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APPLICATION OF LEAN TO IMPROVE CUSTOMER LEAD-TIME IN THE FASHION INDUSTRY IN GHANA: A CASE STUDY OF ROYALTY BY NANASEI

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Abstract: **The purpose of this paper is to minimize the customer lead time of Royalty by Nanasei through the use of lean process improvement methodology. This study utilized a mixed method approach and a descriptive case study research design. Data was collected through administered questionnaires from three hundred and eighty-four (384) existing customers of the company alongside with semi-structured interviews from selected personnel from Royalty by Nanasei. The findings indicated that average customer lead time was 11.87 days and majority of customers expected their clothing to be ready within 5 working days on average. The paper established through a proposed future state value stream mapping that, with the use of information technology, the company could complete a single garment between a timeframe of 16 hours 33 minutes to 22 hours 33 minutes (less than a day). The paper recommends that the company should develop relationships with local suppliers that can deliver fabrics and materials much more quickly and hassle-free than its employees going to town to purchase them. The study also recommends that, the company should create an online portal enabling customers to place their orders as well as feedbacks on lead-times and payments.**

Keywords: **Lean, Lead-time, Value Stream Mapping, 5S, JIT.**

I. INTRODUCTION

Formerly, customer lead time was not of great importance to Ghanaians as consumers generally accepted that most businesses in the country offered slow and inferior customer services unlike Western nations such as the United States, Canada and the United Kingdom among others. However, for the past decade, lead times has been of great concern for customers in Ghana, especially the elite (in terms of education and profession) who have had much exposure to the business practices of companies in more sophisticated nations [1]. Due to the fast growth of industries worldwide and increase in globalization, companies in Ghana have found themselves competing not only with local companies but also, with companies from the Western nations; providing the same products/services with much broader resources, more expertise and more financial backing [2],[1]. Subsequently, this has opened the minds of many consumers with respect to the importance of lead time in customer service and the obligation of companies to ensure a reasonable lead time [1]. The lean methodology is therefore regarded as the most effective way to enhance business processes by maximizing the value added to customers, minimizing waste and increasing process speed by reducing the order-to-cash lead. In other words, it seeks to create more value for the customer with the use of fewer resources which cuts down costs [2]. Some of the available lean process improvement tools include Six Sigma, kanban, Lean Canvas, just-in-time (JIT), jidoka, takt time, heijunka, poka-yoke, 5s (seiri, seiton, seiso, siketsu and shitisuke) and kaizen. The main goal of these lean tools is to reduce the seven lean wastes; namely; defects, waiting time, unused talent, transporting, unnecessary inventory, excess movement and extra processing [3]. In addition, value stream mapping is one of the lean management tools which involves analysing the current states of the process of taking a product or service from the order through the various

processes and finally to the end consumer. The process in question is referred to as the order-to-delivery process, which is one of the main avenues through which customers directly communicate with companies, the final sale transaction is made, and cash is generated for these companies. The order-to-delivery process is a key business process that is managed by the supply chain organization [4]. Royalty by Nanasei is a sole proprietorship that was established in 2013, but legally registered in 2017 to produce custom made luxury outfits and tailored bespoke kaftans for men [5]. Since its establishment in 2013, the demand for Royalty products has been relatively high, nevertheless, there has always been massive complaints from customers with respect to its customer lead time –considered to be very lengthy as compared to industry standards. The Management of Royalty by Nanasei has blamed this partly on the company not having set standards for turnaround time, systems that gives feedback on production as well as effective systems for communication with customers. These factors, in turn, have resulted in customer dissatisfaction and reduced customer retention rates from 68% in 2015 to 41% in 2017 [1]. The aim of this study therefore, is to apply lean technique to improve the customer lead time of Royalty by Nanasei. The specific objectives of this research are to: determine the company's average customer lead time; determine the expectations of its customers with respect to lead time; and to utilize value stream mapping to develop a more efficient order-to-delivery process for the company.

