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Enhancing logistics and warehouse management for a startup company: Challenges and Opportunities

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Abstract

KANE Watches is a young, small company competing in the watch market. Obstacles in inventory management and logistics activities in the organization required an in-depth study for identifying and presenting proposals on how to improve efficiency.

By using various analytical methods, including ABC with XYZ analysis, RIs, PIs and KPIs measurements combined with cost calculation and market study, a theoretically accurate overview on the overall inventory management and logistics operations of the company was achieved. Based on the overview, weaknesses in sales demand forecasts and bookkeeping were exposed. These were caused by, respectively, lack of reliable data, the inexperience of the person in charge, human errors and outdated procedures.

The result was a series of recommended actions in response to each individual problem and weakness to help strengthen the performance of the company and increase its overall competitiveness. The proposed actions were targeted on improving the demand forecast as well as on a more economical and logical order frequency with EOQ calculation based on the ABC-XYZ combined classification. Furthermore, recommendation for using third-party fulfillment service was put into consideration in addition to expense comparison against the internal-operated service cost.

In conclusion, the proposals served only as a theoretical solution for the problems of the organization. The study also gave grounds for recommending future research on optimization. Any plan for applying the given proposals in actual situations will require consultation with professionals.

Keywords/tags: Inventory Management, Logistics, EOQ, ABC Analysis, Demand Forecast

Miscellaneous (Confidential information)

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1 Introduction

1.1 Reaserch Background:

This Bachelor's Thesis:" Enhancing logistics and warehouse management for a startup company: Challenges and Oppotunities" is writen and implemented as a co-operation between the Thesis writer, JAMK University and KANE Watches. As the company is growing steadily and new models of watch are being added to the provided product's list, the more challenges for maintaining and improving operation activities has surfaced, especially in the fields of transportation and warehouse management. The research achieves quite a lot of interest from the company in the situation where more new SKUs (Stock Keeping Units) are introduced, while improper warehouse control and the lack of demand forecast have built up uneven proportion of stock quantities between variants of product.

To survive in a harsh competition for online selling, or e-commerce, reaching and maintaining high service level is crucial and one of the driven factors to success. And to achieve the above-mentioned conditions, stock level control and transportation/ delivery availability assurance is nothing more than backbones.

Thus, the improvement is deeply related to warehouse and logistics relationship management. In a like manner, balancing the level of stock for each SKUs to harmonize with the new forecast for the upcoming demands, maintaining and improving the relationship with transportation partners in order to lower the cost and higher the availability.

1.2 Objective of the research:

The research mainly focus on identifying the difficulties which the company has to face when expanding the operation, where simple and outdated methods of management are no longer applicable. The cost for logistics activities are significantly high but the result is limited and inefficient, come along with the inaccuracy when it comes to forecasting and maintaining reasonable stock in hand. Solutions and innovative actions are urgently needed to reduce stock keeping and delivering cost, while

maintain and improve service level. Seeing that, the most reasonable way is to reduce the number of slow-moving units while increase fast-moving ones, which affect the production plan and EOQ (Economic Order Quantity). Additionally, it is worth to consider the effect of local and global transport status quo on how to manage the relationship with 3PL provider and private forwarder, which can lead to great decrease in shipping cost.

Consequently, the primary objective of this thesis is to state the difficulties, challenges and advantages predicted to affect the organization's operation, let alone the recommendation for the responsive actions: implement new technical support and management methods, organize business relationship. The objective can be found with more detail in the list below:

- Operation cost calculation (production and order fulfillment) and optimization of B2B and B2C business.
- Discussing the strength and disadvantage which SMEs (in this case the KANE watches organization) faces when organizing and maintaining business relationship with partners (Suppliers and Transport service providers) in the field of watches and suggestion for improvement.
- Development of managing stock and forecasting sales demand

1.3 Supported theory and research methods

In the view of the subject of this study, the basic definition and theory for warehousing, inventory and transportation need to be addressed, besides analytical technique and tools. Those theory is collected through textbooks, published articles and verified online-sources.

The practical experience suggests the implementation of both qualitative and quantitative research methods, which is applied through different parts of the thesis. On one hand, the data retrieved from the company database is mostly numerical, which require calculation and transformation into useful and valuable details, which show noticeable patterns and changes, which also is the characteristic of quantitative method. By way of contrast, the reasons behind the changes affected the company's operation which cannot be determined by number, can be found by systematically

uses a predefined set of procedures to answer the question, collects evidence, study on behavior, opinion and social context, which are the nature of qualitative research method.

For analytic tools, ABC and XYZ analysis are the most reliable and widely used for warehouse and inventory management optimization which most of the time combined together. These techniques are used to determine the importance and necessity of units by combine items within a specific range of characteristics, such as market value, storing cost, product life, etc.

All the above-mentioned methods and theory, combine and compare with data and information achieved from TradeGecko management system, are sufficient enough to give a detail look on the subject of the study and able to come with required actions for inventory improvement and cost reduction.

2 Company and Key Supply Chain Partners:

2.1 KANE Watches:

Founded by Mr. Christopher Rasker on June 2016, KANE Watches is a fashion watch brand inspired by the minimalism movement from Japan, expresses through simple and elegant design by simplifying unnecessary details, only keep the basic function of a watch powered by quartz Miyota movement.

“KANE Watches are designed in the heart of Amsterdam and inspired by the essentialist lifestyle movement in Tokyo, Japan. Essentialism is centered around the idea of removing unnecessary clutter from one’s life and placing focus on what is truly important. In essence, it is all about making more out of less, and this is what KANE Watches offer to anyone who wears them.” (KANE Watches concept)

“The company mission is to create clean and simple timepieces, which through their modular design and select range of styles, represent timeless essentials for every man’s wardrobe.” (KANE Watches Mission)

The work done at KANE guided by the vision of an ideal world from the founder and the company members: “where men are empowered in their individuality and can

confidently express who they are through the watch that they wear. We want to live in a world free of complacency and resignation, where men are committed to personal development and through continuous improvement strive to become the best they can be. (KANE Watches Vision)

2.2 Ritzy Group:

Ritzy is a lead fashion-watch manufacturer with the facility located in Shenzen, China. The company co-operates with some of the most famous fashion watch brands across the Globe (Vincero, Brandfield, etc.)

Ritzy has the ability to provide the brand with different order quantity with competitive manufacturing cost as well as lead time for different demand base on customer's market, seasons, etc. which give them the edge to become a key partner, an important factor to be considered for the development of KANE.

2.3 Flexport as Freight Forwarder:

Founded in 2013, Flexport is a full-service air and ocean freight forwarder, providing a robust platform and end-to-end service for modern logistics teams. Real-time tracking, structured data, shipment-specific communication, and a dedicated team of experts make running your supply chain through Flexport simple, reliable, and accuracy.(https://www.flexport.com/about)

Flexport has a workforce of 600 people with their vision: to turn international logistics into a reliable utility that companies all over the world can depend on to grow their businesses. According to their website and report, Flexport now helps more than 10,000 clients and suppliers manage all aspects of their supply chain operations. With offices on three continents, Flexport team is able to communicate and provide services for different client across the Globe without any difficulty in term of geography (https://www.flexport.com/about)

2.4 Pakketen Fabriek as 3rd-party fulfillment service provider:

De Pakkettenfabriek is a specialist in the field of e-fulfillment.
Their main warehouse in located in Roelofarendsveen (near Schiphol), The Netherlands, where they taking care of the storage, pick & pack and shipment of packages for a wide variety of web stores and brands. They can constantly assist customer to help them the best solutions for different types of products. Whether it concerns sending clothes racks, shirts, special beers or postcards; they also take care of the connection between the check-out in the web store and delivery of the sold product to the customer at the door. (About PAKKETTENFABRIEK).

De Pakkettenfabriek understands the need of the customers in term of e-commerce fulfillment using their own experience. The webshop of the client can be linked directly to their Warehouse Management System while the customer can also maintain their own system without interference. The company also look for the best packaging options, transport service rate and special service (gift cards, special packaging, decoration, etc.)

Several advantages that De Pakkettenfabriek can offer to the customer to improve their operation include:

- Orders arrive automatically from the web shop (Shopify, Amazon, Website) to De Pakkettenfabriek, after which they are packed within 24 hours.
- Real-time insight into the company stock status (which stored in their main warehouse).
- Customers are automatically updated with shipping details, the Sellers can also track the status of the package themselves.
- Orders for retailers or B2B customers can be entered into the system manually or automatically.

De Pakkettenfabriek Customer Support can support and help the customer service for questions and ambiguities or they can also take care of the part for Customer Support (About PAKKETTENFABRIEK).

The company can serve as a helpful third-party e-fulfillment service provide for small and medium size company, decreasing the time and effort used to build and develope their own fulfillment system as well as avoid mistakes that can happen due to the lack of experience which can be found quite frequently in entrepreuner.

The co-operation with De Pakkettenfabriek is under consideration and is a part of the suggested action according to the forecasted cost calculation and comparision to the previous operation using the company internal workforce.

