with 20 workers assigned to work.

D. Product Demand

Table 4
Wall Décor demand

Product	Quantity Demand
William Wall Décor	20
Reeve Rattan Wall Décor	25
Methuzella Rattan Wall Décor	15 sets (3/s)

Table 4 shows the three distinct wall decors and their quantity demand to produce. The company gives the quantity demand. For William Wall Décor, the market is 20 items; for Reeve Rattan Wall Décor, the quantity demand is 25 items; and for Methuzella Rattan Wall Décor, the order is 15 sets, and each set contains three items (A, B, C). This data will be used for the

Table 5
Materials used to manufacture wall decor

Materials	William Wall Decor		Reeve Rattan Wall Decor		Methuzella Rattan Wall Decor		Total
	Unit Required	Total Required	Unit Required	Total Required	Unit Required	Total Required	
Plywood ½''x4'x8'	1	20	1	25	1.5	22.5	67.5
Wood 3''x4''x10'			1	25			25
Wood 1''x2''x10'	2.165	43.3					43.3
Wood 2''x4''x10'					5	75	75
Wicker 3mmØ	4	80					80
Wicker 6mmØ	5	100	1.2	30			130
Wicker 8mmØ	5	100					100
Rattan Pole ½Ø					1	15	15
Rattan Pole ¾Ø					1	15	15
Rattan Pole 1Ø					1	15	15
Fiber 0.001''x3''x4.3'					1.67	25	25

Table 6
Wall Décor demand

Job Order No.	Product	Received Date	Production Lead Time	Due Date
JO 1	William Wall Decor	Oct. 3, 2022	90 days	Jan. 24, 2023
JO 2	Reeve Rattan Wall Decor	Nov. 7, 2022	90 days	Feb. 27, 2023
JO 3	Methuzella Rattan Wall Decor	Nov. 12, 2022	90 days	Mar. 4, 2023

production planning of Detalia Aurora Inc.

E. Materials Used

Table 5 shows the materials used for William Wall Décor, Reeve Rattan Wall Décor, and Methuzella Rattan Wall Décor. It presents the unit required and the total required materials for each specific product. The required unit is multiplied by the total demand for each wall décor to get the total required materials. In total required, for ½''X4'X8' plywood, it needed 20 pieces for William Wall Décor, 25 pieces for Reeve Rattan Wall Décor, and 22.5 pieces for Methuzella Rattan Wall Décor with a total is 67.5 pieces ½''X4'X8' plywood. For 3''X4''X10' wood, it needs 25 pieces for Reeve Rattan Wall Décor. For 1''X2''X10' wood, it needs 43.3 pieces for William Wall Décor. For 2'X4'X10' wood, it needs 75 pieces for Methuzella Rattan Wall Décor. For 3mmØ wicker, it needs 80 pieces for William Wall Décor. For 6mmØ wicker, it needs 100 pieces for William Wall Décor and 30 pieces for Reeve Rattan Wall Décor, totaling 130 pieces of 6mmØ rattan wicker. For 8mmØ wicker, it needs 100 pieces for William Wall Décor. For rattan poles of 1/2, ¾, and one diameter size, it needs 15 pieces each for Methuzella Wall Décor. Twenty-five meters of 0.001''x3''x4.3' fiber sheets are needed for Reeve Rattan Wall Decor.

F. Job Order Received Date and Due Date

Table 6 presents the received date and due date of the job orders. Products that comprise the job orders are as follows: William Wall Décor, Reeve Rattan Wall Décor, and Methuzella Rattan Wall Décor. Job order one was received by the company on October 3, 2022, job order two on November 7, 2022, and job order three on November 12, 2022. There is no exact due date, but the company was given by the customer 90 days production lead time for each job order. Based on the production lead time, the researchers have calculated the due date using the number of the company's working days. Thus, the due date for job order one will be Jan. 24, 2023, job order two will be on Feb. 27, 2023, and job order three will be due on Mar. 4, 2023.