II. LITERATURE REVIEW

Theoretical Review:

After having reviewed a number of theories on continuous improvement, the Researcher is of the view that the theory of constraints is the theory that is most applicable to this study. This theory hypothesizes that every complex system is comprised of multiple linked activities, with one of the activities acting as a constraint upon the entire system or the weakest link. With that said, the theory of constraints first and foremost seeks to identify the most important constraint that prevents a company from achieving its goal before improving the constraint in a systematic way until it ceases to be a limiting factor [6]. The theory incorporates a process known as the Five Focusing Steps for the identification and elimination of constraints. The model consists of the following five steps: (I) identifying the constraint, (II) exploiting the constraint, (III) subordinating and synchronizing the constraint, (IV) elevating the performance of the constraint and (V) repeating the process. [7] explained that (i) identifying the constraint involves identifying the part of the process in question that hinders the goal from being achieved; (ii) exploiting the constraint involves the utilization of existing resources to improve upon the amount of materials or items passing through the constraint; (iii) subordinating and synchronizing the constraint involves the reviewing of all of the activities in the process in order to make sure that they are geared towards rectifying the constraint; (iv) elevating the performance of the constraint involves taking further actions to eliminate the constraint if it still exists; and (v) repeating the process involves immediately addressing the next constraint once a constraint has been resolved as the Five Focusing Steps is a continuous improvement cycle. According to [6], lean tools can be used to effectively identify the constraint. Among these, Myerson included Value Stream Mapping (VSM) and Gemba. VSM involves the visual mapping of the flow of production in the present and in the future using a defined set of symbols and techniques. [8] added that VSM is helpful for problem solving exercises involving complex processes by providing a foundation to work with when identifying the constraint. Gemba on the other hand, involves a researcher spending time monitoring activities on the plant floor in order to gain a deep and thorough understanding of the existing issues through first-hand observation and engaging in conversations with employees [6]. Thus, the Gemba theory was chosen for this study due to the major issues at Royalty by Nanasei relating to its lead time. To be specific, a constraint(s) has made its lead time significantly longer in comparison to industry standards. In consequence, it is believed that the application of the Five Focusing Steps (recommended by this theory) can be used to resolve the issue at hand.

Empirical Review:

With regards to empirical studies on the subject matter, a study was conducted by [9] in Finland for a cable manufacturing company; utilizing an enterprise resource planning (ERP) system. The purpose was to creating a new order-to-delivery process to reduce its delivery time. It also examined the factors that influenced the performance of its order-to-delivery process. Before the study was conducted, the customer lead time of the order-to-delivery process was 24 weeks, whereas the company sought to meet a new required schedule of three (3) months or 12 weeks. In other words, the main objective was to reduce the delivery time of the company's order-to-delivery process by 50%. Another relevant study was conducted by [10] who emphasised the lean principles. The study applied lean principles to an order-to-delivery process for a company that sells spare parts with embedded software. It was revealed that, what the customers valued most, is the company's order-to-delivery process having a shorter delivery time and high quality outputs (products). Furthermore, [11]

dealt with the application of lean principles in the clothing industry. The research sought to determine the effects of the application of the lean concept in retail. Likewise, research work by [12] provided a framework for how lean management methods could be incorporated into the supply chain process by retailers of clothing (fashion) in Norway. The analysis and evaluation of different management methods were done using AS-IS value stream map. However, the issues of the companies under study were grappling with, were not related to their order-to-delivery processes but rather, with the quality of their products. As a matter of fact, the quality issues identified were: (i) unorganized products on shelves for long periods of times; (ii) price tags and small pieces of paper on the floors of fitting rooms; and (iii) an eliminated reward situation which ended up backfiring unexpectedly. From the works carried out in the fashion industry, it is evident that many other countries have been suffering from what is referred to as the lead time gap, or the time it takes for fashion companies to source all materials, produce ideas and designs, convert them into products, and deliver them to the marketplace. It has been noted that this lead time is often much longer than what customers are comfortable with. This, in turn, causes losses in revenue and often results in significant mark downs on price tags being made at the retail level [13]. [14] further affirmed that lean process improvement can significantly enhance quality through easily detecting and correcting quality issues and implementing processes that are less prone to such issues. Apparently, the review conducted shows that, no studies on the subject matter have been conducted in either sub-Saharan Africa or Ghana in particular. This may suggest that, minimal or no attention has been given to lean improvement methods in the fashion industry within the African continent. This paper thus intends to fill this gap.