3 Inventory and Logistics Management:

3.1 Inventory management

The objective of inventory management is to make a transition between “inventory” and “information” to become more cost-effective. In order to accomplish the objective, the information have to be timely, accurate, reliable and consistent.
(Viale, J. David. 1996). The main purposes for the management application is to help increasing customer service, product availability, cut down the cost for storage and improve the efficiency of purchasing operation.

According to Krichen, Saoussen, and Jouida, Sihem Ben. 2015, Inventory management is a series of activities involves monitoring the level of stocked goods of the company as well as its flow:” from the suppliers to the set of intermediate warehouses” (Chap 5.2, pg 58).

3.1.1 Forecasting:

Demand forecasting is considered a crucial part of business operations in every sector. The main target of the whole forecasting activity is to come up with the most reliable data of the upcoming period, including demand, trends, and other information that might be useful for gathering the organization’s future strategy. In fact,” Using advanced analytics, companies can now sense demand signals associated with consumer behavior patterns and shape future demand using predictive analytics and data mining technology. They can also measure how effective their marketing campaigns are in driving consumer demand for their products and services, and therefore

they can optimize their marketing spending across their product portfolios. As a result, a new buzz phrase has emerged within the demand forecasting discipline: sensing, shaping, and responding to demand, or what is now being called demand-driven forecasting" (Chase, 2013, pg.2). As a result, for all those mentioned improvements, demand forecasting is now being seen as the key driver for the development of supply chain. According to Chase (2013), forecasting is now focus on predicting and stimulating the result for upcoming demand, not only react, or counter to the change in market behaviour.

Also he noted that "New enabling technologies combined with data storage capabilities have now made it easier to store causal factors that influence demand in corporate enterprise data warehouses; factors may include price, advertising, in-store merchandising (e.g., displays, features, features/ displays, temporary price increases), sales promotions, external events, competitor activities, and others, and then use advanced analytics to proactively shape future demand utilizing what-if analysis or simulations based on the parameters of the models to test different marketing strategies."(pg.2)

Exponential Smoothing forecast

Exponential smoothing is one of the most effective and robust methods for time series forecasting (Kolassa, Stephan, and Enno Siemsen, 2014).

In a general term, the index t described the time-period of a time series with the forecast level in each period t according to exponential smoothing expressed by the following equation:

$$S_{t+1} = S_t + \alpha\epsilon_t \,,$$

where ϵ_t is the forecast error (actual - forecast) for period t.

Figure 1. Single Exponential Smoothing equation

the coefficient alpha, or α, is a smoothing parameter and fall between 0 and 1. The higher α, the higher the weight given to the result to contradict the previous data

when calculating a prediction. The lower α, the more the predicted result is calculated based on the whole sales demand data in the past without heavily discounting previous data.

The Forecast Error in period t is calculated as the difference between the actual demand in that period and the forecast made for the same time (Kolassa, Stephan, and Enno Siemsen, 2014)

$$\text{Forecast Error}_t = \text{Demand}_t - \text{Forecast}_t$$

Figure 2. Forecast error formula

Chase (2013) stated that:" Three well-known exponential smoothing (ES) methods are widely used in most software packages and solutions:

- Single exponential smoothing (explained above)
- Holt's two-parameter: Since the single exponential smoothing could not keep up to the accuracy when there is a trend, therefore a second equation is introduced with a second constant, **γ**

$$S_t = \alpha y_t + (1-\alpha)(S_{t-1} + b_{t-1}) \quad 0 \le \alpha \le 1$$

$$b_t = \gamma(S_t - S_{t-1}) + (1-\gamma)b_{t-1} \quad 0 \le \gamma \le 1$$

Figure 3. Equations for double exponential smoothing

- Holt's-Winters' three-parameter (Tripple Exponential Smoothing): This is, again, the expansion from the Double Smoothing. A third equation is added to balance the effect of seasonality. **β** (third constant), the same as **α** and **γ**, has to be chosen in a way that the Mean Squared Error (MSE) is minimized. Finally, the equations of this method is expressed as below:

$$S_t = \alpha \frac{y_t}{I_{t-L}} + (1-\alpha)(S_{t-1} + b_{t-1}) \quad \text{OVERALL SMOOTHING}$$

$$b_t = \gamma(S_t - S_{t-1}) + (1-\gamma)b_{t-1} \quad \text{TREND SMOOTHING}$$

$$I_t = \beta \frac{y_t}{S_t} + (1-\beta)I_{t-L} \quad \text{SEASONAL SMOOTHING}$$

$$F_{t+m} = (S_t + mb_t)I_{t-L+m} \quad \text{FORECAST},$$

Figure 4. Tripple exponential smoothing ("Holt-Winters" (HW) method) equations

- y is the observation
- S is the smoothed observation
- b is the trend factor
- I is the seasonal index
- F is the forecast at m periods ahead
- t is an index denoting a time period

Figure 5. Annotation for equation symbols

Although all these methods are available in most demand forecasting solutions, Winters' three-parameter exponential smoothing is the most widely used based on benchmarking surveys conducted by several forecasting trade organizations." (pg.143). However, he also included that based on his own experience, the three mentioned methods seem to work the best when it comes to demand forecast with limited parameters and data because of the accuracy they provide in identifying and predicting trend/cycle, seasonality, and unexplained error, which is the most suitable for KANE situation with limited history of sales and demand.

Misconception affect the accuracy of forecasting:

Improvements in demand forecasting accuracy have been a key ingredient in allowing companies to gain exponential performance in supply chain efficiencies. Unfortunately, demand forecasting still suffers from misconceptions that have plagued the discipline for decades and have become entrenched in many corporate cultures. (Chase, 2013)

The core misconception that has troubled companies for years is that simple forecasting methods, such as exponential smoothing, which measure the effects of trend, seasonality, and randomness (or what is known as unexplained randomness, or noise), can be used to create statistical baseline forecasts and enhanced (or improved) by adding gut-feeling judgmental overrides (pg. 3)

Another misconception, according to Charles W. Chase, is the needs of the responsible person or department who make the judgmental overrides shape the political bias which influencing the decision.

To conclude, Chase wrote about those misconceptions as they are ”difficult to overcome without a great deal of change management led by a corporate “champion.” A corporate champion is usually a senior-level manager (e.g., director, vice president, or higher) who has the authority to influence change within the company.”(pg. 4)

3.1.2 Purchase Order Consideration

In 2010, Thukaram in his publish noted that ”In connection with fixation of various levels for materials, the term ‘lead time’ refers to the time required for the whole procurement procedure and ‘delivery time’ refers to the period which is required for execution of orders by the suppliers, i.e., from the time the order reaches the supplier till the commodities are dispatched to the purchaser” (pg.141).

Lead time: the time period allowed to complete an operation/process to manufacturing an item, which include time to prepare and process the order, queue, setup and run time, etc. until the finished goods are recorded as stored in the inventory or shipped.

Delivery time: defined as the time between when an order is placed to the manufacturer until the order is delivered to the recipient.

For conclusion, when considering placing an order, it is necessary to take into account the time it will take to prepare, produce and receive the shipment to ensure while the production process is made, the stock is still sufficient and there is low to no possibility of stock-out.

3.1.3 Economic Order Quantity (EOQ)

Based on their study in 2015, Krichen and Jouida expressed:" The problem for inventory management is, when ordering supplies, to determine what quantity of a given product to order. Many formulas and algorithms have dealt with this problem. Of these the simplest formula is the most used (EOQ) or Lot Size formula" (pg.60)

According to Thukaram (2000), the Economic Order Quantity (EOQ) help managing the inventory by deciding most economical and logical quantity of product for purchasing when new batch of supplies is required.

Input data:	***Output data:***
q the ordered quantity	TC the total cost
d the annual demand	EOQ the optimal order quantity
a the fixed ordering cost for each order	T the order cycle time
h the unit holding cost	N the number of orders
p the purchasing cost	

Figure 6. Input and Output data for Inventory Management

The quantity for purchasing products in one purchase order:" is affected by two conflicting cost, termed as ''Ordering cost'' and ''Cost of carrying the inventory''. The two cost is then explained in the following part.
Ordering cost, by the definition, is the cost for placing a purchase order, which can be again divided into 2 component costs:

- Fixed ordering cost (include salary, rent, service fee, etc.)
- Variable ordering cost (document cost, stationery, shipping, etc.)

Cost of carrying the inventory or holding cost:

There are several important components combined to form the total cost of holding inventory:

- Investment cost
- Storage cost (This cost consists of rent, salary for staff – handling and organizing, bill of electricity used, maintenance expenses for the inventory room, and equipment costs)

- Wastage cost (include deterioration and damages, obsolescence and handling losses. The cost of foregone liquidity is also counted)
- Miscellaneous cost (insurance, pilferage, etc.)