G. Current Production Schedule

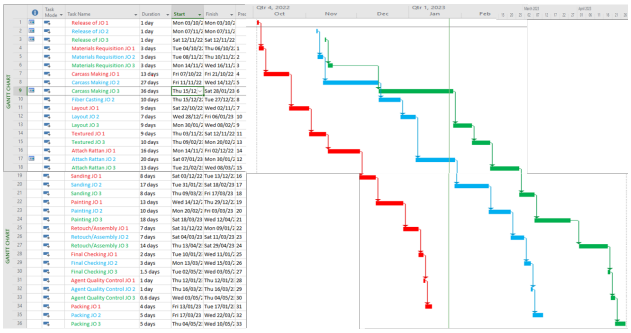

Fig. 10. Current production schedule in manufacturing the three wall decors

Figure 10 shows the current production schedule of the three products: William Wall Décor, Reeve Rattan Wall Décor, and Methuzella Rattan Wall Décor using Gantt Chart. The red color code represents the William Wall Décor, the cyan for Reeve Rattan Wall Décor, and the green color code for Methuzella Rattan Wall Décor. The schedule sequence started from the received date of the job orders, followed by the material requisition of 3 days for all products and process flow of each specific process flow. The duration of each process was based on the standard time with the number of workers assigned multiplied by the demand (See Tables 1,2, 3 & 4). The schedule follows six working days a week from Monday to Saturday, and Sunday is considered a rest day. It also observes correct Philippine holidays for the years 2022 and 2023.

As presented in the current schedule, carcass making for Methuzella Rattan Wall Décor started late due to the unfinished carcass making of Reeve Rattan Wall Décor. The operator cannot work on two products at the same time. Hence, job order 2 started its carcass making on November 11, 2022, and finished on December 13, 2022. On the other hand, job order 3 finished its material requisition on Nov. 16, 2022. It is impossible to start the first process, carcass making, on the next day with the same number of workers assigned. That is why job order 3 started on Dec. 14, 2022. The production of Methuzella Rattan Wall Décor stopped for 21 working days. That is the

only idle time detected in the current production schedule.

The current schedule shows that job order 1 started on Oct. 3, 2022, and ended on Jan. 17, 2023; job order 2 started on Nov. 7, 2022, and ended on Mar. 22, 2023; and job order 3 started on Nov. 12, 2022, and ended on May 9, 2023. Given the production lead time of 90 days for each product, job orders 2 and 3 have exceeded the due date (See Table 6). William Wall Décor finished its production in 85 working days and had five days before the due date, Reeve Rattan Wall Décor took 110 working days to finish, which exceeded 20 days from the due date, and Methuzella Rattan Wall Décor took 141 working days which caused 51 days delay from the given 90 days production lead time. The exceeded production lead time of two job orders could lead to cancellations of orders, penalties for delays, and no reorder from customers. If these problems are unattended, the company will not be able to generate revenue that can affect the whole organization.

H. Proposed Production Schedule

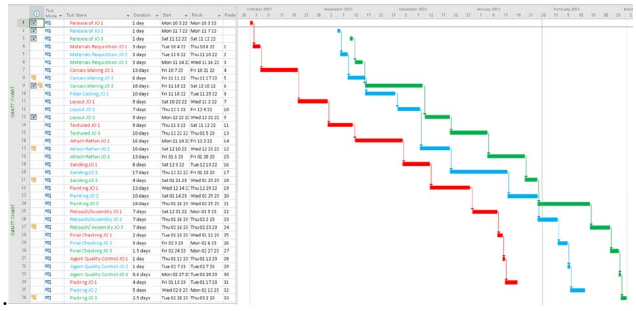

Fig. 11. Proposed production schedule in manufacturing the three wall decors

Figure 11 shows the proposed production schedule for manufacturing the three products. In order to meet the production lead time of 90 days, the researchers have proposed a new production schedule by adding workers. Manpower is added to processes that have a long period of process time. For job order 2, 18 workers were added for carcass making and 4 for attaching rattan. There are a total of 22 workers working in carcass making, and 8 workers in attach rattan process. From the total number of workers for producing Reeve Rattan Wall Décor (See Table 2), these remaining 18 workers were originally assigned to other processes in furniture manufacturing and temporarily moved to carcass making and attached rattan. Carcass making has reduced its process time from 27 days to 6 days, and attach rattan has reduced its process time from 20 days to 10 days. This resulted in a shorter production time for the Reeve Rattan Wall Décor, with 79 days from 110 days. Job order 2 has 21 working days before the targeted 90 days' production lead time. It ended on February 13, 2023.

In job order 3, manpower was also added to achieve the production lead time. Four workers are added to carcass making, two for sanding, two for packing, and one for retouching/assembly. The total number of workers working in carcass making is 8, 4 workers in sanding, 4 workers in packing, and 2 workers in the retouch/assembly process. These workers added were also originally assigned from other processes and were temporarily moved to the aforementioned processes. The addition of manpower in job order 3 affects the current process time of carcass making from 36 days to 18 days, 8 to 4 days in sanding, 5 to 2.5 days for packing, and 14 to 7 days to retouch/assembly process. This resulted in a shorter production time for Methuzella Rattan Wall Décor, 88 days from 141 days from the current production schedule. The job order has the remaining 2 working days before the due date. Job order 3 ended on March 2, 2023.