III. METHODOLOGY

The study used the mixed method approach in order to appropriately answer the research questions as it provides researchers with the opportunity to achieve triangulation –validation data through the cross-verification from two or more sources. This specific type of triangulation is referred to as data triangulation. The research made use of both the descriptive case study design (which involves an in-depth study of an individual, group of individuals or community) and the descriptive observational design (where animal and / or human behaviour is closely monitored and observed). The descriptive research design was chosen according to [15], which provides very detailed information about individuals or group of individuals. The research population of this study comprised the entire staff and management team of Royalty by Nanasei–35 persons; and all of its existing registered customers–approximately 3,185 persons. The statistical population (N), on the other hand, comprised all customer clothing orders made during the last 365 days of the company's operations–1,431 orders. The sample size of customers and purchases made were generated with the use of the Yamane equation. The statistical sample (n), consist of data concerning 313 customer clothing orders of the company. Furthermore, data was sampled from management and staff of the company using the purposive, non-probability sampling technique as it provides this study with the opportunity to select those respondents who have in-depth knowledge of the subj1ect area. Questionnaires and semi-structured interviews were employed as the main data collection instruments. The quantitative data (collected through the administering of questionnaires) was analysed with the help of a Statistical Package for Social Sciences (SPSS) Version 22.0. The qualitative interview data was confirmed through a coding technique inspired by [15] where relevant words, phrases, sentences among others, were labelled, categorised, relationships and associations between these categories described and results interpreted and discussed. Subsequently, reliability of the questionnaires was established through a method referred to as test-retest reliability where questionnaires were administered to a group of respondents who were part of the research population on two separate occasions. The scores obtained were then correlated to ensure stability and consistency. The reliability of the interview guides was also guaranteed by carrying out one-on-one interviews and administering standardized questionnaires. On the other hand, the validity of the findings was ensured by: selecting a non-random sample to gather information about the company's order-to-delivery process; employing the simple random sampling technique to minimizing selection bias while collecting information about customer expectations; and personally observing the order-to-delivery process of the company. Ethical issues were handled with high level of professionalism–informed consent was sought from respondents and the purpose of the study was clearly explained.

IV. FINDINGS

Presentation of Data:

Average Customer Lead Time

When the operations manager was interviewed, he indicated that, the current supply chain and order-to-delivery processes of majority of fashion companies in Ghana are decades old and linear. They flow in one direction which starts with

planning, design and development, manufacturing, and then finally ends in distribution to retail locations. According to [12]'s logic, this could be problematic as originally, the supply chain was the creation of a world of linear thinking however, a combination of forces in recent times has begun to shift the supply chain from a linear logic to a more networked and systemic logic. In light of the aforementioned, the procurement manager added that, rapid turnaround time is now the order of the day therefore, it is essential for apparel companies to ensure that every link in their supply chain processes is strengthened as much as possible. He further asserted that, to improve upon their supply chain processes, many companies in the industry have been accelerating the delivery of products that are selling, and shutting down the production of stalled products. In an interview with the Managing Director (MD) of Royalty by Nanasei, he vehemently defended the company's on-demand manufacturing supply chain strategy as effective and cost beneficial; resulting in a shorter and more local supply chain as well as cutting down cost. He further explained that, before the company was set up, the owners observed that, consumers experienced some difficulties in finding clothes with an accurate fit to their body shapes and were also limited by the standard products that were being offered by clothing retailers. As a matter of fact, most apparel manufacturers were using production processes which were designed to achieve economies of scale through product standardization. [13] study therefore asserted that, on-demand manufacturing could drastically improve the speed-to-market capabilities of the apparel industries in many countries if retailers could embrace it. The operations manager commented that, those companies (clothing retailers) that seek economies of scale and practice standardization, deal with wholesalers whose requirements exceed the minimum order quantities. This obligates other clothing brands to buy beyond what is necessary so as to make a sale. The author thus indicated that, this situation unfortunately leads to excess inventory which results in markdowns, and brand dilution; no serious brand can afford to tread this path. Likewise, the procurement manager stated that, many companies have no problem with buying beyond what is necessary due to the fact that, 70 percent of purchases made by customers are usually based on impulse. With that, when the demanded item is not readily available, no sale will occur. It was further explained by the MD that Royalty by Nanasei's on-demand manufacturing is a win-win situation for both customers and the company; customers get exactly what they requested for and the company is mandated to make exactly what the customer orders. Consequently, this results in little waste, no excess inventory and no accounts receivable risk. Analysts and industry players on noticing this, have started accepting purchase transactions in smaller quantities and identified in strategic location to customers to reduce their delivery time. These arguments were backed by [2] and [14] in their works. Lastly, the MD pinpointed that, part of the company's goals is to fulfil on-demand purchases in quick rotation –with no minimum order quantities and a lead time of 5 working days. He further emphasized that, the target for the next 4 years is to reduce the lead time from 5 working days to 2 days. The average customer lead time was computed with the formula: Lead-Time of Service / Number of Service. From the company's records, the total time of service requests was found to be 3,715 days. As previously mentioned, the number of service requests was 313.Therefore, the lead time: 3715/313 resulted in 11.87days. [16] therefore posited that, a company having knowledge of its average customer lead time can provide a competitive edge for its products and services, play a significant part in demand forecast and have a direct influence on customer satisfaction among others.