The above-mentioned costs are not the only thing and can affect the determination of EOQ. There are a few more cost that need to be considered before a decision is made:

- Stock-out (or outage) cost: this cost appears when there is an event occurred and interrupting the production of the items to ensure the continuous operation of the business. ”Stock-out cost includes the additional cost of an expensive substitute, delayed production cost and customer’s dissatisfaction owing to the use of inferior item. If customers reject such goods the cost of waste product is also treated as stock-out cost**.”** (Thukaram, 2000, pg.147)
- Systemic cost: This is a side cost arises from stock-out cost. As mentioned above, this include the additional cost of emergency purchases which certainly appear such as higher rates, increased transportation costs, cost of job rescheduling, set-up cost, etc. correspond to the limited reaction time.

As Thukaram noted in his study:” The cost of carrying inventory will be less when the quantity of materials bought is also less and vice versa. Therefore, EOQ is a problem of balancing the two conflicting kinds of cost, i.e. the cost of ordering and cost of carrying the inventory. The EOQ is taken at that level where the total cost of purchases must be the lowest which is possible when the cost of ordering is equal to cost of carrying the inventory” (pg.147)

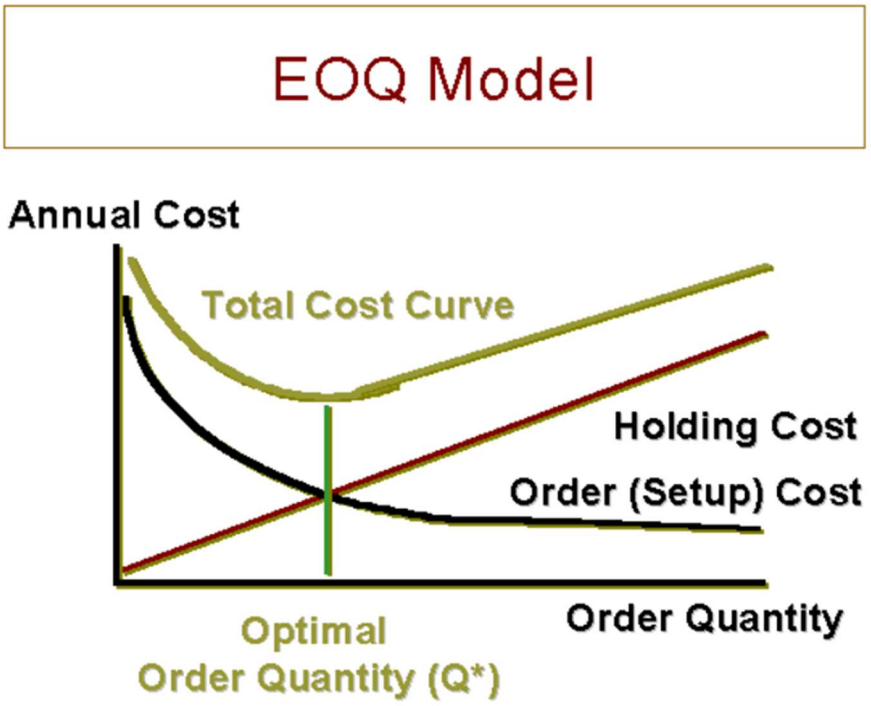

Figure 7. Illustrating graph of EOQ concept

The EOQ formula can be express with the following equation:

$$EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

D = Annual demand (units)
S = Cost per order ($)
C = Cost per unit ($)
I = Holding cost (%)
H = Holding cost ($) = I x C

Figure 8. EOQ formula

3.1.4 E-Procurement

In the book Supply-Chain Management: Theories, Activities/Functions and Problems, 2011, the author Regina M. Samson stated that the procurement management is considered one of the most crucial and valuable parts in supply chain management.

In the current world of digital evolution and the tradional shopping is dominated by online-shopping, or in another word, e-commerce purchasing, she stated:" the complexity and levity of procurement management is on a great rise because customer demand and market have changed more and more rapidly. E- procurement or e-purchasing (EP), which utilizes the modern information technology (IT) especially e-marketplace (EM), appears in recent years." (pg.39). Also, according to her research, the process of E-procurement can help reducing transaction cost while increasing the efficiency and transparency compare to the traditional procurement, which then will also:" improve the whole operation efficiency and competitive advantage of supply chain" (pg.39). For the conclusion, e-procurement and e-marketplace is seen to be an important steps forward and become the main focus of supply chain management, demand much more appreciation "as the most valuable parts in supply chain system" (pg.39).

Regina M. Samson, through her study, classified the current e-procurement practices into two types by separate them based on the number of involved parties:

- E- procurement activities performed directly between buyer and supplier, such as procurement through value-added network (VAN) or electronic data interchange (EDI) (pg.39);
- E-procurement activities through e-marketplaces, where the implementation for such activities is inexpensive and many related costs are excluded or eliminated (required system, training and human resources cost, etc.)

Acording to the author opinion, the market-entry barrier for e-procurement strategy is reduced greatly, which might cause by the innovation of technology, helping a considerable number of small and medium-sized suppliers can easily negotiate and complete deals with the core member and other members of supply chain directly and inexpensively. "Therefore, the e-procurement strategy based on e-marketplaces is welcomed by many enterprises, especially small and medium-sized enterprises (SMEs)." (pg.40)

3.2 Fulfillment

Order fulfillment is, by definition, the steps involved in receiving, processing and delivering orders to the final customers (Steve Bulger, 2013). It contributed an important part in the development of the company and the result and performance can be used as a measuring indicator for management and improvement purposes.

The cost for order fulfillment also accounting for a significant portion of total operating costs. The fulfillment cost can be broken down into several different segment:

- Picking and packing cost
- Packaging cost
- Delivery cost

Picking and packing: the cost for this activity is due to the labor cost and average time consumed for the activity to be done. This could be calculated by using average payment rate for human workforce, multiply by the time period consumed to pick and pack a shipment. The cost will vary between company due to the differences in salary and allowance. The cost also takes into account the number of different SKUs and the quantity of each type in an order or shipment because of the variation of time needed to locate and retrieve the items.

Packaging cost: This cost is obtained by using purchasing data of the company. The cost may include the purchase price of boxes with many dimensions used for orders with different quantities, small but necessary items such as tape, void fill material.

Delivery cost: this cost is one the most important cost when it comes to the business of online sale/e-commerce. The cost is determined mostly by the negotiating ability and sales demand of the company. It also depend on the nature of the product which the company offers to the customer because the price and rate given by the delivery service provider will be calculated directly base on the volume, weight and dimension of the package.

Watch companies, KANE Watches in particular, have the advantage in this cost due to the small size and low weight of the product (watches).

More details and cost calculation will be given in following chapters.

4 Analytic tools

4.1 KPIs and Performance Measurement

According to Parmenter (2015), there are four types of performance measures, which falls into 2 different categories: result indicators (RIs) and performance indicators (PIs).

”The term result indicators to reflect the fact that many measures are a summation of more than one team’s input. These measures are useful in looking at the combined teamwork but, unfortunately, do not help management fix a problem as it is difficult to pinpoint which teams were responsible for the performance or nonperformance” (pg.3, Parmenter, 2015) which means the indicator is suitable for overall assessment, with different teams and contributors work together to achieve the result served as the base for the measurement. The result indicator is not fit for indicating individual performance. However, due to the fact that the company is smalls and the human resources is extremely limited, RIs and KRIs are still very important and are contributed as a crucial part of this thesis to pinpoint and improve the operation of the logistics and supply chain activities of the company.

Continue in his study, he later noted:” Performance indicators, on the other hand, are measures that can be tied to a team or a cluster of teams working closely together for a common purpose. Good or bad performance is now the responsibility of one team. These measures thus give clarity and ownership.” (pg.3). Along with RIs and KRIs, Performance Indicators and Key Performance Indicators are vital to find the bottleneck in the company activities. Monitoring and managing the performance of each individual to find the best possible solution to increase to productivity and effectiveness.

Parmenter also give the definition of each indicator and point out the differences between them, clarify the misunderstanding or confusing they may cause:

”1. Key result indicators (KRIs) give the board an overall summary of how the organization is performing.

2. Result indicators (RIs) tell management how teams are combining to produce results.

3. Performance indicators (PIs) tell management what teams are delivering.

4. Key performance indicators (KPIs) tell management how the organization is performing in their critical success factors and, by monitoring them, management is able to increase performance dramatically." (pg.4)

While RIs and KRIs focus mainly on the result of the company, which directly show how well/bad the organization perform in term of financial aspect, the KPIs and PIs are more point toward the effectiveness of how work is managed and executed by individuals.

All of them, combine and interact with each other, give a full look at the operation of the organization scenario and help the monitoring and managing easier and much more effective.

Using information and statistic retrieved from the company's database, a fair and highly accurate calculation on the cost and effectiveness in term of logistics and supply chain operation of the company can be done along with an estimated result when the suggested actions go into the implementation.

The criteria used for comparison will be:

- The effectiveness of forecasting between the old method and the improved method, based on sales history.
- The cost of picking, packing and delivering by the company versus the outsourcing to the 3rd-party fulfillment.
- EOQ calculation and the impact of frequent order, including international shipping and importing on the company financial aspect.

The above-mentioned comparison will give a more clearly look on how change can affect the whole system and increase or decrease the effectiveness of the operation and the productiveness of the company.