The addition of workers for a certain process in the proposed production schedule is essential to reduce the production time from the current production schedule. It is the most effective, accessible, and low-cost option to finish production as early as possible rather than having the regular number of workers do overtime jobs or buy new machines. Achieving a shorter production lead time would lead to good customer satisfaction, more customer orders, less labor cost, and more company revenues.

6. Summary of the Study

Detalia Aurora, Inc. is a hand-craft and material-driven business committed to producing furniture and home decor of the finest quality. It serves all retail, wholesale, or hospitality clients in high-end and high sectors worldwide. Moreover, it combines cutting-edge technology, traditional Filipino craftsmanship, and the creative application of local materials to create goods of the best quality in transitional and contemporary styles. However, the company needs the production planning and the schedule of the job order, which are the William Wall Décor, Reeve Rattan Wall Décor, and Methuzella Rattan Wall Décor.

The main purpose of this research is to create a proposed production schedule for the three wall decors to meet each product's given lead time. The researcher collected all the data in Detalia Aurora Inc. to create a project schedule. The researchers used an interview with the team of managers, especially in production. The team of managers consists of the production manager, supervisor, operation manager, and company owner. The data collected was the key source in answering the questions.

The researchers use a Gantt chart to create a project plan and schedule for the products. The duration of each process is based on the standard time given to the researchers by the company's record. It also shows when the product and the processes started until arrival.

7. Findings

Based on the results of the current production schedule, there are two products out of three that go beyond the production lead time of 90 days. These products include Reeve Rattan Wall Décor and Methuzella Rattan Wall Décor. The William Wall Décor did not show any conflict in the production schedule. The current end time for job order 2 is March 22, 2023, while the due date is February 27, 2023. On the other hand, the current end time for job order 3 is May 9, 2023, while the due date is March 4, 2023. Hence, the production of Reeve Rattan Wall

Décor exceeded 20 working days, and Methuzella Rattan Wall Décor exceeded 51 working days from the due date. These overdue production lead times could result in order violations or cancellations, penalties for delays, and no further orders from consumers. To meet the due date, there is a need for adjustments to the current production schedule.

The proposed production schedule suggests additional workers to reduce extensive process time in order to meet the 90 days production lead time. Manpower was added to job order 2 processes: 18 workers in carcass making and 4 in attaching rattan, and job order 3 processes: additional 4 workers in carcass making, 2 in sanding, 1 in retouching, and 2 workers in packing. The workers were originally assigned to other processes in furniture manufacturing and temporarily moved these processes. To minimize the production time compared to the current production schedule, the suggested production plan requires the addition of manpower for a specific process. It is the most effective, accessible, and cost-effective method for completing production as quickly as possible, compared to hiring overtime labor or purchasing additional machines.

As a result of the proposed production schedule, manufacturing the Reeve Rattan Wall Décor reduced its production time by 31 working days from March 22, 2023, to February 13, 2023. Manufacturing the Methuzella Rattan Wall Decor also ended 53 working days early from May 9, 2022, to March 2, 2023. All of the products now meet the production lead time: job order 1 finished in 85 days, job order 2 ended in 79 days, and job order 3 was completed in 88 days. Achieving a shorter production lead time would result in improved customer satisfaction, an increase in customer orders, a decrease in labor costs, and an increase in the company's revenue.

8. Conclusion

From the finding, the researchers have concluded to propose a new production schedule for William Wall Décor, Reeve Rattan Wall Décor, and Methuzella Wall Décor in Detalia Aurora Incorporated. The proposed production schedule suggested the additional workers to specific processes with long process time to adjust and reduce the duration of manufacturing these products. This is to meet the production lead time of 90 days. For job order 2, a total of 18 workers were added to reduce the production time to 79 days from 110 days. While job order 3, a total of 9 workers were added to specific processes to minimize the time required in manufacturing the wall décor. By adding these workers, producing Methuzella Rattan Wall Décor will take 88 days to finish from 141 days in the current production schedule. These workers were originally assigned to other processes in furniture manufacturing and temporarily moved the process that needed more manpower to finish the process in a long process time. In the proposed production schedule, all the job orders meet the production lead time. This is to ensure the maximization of production, prevention of delays, and good customer satisfaction.

9. Recommendation

Based on the findings and the conclusion, it is recommended to implement the proposed production schedule in Detalia Aurora Incorporated. This is to enhance not only current production in the company but also meet up customer satisfaction. If the production lead time is shortened in the new schedule, there is a strong possibility for the company to cater to more customers and job orders.

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