Current State of Order-to-Delivery Process

On the current state of the order-to-delivery process at Royalty by Nanasei, it was pointed out by the operations manager that the whole process starts with receiving a purchase order from a customer (via telephone or face-to-face) by the front desk receptionist. During this step, the order clerk records the details of the request (*type of garment, quantity and the size)* in a special order book. The operations managers further clarify that; it is necessary for customers who do not know their clothing size to come in for their measurements to be taken at the production department. A supervisor then enters the information into a master book; archived by management in case the information captured initially is lost, misplaced or miscommunicated among others. The order book is then handed to the operations manager however, if not available, the supervisor keeps it until he arrives. It is worth noting that, the documentation process is estimated at an average of 15 minutes provided the operations manager is available. [7] therefore emphasized that manual data entry is disadvantageous as it puts pressure on people to do double check of their work at all times. It also makes customer queries difficult to respond to –as information is stored in different physical locations and may even require finding the right person to respond. The order clerk then informs the production department of the order request, which take approximately 10 minutes. The operations manager however indicates that, there could be delays in the process due to employees engaging in unnecessary 'small-talks,' as that is the case in many companies. He went ahead to explain that, the order clerk spends the next 20minutes printing the invoices and order request –as he/she has to conduct a cursory verification on the orders. Delivering and explaining the order of request by the order clerk to the production department takes closely to about 30 minutes. Furthermore, the operations manager mentioned that, it is the duty of the fashion designer to design a

specification sheet with which the full design details (measurements, fabrics, printing techniques and supporting images for the garment) are being produced. Through observation, it was determined that it takes approximately 3 hours to complete each specification sheet by the fashion designer. Once the fabrics are determined, it is the job of the courier to procure the necessary materials, fabrics and accessories from the appropriate stores in town. Patterns are then cut out of these fabrics for the specific garment being produced before they are sown together. The sourcing of items by the courier was observed to take an average of 4 hours due to constraints like traffic, quality comparisons, and the unavailability of certain items, while the cutting of patterns takes roughly 3 hours. Undoubtedly, the company has a poor relationship between its suppliers and the management system thus leads to poor delivery times and in some cases, wrong specifications. [17] therefore posited that, one of the ways in which companies can leverage on their relationships with suppliers is to insist on the timely delivery of necessary goods. Accordingly, the head of production stated that, it takes averagely 4 to 10 hours to sew a garment and approximately 1 hour to clean garment meticulously. The quality assurance manager also takes approximately one and half hours to scrutinize the garment and make the necessary corrections if any. On the whole, it takes nearly 4 hours to complete the garment and package it for delivery to the customer. Moreover, the courier takes an average of 3 hours to deliver each garment to a customer. Fig.1 illustrates the current state process of sewing and delivering of garment with a total duration of 22 hours 11 minutes to 31 hours 11 minutes.