4.2 ABC Analysis:

In the nineteenth century, Pareto, an Italian Philosophy introduced a concept:" based on the principle "Vital few-Trivial many"" (pg.137, Thukaram, Rao , 2000). The concept originally used to illustrated:" the fact that most of the wealth in Italy was owned by a small proportion of the population" (pg.137). ABC Analysis was found based on the same principle: "On an analysis of materials consumption in all factories it is revealed that about 80 per cent of total value of issues accounts for 20 per cent of the items. So this technique is sometimes expressed 80 : 20 rule." (pg 137) When using this technique for material and stock control, stock keeping units (SKUs) are classified into three different categories: A, B and C. According to Thurakam, each category has their own characteristic and can be expressed as the following: Category A SKUs have small quantities but account for a large share of total value, which is " the vital few from a financial point of view"(pg 137). SKUs from Category B have a medium quantities with medium usage value can be seen as normal items. And finally Category C SKUs: they have relatively high stock with low usage value, defined as the trivial many.

Category	Percentage of items	Percentage of overall value
Class A-items	5-25%	40-80%
Class B-items	20-40%	15-40%
Class C-items	40-75%	5-20%

Figure 9. Categorized items in ABC classification

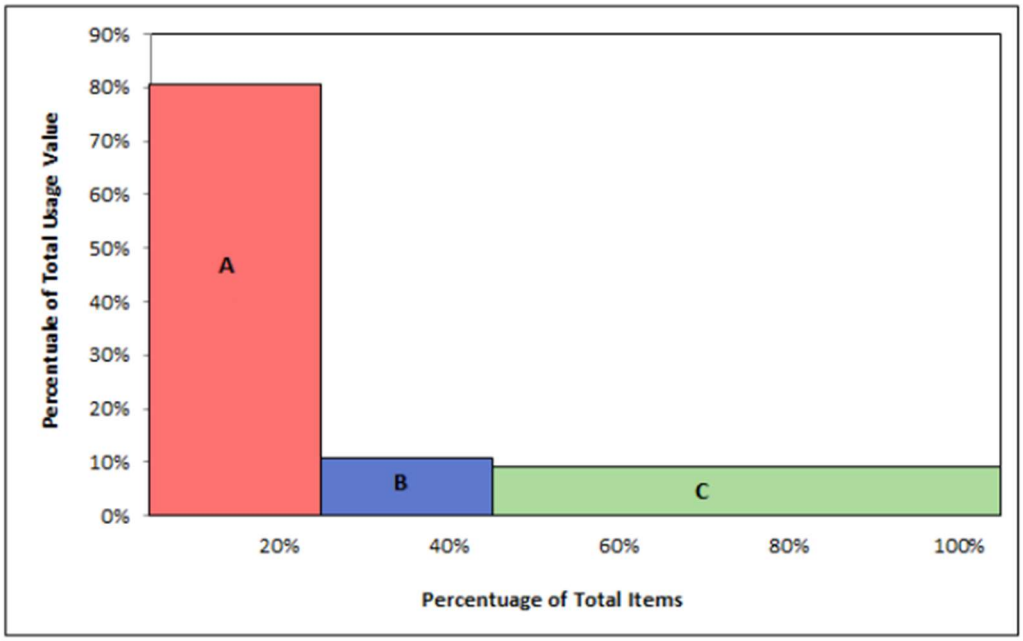

Figure 10. Example Chart for proportion of item classes in ABC classification

Because of the different in characteristics of the items from the above-mentioned categories, ”a strict control is exercised over ’A’ category material, perhaps under the supervision of an experienced person, a moderate control is exercised over ’B’ category materials and relatively lesser degree of control over ’C’ category materials.”(pg 137). Thurakam also present a suggested policy guildlines which can be established according to each categories once the analysis has been done as the table below:

From the point of view	*'A' Items*	*'B' Items*	*'C' Items*
1. Degree of control	Very strict control	Moderate control	Low control
2. Safety stock	No safety stock	Low-safety stock	High-safety stock
3. Ordering	Frequent ordering	Once in 3 weeks	Bulk ordering once in 6 months
4. Periodicity of control	Weekly control statements	Monthly control reports	Quarterly control reports
5. Value analysis	Rigorous value analysis	Moderate value analysis	Minimum value analysis
6. Forecasting	Accurate forecasting and planning	Estimate based on past data and present plans	Rough estimates
7. Lead time	Maximum efforts to reduce lead time	Moderate efforts	Minimum efforts

Figure 11. Example of policy guideline for ABC analysis (Thukaram, 2000)

4.3 XYZ analysis:

XYZ Analysis is a method to classify items in the inventory system based on the ability to forecast, in other word, the variability of the consumption/demand of the items.

The items, similar to ABC analysis, are categorized into 3 different categories; X, Y and Z.

- X-items have their characteristic of steady turnover, which make forecasting for future demand is easy and reliable. Can be express as very little variation
- Y-items have some variation, which indicate unsteadily demand. However, the forecast for items in this category can also be predicted but the accuracy is not very high because the fluctuation of their consumption is due to know factors such as seasonal change, lifecycle of the item or the competition within the market, etc. which can be foreseen and adjusted but with limited precision.
- Z-items are items/SKUs that have the most variation. The demand for items in this category can be extremely fluctuated with no trend or known factor involved or influenced, which make a reliable forecasting is almost impossible.

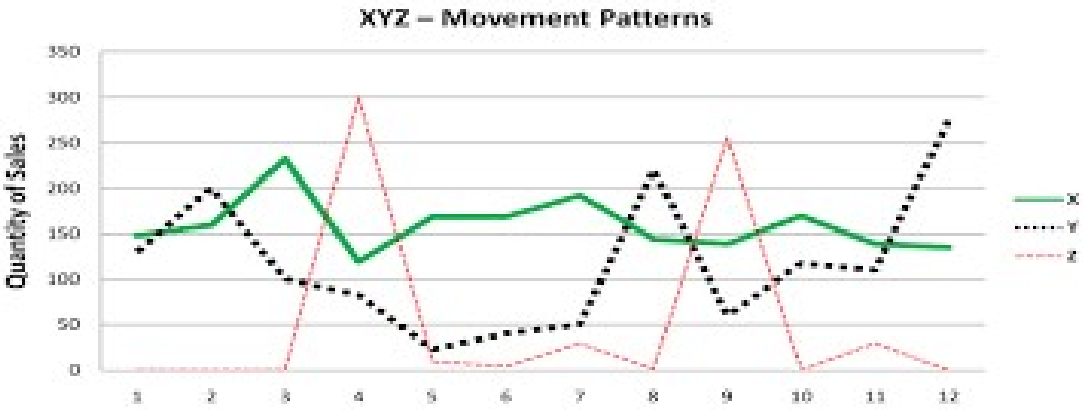

Figure 12. XYZ movement pattern (Milan Stojanović, Dušan Regodić The Significance of the Integrated Multicriteria ABC-XYZ Method for the Inventory Management Process, Vol. 14, No. 5, 2017)

5 Current situation, challenges, opportunities and suggestive actions

5.1 Current situation, challenges and opportunities:

5.1.1 Company:

As the company has limited financial resources for investing in large and up-to-dated warehouse and storing system, storage has and always been a problem. From the beginning since the company was founded and continue until the recent month, a small stock room within the same building as the office has been used as a temporary stock location, where product in different categories is stored as the place. Due to the fact that the company is using hand picking and packing with write-down check list. It is possible, and also frequently to have human mistakes while performing the act. Those above mentioned reasons are the main reason for an increase in stock keeping cost, as well as a significantly low accuracy of bookeeping record for stock quantity. The result is low availability and customer service level, high stock keeping cost, directly hurt the company financially and reputationally

Another problem most of the small and medium enterprises (SMEs), include KANE Watches, face when it comes to the shipping is the volume, which is the main key when negotiating with courier company to acquire or maintain a good rate or import/export tariff. The volume of shipping (usually measured as package or shipment per day/month) which a company can offer to its delivery partner is calculated base heavily on the sales history and demand forecast, which has a considerable variable depending on the forecasting method and available sales data (as mentioned in part 3.1). For KANE watches, the company has been able to maintain a relatively good relationship with different delivery and shipping service provider, both large and small enterprise (UPS, FedEx, DHL, Skynet, KDZ, etc.) to achieve the best rate possible.

However, since the KANE Watches has a wide range of option for delivery, it has become a problem when it comes to narrow down and build a strong core relationship with only one or two service providers. In one hand it helps the company to have several options for different shipping destinations. In the other hand, it limits the

ability of the organization to truly commit to one or two key partners and over-complicating the procedure for delivering the package due to the fact each courier has their own system and procedure to deal with shipments.

5.1.2 Market

The increase in number of fashion-watch brands, along with the competition between traditional watchmaking and fast, mass producing China-based Quartz watch company significantly add up to the market saturation, which make it much more difficult for young, start-up company to account for a part in the market share. The main competitors for fashion-watch powered by Quartz movement, such as MVMNT, Vincero, Daniel Wellington, etc. have been around for a considerable amount of time (five to six years) and have already built a respectable reputation due to their large investment in marketing and branding.