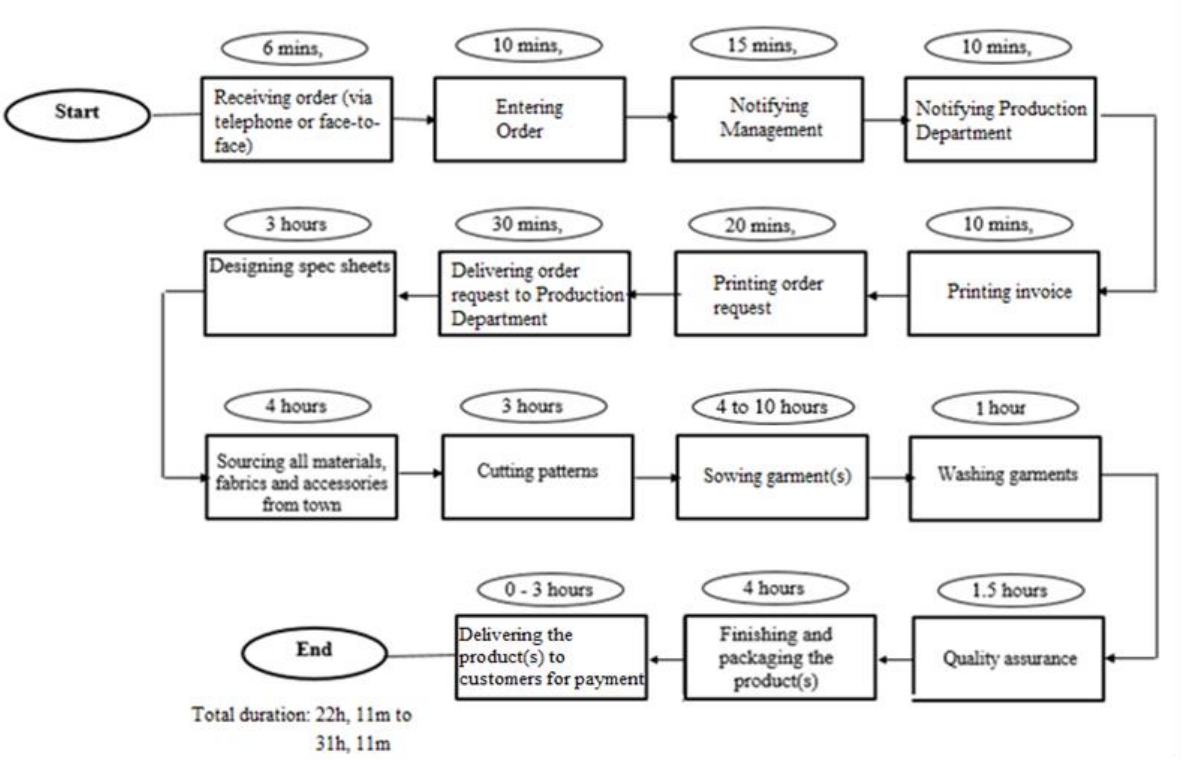

Fig 1: Current state of Royalty by Nanasei's order-to-delivery process

Customers' Expectations

Table 1 below, illustrates a summary of customers' expectations. From the table, 4.1% (12) and 7.5% (22) of the respondents 'Strongly Agree' and 'Agree' respectively to expecting their clothing to be ready the same day they place the order. 8.5% (25) of the respondents were however 'Not Sure' while 54.1% (159) and 25.9% (76) Disagree and Strongly Disagree respectively. The overall interpretation based on the weighted average therefore suggests that, customers are not expecting their clothing to be ready the same day they place an order. With respondents expecting their clothing to be ready by the next working day; 8.5% (25) "Strongly Agree", 10.6% (31) "Agree", 47.4% (139) "Disagree" and 33.4% (98) "Strongly Disagree. The overall interpretation as based on the weighted average (as tabulated in Table 1 below) shows that, customers do not agree to expect their clothing to be ready by the next working day. While 3.4% of respondent were 'Not Sure' if they expect their clothing to be ready within 3 working days, 23.1% (68) "Strongly Agree" and 17.3% (51) "Agree" to expecting their clothing to be ready within 3 working days. Respectively, 50.0% and 6.1% also indicated that they "Disagree" and "Strongly Disagree" to expecting their clothing to be ready within 3 working days. From an overall weighted average of 3.01, it implies that, customers are not sure of expecting their clothing to be ready