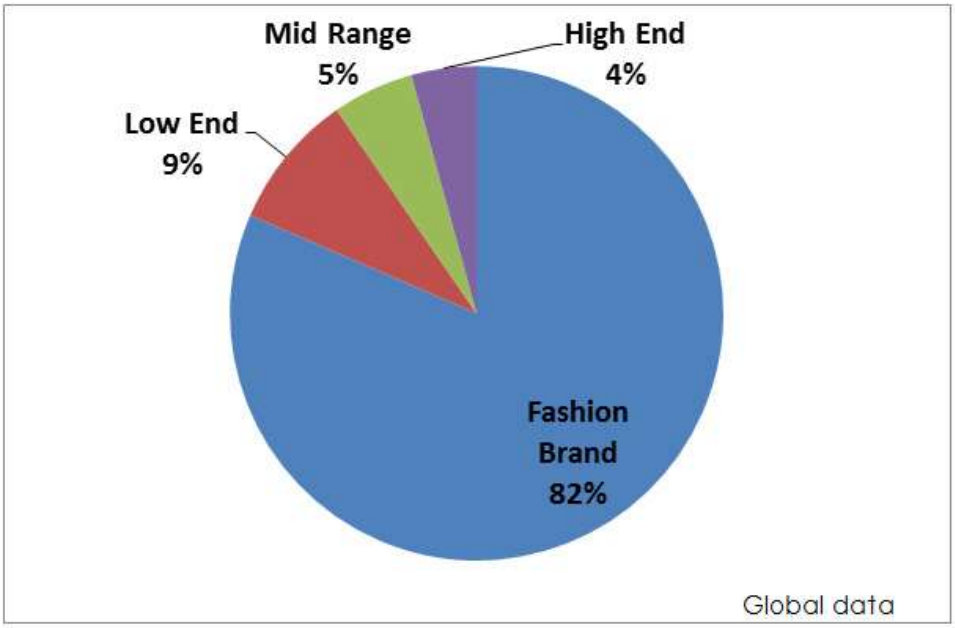

Figure 13. Total Units of watches Sold worldwide. Colin, Global luxury watch and UK watch repair market article , 2 November, 2014, http://www.great-british-watch.co.uk/global-luxury-watch-and-uk-watch-repair-market/

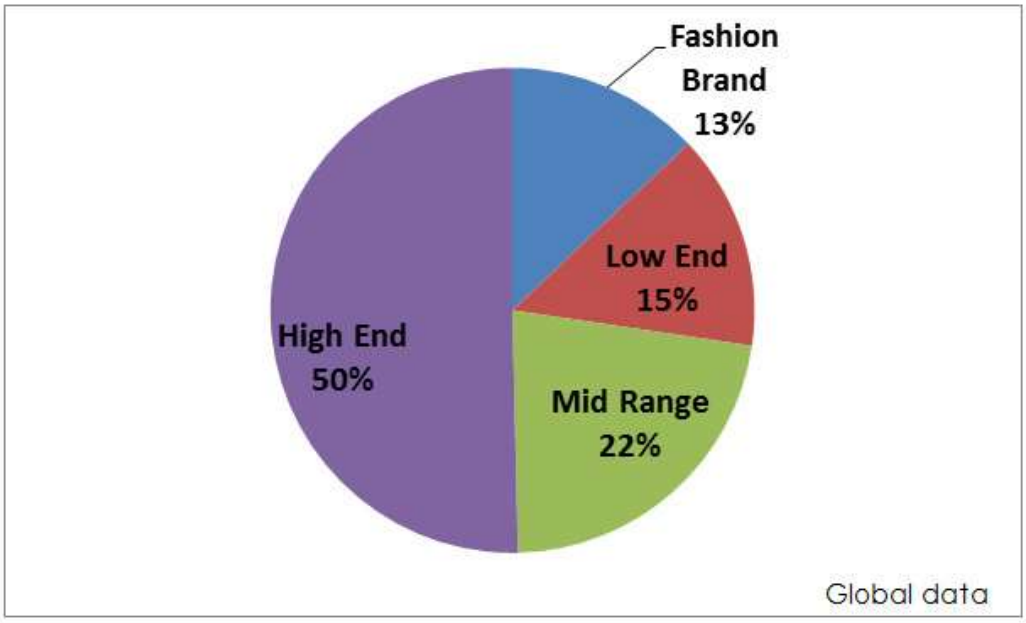

Figure 14. Total value of watches sold worldwide. Colin, Global luxury watch and UK watch repair market article , 2 November, 2014, http://www.great-british-watch.co.uk/global-luxury-watch-and-uk-watch-repair-market/

The classification for watches can be explained with characteristics as below:

Fashion watches:

- < $500
- Fashion / Sports Brands
- Mass Production
- Quartz or Automatic Movements made in Asia
- Average Industrial Craftsmanship Quality
- Usually have Mineral Crystal
- Usually not worth servicing except for battery

Low-end watches:

- $500-$1,500
- Some Heritage/Pedigree
- Mass Production
- ETA Automatic Movements, some Quartz
- Basic Craftsmanship Quality

Mid-range watches:

- $1,500 - $5,000
- Average Heritage/Pedigree
- Mass Production
- Good Automatic Movements, frequently ETA
- Good Craftsmanship
- Occasionally use Precious Metals and Stones
- Sapphire Crystal

High-end watches:

- Over $5,000
- Respected/Superb Heritage/Pedigree
- High resale values
- Brand recognition by greater public
- Complex Quality Automatic Movements, most In-House
- Great/Impeccable Craftsmanship, often Handmade in high-price range (over $10,000
- Precious Metals and Stones
- Sapphire Crystal

According to the Global Watch Market 2017-2021 from Technavio published on January 2017, ”high demand for Swiss luxury watches is boosting sales and the market is expected to reach a Compounded Annual Growth rate (CAGR) of more than 7.6% during the forecast period. Rise in disposable income and a burgeoning upper middle class in emerging countries such as India, China, and Brazil is contributing to market growth”. ”Manufacturers are also entering the e-commerce scenario by setting up their own e-boutiques. Online sales of watches have witnessed considerable growth and the trend is expected to continue during the forecast period.”

Watch market is divided into 2 segments according to 2 different movements used in the timepiece:

- Quartz-powered Watches
- Mechanical-powered Watches (including manual and automatic movement)

Also from the report, the quartz segment of the market was considered to be worth nearly 40 billion US dollard in 2014. Quartz-powered watches have a relatively low cost for maintenance and are usually fit for daily use. ”The quartz segment is further classified into analog and digital. Analog quartz watches are considered a fashion accessory, while digital watches are gaining popularity in emerging countries.” (“Global Watch Market 2017-2021.” Technavio New, Technavio, Jan. 2017)

Brands have their own distribution channels with different methods foor presenting and selling their product. These include:

- Specialist retailers
- Departmental stores
- E-commerce / online store

There are four key regions in the watch market:

- APAC (Asia-Pacific)
- Europe
- North America
- ROW (Rest-of-the-World)

From the same report, APAC countries are accounted for the largest share of the market. ”Growing number of HNWIs, rapidly growing upper middle class, growing interest of consumers in luxury products, large portfolio of products, innovations, and new product launches are expected to fuel the growth of the market in APAC during the forecast period.” (“Global Watch Market 2017-2021.” Technavio New, Technavio, Jan. 2017)

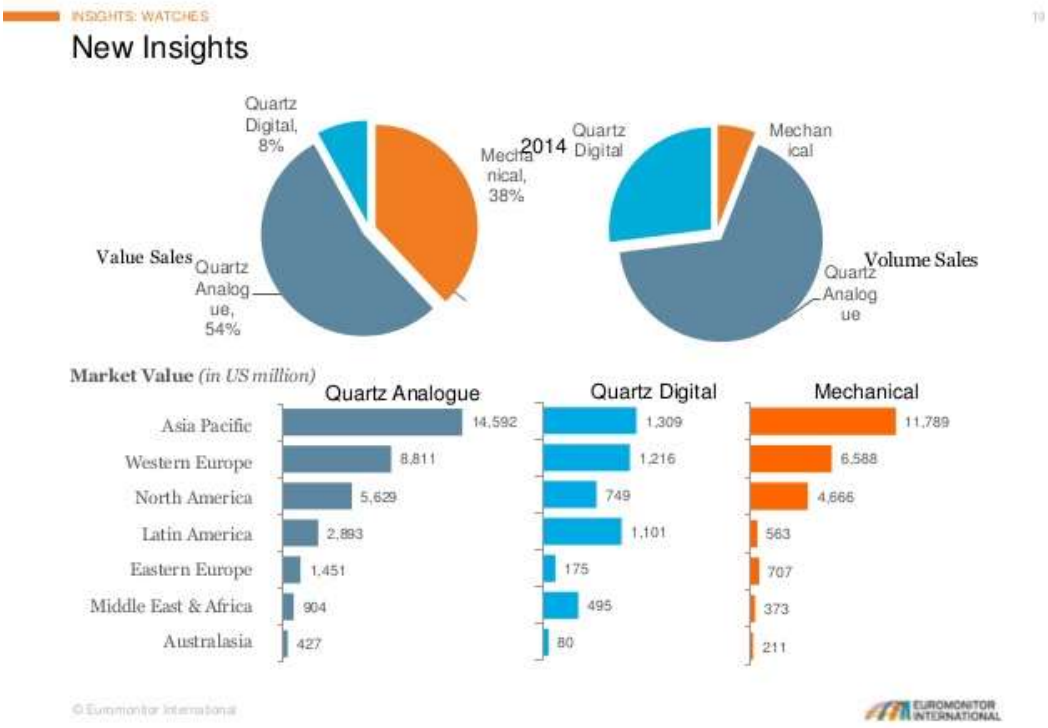

Figure 15: State of the Personal Accessories Market in 2015.