within 3 working days. Further demonstrated in Table 1, 65.0% of the respondents indicated that they "Strongly Agree" to expecting their clothing to be ready within 5 working days whereas 17.3% "Agree". However, 11.2% "Disagree" and 6.5% of the respondents "Strongly Disagree" to expecting their clothing to be ready within 5 working days. The overall interpretation based on the weighted average validates that, customers agree to expect their clothing to be ready within 5 working days. Also, as highlighted in Table 1, 75.5% and 24.1% "Strongly Agree" and "Agree" respectively to expecting their clothing to be ready exactly on the date stated by the representative of the company while 0.3% were "Not Sure. The overall interpretation therefore shows that, the customers agree to expect their clothing to be ready exactly on the date stated by the representative of the company. Responses from respondents expecting an online portal to place their orders indicates that, 49.0% "Strongly Agree", 31.0% "Agree", 15.3% "Disagree" and 4.8% "Strongly Disagree". The overall interpretation based on the weighted average recorded confirms that, customers do expect an online portal to place their orders. This section of the paper is key, as according to [17], delivery can make or break a purchase. They further point out that, approximately 50% of consumers will abandon a particular service if they cannot provide the delivery option which suits them. With this in mind, [4] affirmed that, delivery can be a crucial obstacle or enabler to selling. Furthermore, [18] asserts that, service providers that are successful with their delivery of service to consumers are those that have the option for the next day delivery and the ability to set a specific date for delivery.

Table 1: Customers Expectations

Questions	Total percentage of "Strongly Agree" and "Agree"	Total Percentage of "Not Sure"	Total percentage of "Strongly Disagree" and "Disagree"	Weighted Mean	Interpretation
I expect my clothing to be ready on the same day that I placed the order.	11.60%	8.50%	79.90%	2.1	Disagree
I expect my clothing to be ready by the next working day.	19.10%	0%	80.90%	2.13	Disagree
I expect my clothing to be ready within 3 working days.	40.50%	3.40%	56.10%	3.01	Not Sure
I expect my clothing to be ready within 5 working days.	82.30%	0%	17.70%	4.23	Agree
I expect my clothing to be ready exactly on the date stated by the representative of the company.	99.70%	0.30%	0%	4.75	Agree
I expect there to be an online portal to place my order.	79.90%	0%	20.10%	4.04	Agree

Source: Fieldwork (2018)

Future State of Order-to-Delivery Process

The proposed future state of order-to-delivery process was based on the introduction of technology to the process flow; removing the identified non-value added activities and wastes in the end-to-end process flow of manufacturing and delivering garments to customers. This was affirmed in a study by [19] stating that, technology sometimes is needed to advance the lean philosophy of creating more with less resources. The use of online ordering system was introduced in the process flow and a recent study by [3] confirms that, online ordering system is imperative, due to advantages such as easy order processes, accuracy of orders, transparency of order costs, reduction of human errors and monitoring expenses incurred in real-time. In addition to this, [20] found in their study that, in-house software allows a company to achieve and maintain its standards regarding data collection, analysis and reporting through its ability to be customised. Thus, the introduction of in-house software will considerably reduce the waiting time. For instance, the software would be used to

design the specification sheets instead of being designed by hand in the current state. The in-house software would further be integrated into the supplier's system which will generate automatic request for quotation at a re-order level. This would ensure that there are no shortages in the supply of raw materials. Physical delivery of the supplies by suppliers is estimated at one (1) hour from their various locations in the proposed future state. In addition to this, with the necessary fabrics, materials and accessories available, the patterns will then be cut before the garments are sown. After being sown, it will then be cleaned thoroughly before being taken to the quality assurance manager for a thorough inspection. After being approved, the garments will then be taken for finishing and packaging before it is finally delivered to the end customer and payments received. With these new activities, it has been estimated that the total duration of the order-to-deliver process will take approximately between 16 hours 33 minutes to 22 hours 33 minutes.

After having reviewed the current state of order-to-delivery process and customer lead time with the Operations and Production Managers, it was estimated that, considering the workload, it would take the company between 4 and 6 days to complete customer orders. The future state process flow is illustrated in fig.2 below.