The forecast shows the APAC countries is expected to growth steadily fast during the forecast period and continue to dominate the global watches market, accounting for an approximately 49% share in 2019. Other regions, including Europe and North America are expected to still grow but with a slower rate.

There is an intensive competition between brands and company that has begun for a really long time for a share in the global watches. Each organization has their own pricing strategies and R&D funding, encourage to create new innovation and technology to offer for customers which play a significant role as the driven force for the growth of the market. As the cost for this is undoubtedly high, the result is ”the market is dominated by a few leading players” (“Global Watch Market 2017-2021.” Technavio New, Technavio, Jan. 2017).

From the same report, we have the list of the top five leading vendors in the market, which include:

- Fossil
- LVMH
- Richemont

- Rolex
- Swatch Group

Beside those dominating group, there are other promising vendors which also accounted for a large share of the market. A few name can be mentioned including AP (Audemars Piguet), Burberry, Chanel, Citizen, D&G (Dolce & Gabbana), PP (Patek Philippe), Titan, Timex, Seiko and Casio.

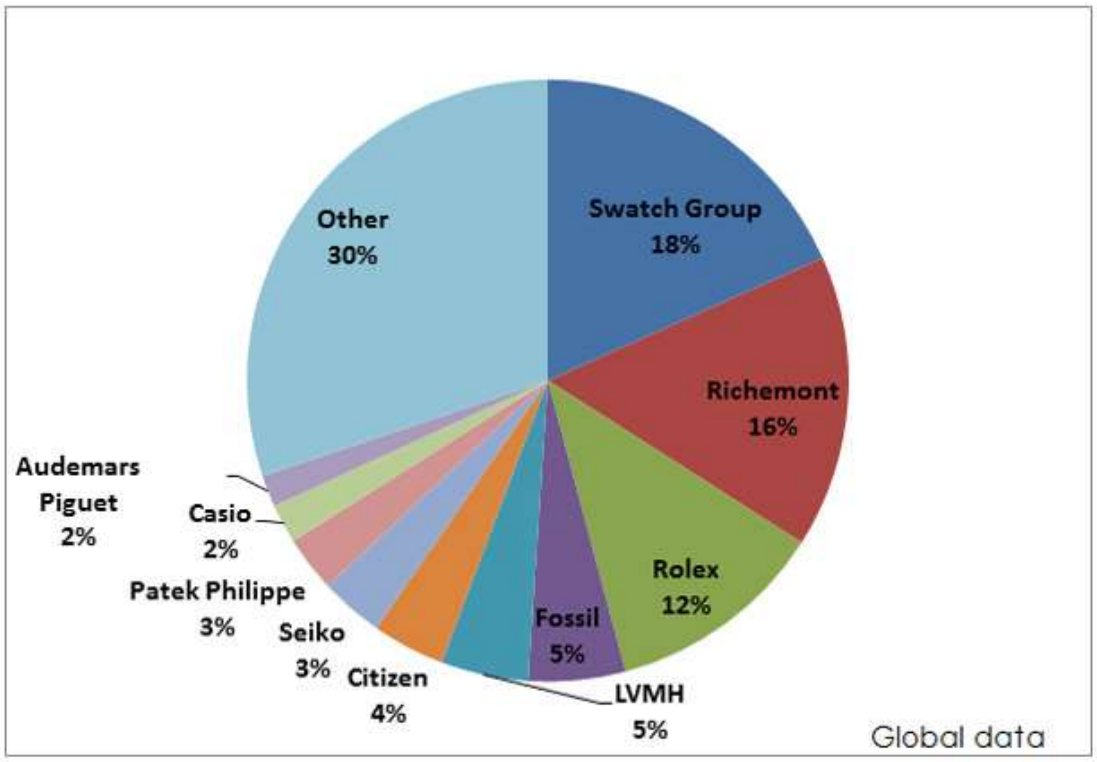

Figure 16. Watch brands market shares.

As presented in the section above, the low availability in the remained share of the market limit the chance for new companies (in this case KANE Watches) to join in, create and develop their own brand recognition or customer appreciation, which is vital for the future improvement and development of the competitiveness of the brand in this particular market for watches.

In the contrast of the market demand, the supply for fashion watch production is plenty with high availability and flexibility in term of both product variant and order quantity, which give the edge for SMEs to decide their best practice to deal with the change in market trend and demand.

5.2 Data Analysis and Suggestions

5.2.1 ABC and XYZ analysis:

Items in the inventory of KANE have been classified base on the definition of item's class with ABC and XYZ analysis method, including watch cases and straps, visual merchandises, packaging material and stationery.

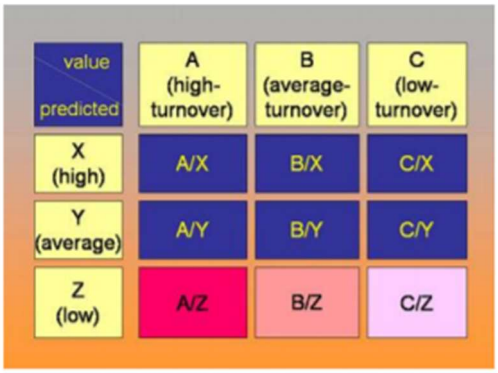

Figure 17. Combination of ABC and XYZ analysis

First, items are categorized into A, B and C group base on their individual quantity and value compare to the total number as the table below.

	No. of SKU	Quantity (individual items)	% total quantity	Value	% total value
A-items	18	7929	34%	€ 205,380.00	88%
B-items	9	294	1%	€ 21,830.00	9%
C-items	12	14937	64%	€ 5,975.00	3%

Figure 18. ABC classification for KANE items

Then an analysis on the sales history include sold quantity combine with sales value of each individual product, along with demand for non-selling items needed for the normal activities of the organization's operation is done with the result: a table combine ABC and XYZ classification with different groups of items based on the characteristics and sales performance has been established to give a better look on the importance and necessary of each unique object.

	A-item	B-item	C-item
X-item	Best-selling watch case and strap		Essential packaging material
Y-item	Other watch cases and straps	Displayed visual merchandise	Non-essential packaging material
Z-item		Stationery	

Table 1. SKUs classification based on ABC and XYZ analysis

The process is done to increase the accuracy of demand forecasting, minimize the chance of stock-out for essential item, thereby maximize the service availability and profit for the company.

5.2.2 Sales demand analysis and customized forecasting:

Looking at the history sales data retrieved from TradeGecko, a platform specialized in inventory management, and Shopify, a cloud-based e-commerce platform, the demand for company product is seen to grow speedily with some fluctuation caused by seasonal reason (holiday, Black Friday, Christmas) and several known factors (advertisement campaign including social media ads, special event, etc.) for both online sales (B2C) and retailer's order (B2B)

Figure 19: Total sales history of 2017, KANE Watches

Figure 20: Total sales history of 2017 - Aug 2018, KANE Watches

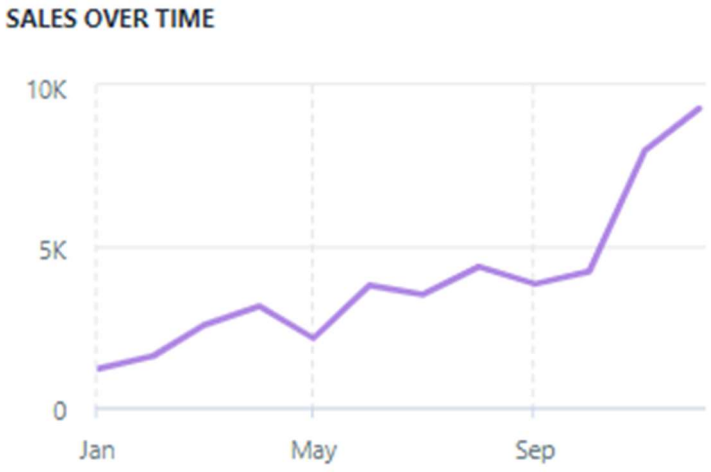

Figure 21. Online sales value of 2017 (in euros), KANE Watches

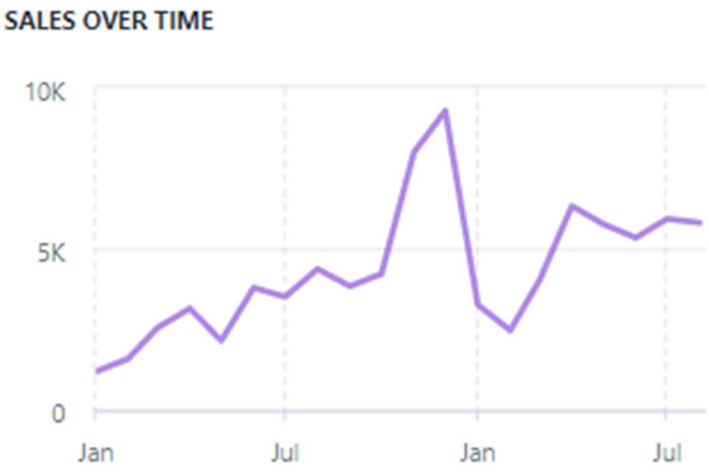

Figure 22. Online sales value 2017 - Aug 2018 (in euros), KANE Watches

Because of the recognizable pattern in both online and overall demands for KANE watches, applied for watch cases and straps products (A and B-items), one considerably easy and practical method for forecasting is exponential smoothing with some adjustment to fit with the change in seasonal demand for final quarter of the year due to the shopping season where the demand is extremely high.

Also, the impacts from other internal and external activities, include online marketing, campaign ads or retailer's promotion, are taken into account for the responsibility of some minor but noticeable changes. Calculation from company's database shows an increase of 9 percent average in online sales demand in some specific months as an effect of marketing campaigns applied in those periods.

	Sep-17	Nov-17	Dec-17	May-18	Jun-18	Jul-18	Aug-18
Total sales value	€ 3,836.00	€ 7,983.00	€ 9,271.00	€ 5,762.00	€ 5,338.00	€ 5,926.00	€ 5,802.00
Sales value attributed to marketing campaign	€ 416.00	€ 492.00	€ 592.00	€ 866.00	€ 641.00	€ 189.00	€ 256.00
Increase percentage	12%	7%	7%	18%	14%	3%	5%
Average increase (%)	9%						

Table 2. Monthly sales increase attributed by marketing campaign break down

5.2.3 Transport cost.

The cost can be divided into 2 parts: import (production delivery cost) and export (sales delivery cost)

Cost for import are a combination of several smaller ones which fluctuates based on number of factors:

- Dimensions and weight of the shipment,
- Nature of the transport goods,
- Destination (distance),
- Season,
- Availability of means of transport.

As mentioned above, the rate can be affected by the weight and dimensions of the package which can be decided by volume or weight (case by case), the mean of transport (air, sea or land), whether or not the shipment contains hazardous material (in this case: lithium batteries) that requires special handling, or insurance included in the delivery (not required but recommended).

Cost of export, in the other hand, is pretty much a fix cost which is decided by the offer/rates adopted by the company through negotiation with delivery service provider. However, the recommendation for co-operating with third-party e-commerce fulfillment has led to the re-calculating of the delivery and all of its related costs, including picking and packing, cost of packaging material, etc. The following table is the cost calculation of the current export activities from the company, using the updated shipping rates acquired from the latest contract with delivery partners.

Order Quantity	PICKING + PACKING COST	PACKAGING COST	SHIPPING COST					
			NL	DE	BE	FR	UK	US
1	€ 2.00	€ 0.28	€ 3.75	€ 5.15	€ 5.15	€ 6.25	€ 6.25	€ 15.95
2	€ 2.25							€ 17.95
3	€ 2.50	€ 0.75	€ 4.90	€ 6.00	€ 6.00	€ 10.50	€ 10.50	€ 21.95
5	€ 3.00							
6~10	€ 5.00							€ 36.95
11~15	€ 6.00							€ 36.95
15~20	€ 7.00	€ 1.00						€ 36.95
20~25	€ 7.00							€ 62.95
25~30	€ 7.00							€ 62.95
>30	21.5e/h	TBA						On Request

Table 3. KANE current export cost

TAX	RETURN COST						COST FOR NL SHIPMENT	COST FOR DE SHIPMENT	COST FOR BE SHIPMENT
	NL	DE	BE	FR	UK				
0%	€ 9.90	€ 10.50	€ 9.90	€ 17.90	€ 17.50		€ 6.03	€ 7.43	€ 7.43
							€ 6.28	€ 7.68	€ 7.68
			€ 10.70	€ 18.50	€ 17.90		€ 8.15	€ 9.25	€ 9.25
		€ 10.91	€ 12.00	€ 19.50	€ 18.70		€ 8.65	€ 9.75	€ 9.75
			€ 13.50	€ 19.50	€ 18.70		€ 10.65	€ 11.75	€ 11.75
			€ 13.50	€ 23.50	€ 20.50		€ 11.65	€ 12.75	€ 12.75
			€ 13.50	€ 23.50	€ 20.50		€ 12.90	€ 14.00	€ 14.00
			€ 31.50	€ 31.50	€ 31.50		€ 12.90	€ 14.00	€ 14.00
			€ 31.50	€ 31.50	€ 31.50		€ 12.90	€ 14.00	€ 14.00
			€ 31.50	€ 31.50	€ 31.50		On Request		

Table 4. KANE current export cost (cont.)

5.3 Recommended action for logistics:

For import, the best practice is to use a freight forwarder, in the case on KANE Watches is Flexport, to avoid any legal consequences or difficulties in term of transport and paperwork because of the lack of experience in the field of international trading for large shipment (outside the EU territory). However, it worth to plan the delivery according to the calculation of EOQ, season and availability of transport option to help decreasing the variable cost and avoiding booking space shortage because of high demand.

Figure 23. KANE Import freight cost

As the cost for import is significantly higher at the last quarter of the year compare to other quarters (approximately 30 percent) as shown from the figure above, it will be logical to prepare and plan the import to happen in the first three quarter.

For export, including Business-to-Business (B2B) and Business-to-Customer (B2C) delivery, the implementation of third-party fulfillment service provide is recommended.

Order Quantity	PICKING + PACKING COST	PACKAGING COST	SHIPPING COST						TAX
			NL	DE	BE	FR	UK	US	
1	€ 2.00	€ 0.28	€ 3.75	€ 5.15	€ 5.15	€ 6.25	€ 6.25	€ 15.95	0%
2	€ 2.25							€ 17.95	
3	€ 2.50	€ 0.75	€ 4.90	€ 6.00	€ 6.00	€ 10.50	€ 10.50	€ 21.95	
5	€ 3.00								
6~10	€ 5.00							€ 36.95	
11~15	€ 6.00							€ 36.95	
15~20	€ 7.00	€ 1.00						€ 36.95	
20~25	€ 7.00							€ 62.95	
25~30	€ 7.00							€ 62.95	
>30	21.5e/h	TBA						On Request	

Table 5. New estimated cost for 3rd-party cooperation

RETURN COST						COST FOR NL SHIPMENT	COST FOR DE SHIPMENT	COST FOR BE SHIPMENT
NL	DE	BE	FR	UK	US			
€ 9.90	€ 10.50	€ 9.90	€ 17.90	€ 17.50	TBA	€ 6.03	€ 7.43	€ 7.43
						€ 6.28	€ 7.68	€ 7.68
		€ 10.70	€ 18.50	€ 17.90		€ 8.15	€ 9.25	€ 9.25
	€ 10.91	€ 12.00	€ 19.50	€ 18.70		€ 8.65	€ 9.75	€ 9.75
		€ 13.50	€ 19.50	€ 18.70		€ 10.65	€ 11.75	€ 11.75
		€ 13.50	€ 23.50	€ 20.50		€ 11.65	€ 12.75	€ 12.75
		€ 13.50	€ 23.50	€ 20.50		€ 12.90	€ 14.00	€ 14.00
		€ 31.50	€ 31.50	€ 31.50		€ 12.90	€ 14.00	€ 14.00
		€ 31.50	€ 31.50	€ 31.50		€ 12.90	€ 14.00	€ 14.00
		€ 31.50	€ 31.50	€ 31.50		On Request		

Table 6. New estimated cost for 3rd-party cooperation (cont.)

As the data from the above calculated sheet suggested, the prices or rates to start the co-operation with De Pakkettenfabriek might cost more than the current rate applied (approximately 20 to 30 percent in accordance with the purchase quantity of products) but due to the low effectiveness of the current internal operation, the advantages of adopting external service out weight the drawback of it. The productive-time usage is predicted to increase by at least 25 to 30 percent with the best guess to be round 50 percent for logistics activities, also mean the previous required work-force is no long necessary. The main work will shift to managing and planning instead of fulfilling orders. Fully automated system will take care of the picking and packing process which will boost the productivity of the whole organization, as well as decrease the chance of receiving complain about shipment due to the decrease in human errors (missing items, wrong shipping address, lost package, etc.), the reason for around two to three percent lost in total sales value of the company (7.500 ~ 11.000 euros) per year. The result is based on the current stage of the company sales demand including online order (average of 90 orders per month) and orders from retailers and sales agents, also other logistics and customer service activities (RMA-warranty response – approximately 15 cases per month, shipping information update - approximately 20 cases per week, delivery exceptions, etc.)