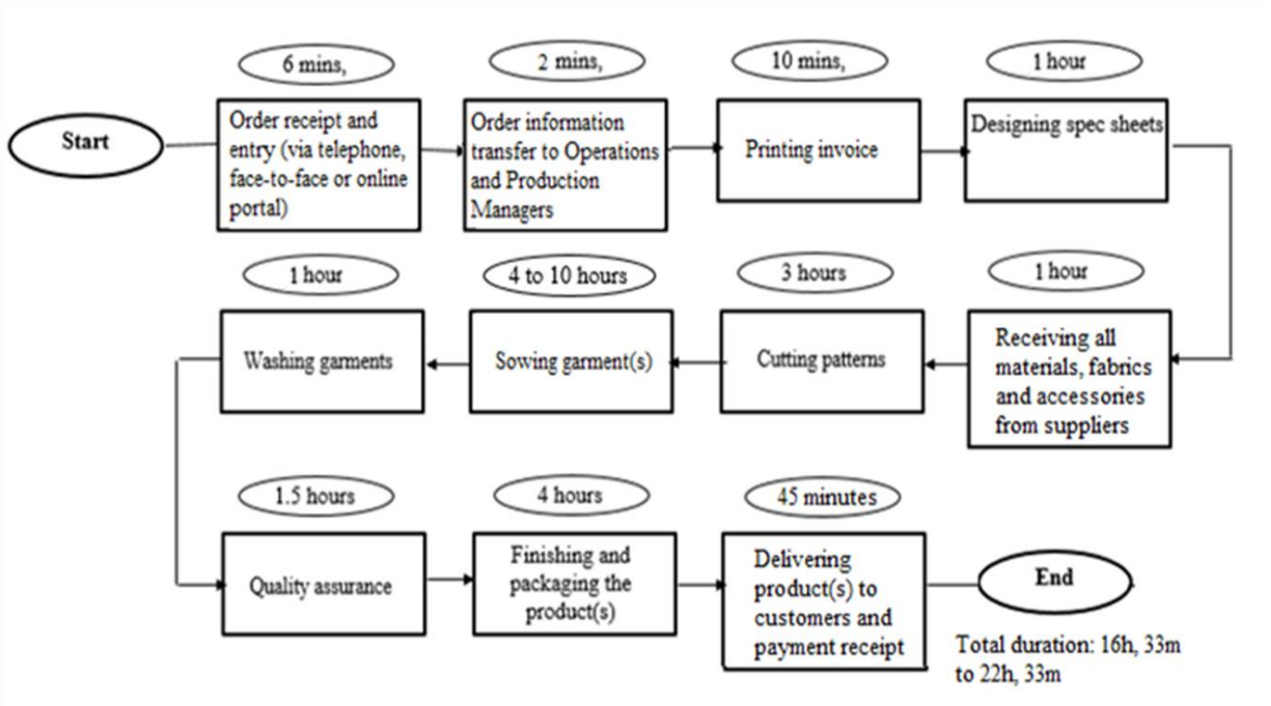

Fig 2: Future State of Royalty by Nanasei's order-to-delivery process

V. CONCLUSION

The overall purpose of this research paper, is to apply lean techniques to reduce customer lead time at Royalty by Nanasei. It was established that, it takes averagely 11.87 days for customers to receive clothing – from the time the customer performs a service transaction. The current state process flow of the company, was revealed through interviews and observations as illustrated in fig.1. The process is made of 15 steps which takes a maximum of 31 hours 11 minutes per garment due to excessive delays. On customer lead times, it was revealed that, customers expect their orders to be ready either 5 working days on average or exactly on the date stated by the sales representative of the company. It was also established that, with the use of information technology (such as computers, in-house software, and an online ordering system), the company could complete a single garment between 16 hours 33 minutes to 22 hours 33 minutes. Finally, it was estimated that in the proposed future state, each customer would receive his / her garment in approximately 4 to 6 days, thus beating the average records of its close competitors. It is recommended that, Royalty by Nanasei should utilize information technology to transfer and record information as opposed to the use of order books or manually transferring information to different personnel and departments of the company. Furthermore, it is recommended that, the company should develop relationships with local suppliers that can deliver fabrics and materials much more quickly and hassle-free than its employees going to town to purchase them. Also the study recommends that, the company should create an online portal enabling customers to place their orders as well as feedbacks on lead-times and payments.

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