5.4 Recommendation for Inventory Management

All the information acquired from sales demand analysis combines with machine learning and human judgement to interfere with the result from algorithms. The data include all sales history in quantity of each type of saleable product from the beginning of 2017 until the current time-period when the study is carried (September 2018). Then the forecast is generated by using forecasting calculation formula explained in the previous part. After a formula-data is achieved, then the forecast is checked and discussed within board of management to adjust base on own experience and the vision for the future development of the company.

		BLACK OUT BLACK MESH	BLACK MESH (OTHER)	BLACK OUT (OTHER)	SILVER STEEL	BLUE ARCTIC	BLACK CODE	GOLD CLUB	GOLD RUSH
2017	1	242	169	178	235	250	275	0	0
	2	476	682	403	493	742	477	332	13
2018	3	382	654	342	251	535	267	341	311
	4	507	987	472	342	794	332	565	419
2017	1	111	76	59	101	100	143	0	0
	2	131	93	119	134	150	132	0	0
	3	131	203	88	174	259	172	68	0
	4	345	479	315	319	483	305	264	13
2018	5	213	398	207	148	293	147	198	214
	6	169	256	135	103	242	120	143	97
	7	258	460	241	183	391	176	263	168
	8	280	520	266	188	430	178	306	201

Table 7. KANE forecast final part 2018 for watch cases

SILVER MESH	GOLD MESH	VINTAGE SILVER	VINTAGE BLACK	VINTAGE GOLD	CLASSIC SILVER	CLASSIC BLACK	CLASSIC GOLD	URBAN SILVER	URBAN BLACK	URBAN GOLD	
460	0	201	74	2	175	85	1	166	113	0	
762	201	543	244	226	370	180	56	330	214	58	
504	326	321	240	153	212	119	118	147	113	91	
619	502	475	352	278	289	162	175	195	147	141	Forcasted
224	0	107	40	2	103	40	1	66	52	0	
236	0	94	34	0	72	45	0	100	61	0	
308	47	192	53	14	127	52	25	123	80	0	
454	154	351	191	212	243	128	31	207	134	58	
252	195	176	148	99	124	71	76	90	74	61	
252	131	145	92	54	88	48	42	57	39	30	
321	223	237	167	139	146	83	73	108	76	64	Forcasted
331	261	254	188	161	151	89	86	108	77	75	

Table 8. KANE forecast final part 2018 for watch straps

As there is a shortage in history sales data point to provide the forecast with reliable information, longer observation is required in order to improve future prediction.

Base on the forecasted result as above, a recommendation come up with the best number of orders per year possible according to the manufacturing capabilities and necessary expenses. The predicted result calculation is done in the following table as a recommendation for the final half and each of the final 2 quarter of the year, which can be used as a reference for future planning.

EOQ calculation	Annual Demand	Cost per unit	Holding cost (%)	Holding Cost	EOQ	Order based on EOQ per	Suggested order per year
BLACK OUT	3068	$ 13.20	2%	$ 0.26	152	20	6
SILVER STEEL	1350	$ 12.50	2%	$ 0.25	104	13	4
BLUE ARCTIC	2348	$ 12.50	2%	$ 0.25	137	17	6
BLACK CODE	1373	$ 12.50	2%	$ 0.25	105	13	4
GOLD CLUB	1241	$ 14.15	2%	$ 0.28	94	13	4
GOLD RUSH	693	$ 14.15	2%	$ 0.28	70	10	4

Table 9. EOQ and suggested order per watch case per year

SILVER MESH	2378	$	6.60	1%	$	0.07	268	9	6
BLACK MESH	4123	$	6.80	1%	$	0.07	348	12	6
GOLD MESH	1011	$	6.80	1%	$	0.07	172	6	5
VINTAGE SILVER	1556	$	5.65	1%	$	0.06	235	7	5
VINTAGE BLACK	913	$	5.65	1%	$	0.06	180	5	5
VINTAGE GOLD	681	$	5.65	1%	$	0.06	155	4	4
CLASSIC SILVER	1054	$	5.65	1%	$	0.06	193	5	5
CLASSIC BLACK	556	$	5.65	1%	$	0.06	140	4	4
CLASSIC GOLD	334	$	5.65	1%	$	0.06	109	3	3
URBAN SILVER	859	$	5.65	1%	$	0.06	174	5	5
URBAN BLACK	593	$	5.65	1%	$	0.06	145	4	4
URBAN GOLD	288	$	5.65	1%	$	0.06	101	3	3

Table 10. EOQ and suggested order per watch strap per year

Reason for the low holding cost of the items comes from the nature and characteristics of the company's product. Watch cases and strap have a relatively long shelf life (estimated 2 years for watch case and 3 to 4 years for watch strap) in a normal condition warehouse, along extremely low storage space occupation, makes them require relatively low overall cost for storing.

Watch cases and straps are ordered separately in term of SKU and individual quantity. However, when it comes to packaging for import and delivery, usually a complete watch (combination from case and strap) is required to minimize the shipping volume and expenses. Therefore, the suggested order per year is lower than the order based on EOQ to compromise with the disparity between watch cases and straps order quantity.

One point to note, the calculation on EOQ and order is done with the consideration of only A items seeing that they are the category having the most impact on the performace level of inventory management. Other classes and groups are seen to need less attention or the previous managing method is proven to be reliable applied to those items.

6 Discussion

The object of this study is to express the difficulties and opportunities small and medium enterprises, by using the example from KANE watches, and from that raise a number of suggestions to increase the effectiveness in the area of inventory management and logistics activities. KANE Watches was and has been faced many obstacles to improve the control of stock, both cost and service quality, and maximize the expense potential of the logistics operation.

As the result from analyzing company data and market situation, also improving approaching methods to the problem, numerous recommendations were introduced to meet the organization requirement at the current stage. The authenticity of the study was constantly evaluated by the company production and demand planning, as well as logistics supervisors to guarantee the quality. The result and recommendation from the research are only available on the theoretical scale, hence, the application of them in real-world business must be determined by experts and professionals. Further study is, therefore, recommended to investigate the impact of those mentioned suggestion on the operation of organizations. To support the recommendation, calculations were done to add credibility and a sharper look into the problem, demonstrated the practicality of the solution.

The study is fully supported by KANE Watches since the organization urgently need a fully-analyzed report on the effectiveness of its operation in the aspect of inventory management and logistics. Since there have been some problems from the beginning of the company function, it is critical to look for improvement to boost the productiveness and solve bottle neck difficulties. Several most recognizable reasons for weakness in inventory managing ability including poor bookkeeping record, limitation in picking and packing procedure, limitation in sales data history directly affect the accuracy of demand forecasting and the lack of experience from manager. Logistics, in another way, influenced by the trend and movement of the global and local commercial environment. Thus, it is easier to study the familiarity and to take advantages from the behavior of the market in view of the change from seasonal and other known factors.

The recommendation from the study can be used as a reference for future reseach on optimazing the operation of inventory management being that the sales data point will be continuously updated and provide a more reliable database to calculate the forecasting error, hence directly improve the accuracy of EOQ and purchase order decision. In addition, the precision of seasonal and other factor-influenced changes on the logistics expenses and effectiveness will be proven and taken into account for upcoming plan. Consequently, it would be less time and effort consumed to adjust and modify the research model than to launch a new research project.

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Appendix:

Rate Information

Freight Charges	Rate	Quantity	Amount
Air Freight	€2.45	x 284.00 KG	€695.75
Fuel Surcharge	€0.28	x 284.00 KG	€78.28
Origin Charges	**Rate**	**Quantity**	**Amount**
Airline Terminal	€0.28	x 284.00 KG	€78.28
Cartage Base	€64.40	x 1 total	€64.40
Export Customs Clearance	€67.19	x 1 total	€67.19
Hazardous Materials Fee	€103.54	x 1 total	€103.54

Figure 24. Example of KANE Import cost break down

Destination Charges	Rate	Quantity	Amount
Airline Terminal	€0.20	x 284.00 KG	€56.80
Cartage Base	€0.32	x 284 KG	€92.16
Liftgate & Other Trucking	€67.19	x 1 total	€67.19
Terminal Handling	€66.00	x 1 total	€66.00
Customs Charges	**Rate**	**Quantity**	**Amount**
Disbursement Service Fee	2%	x 7501 Customs Entry Summary	€7.43
Import Customs Clearance	€75.00	x 1 Air Waybill	€75.00
7501 Customs Entry Summary			
Customs Duty	€431.31	x 1 total	€431.31
Additional Charges	**Rate**	**Quantity**	**Amount**
Freight Insurance	€33.67	x 1 % of Insured Amount	€38.76

Figure 25. Example of KANE Import cost break down (cont.)

Figure 26. Example of an Import shipment