

## Conference Paper

# Effectiveness of New Product Development on Mat Creative Industry

P. Eko Prasetyo, Rusdarti, and Yozi Aulia Rahman

Faculty of Economy, Semarang State University

## Abstract

In the very competitive era, the industrial companies are forced to launch the efficient, effective, and adaptive new products. This research aims at analyzing the strategy and the level of effectiveness of developing the new products on the mat creative industry in Semarang Regency. The main data source used is the primary data using the Ansoff Matrix analysis model and especially the index value of effectiveness of product development (NPI, FFI, MTMI and RDSI). Besides, it also uses the index value of selling effectiveness, customer and supplier responsive, and the operational efficiency index. The result of research indicates that all strategies of Ansoff growth have significantly contributed in increasing the profitability performance of mat industry and there is a tendency to frequently conduct the partial product diversification on the market expansion level. Besides, the ability of modifying the new product development is getting higher, more competitive and responsive to the market, so that the effectiveness of industry is getting better and more adaptive and the cash operational tends to be more efficient. However, the effectiveness level of ability in developing the new products is generally still low and not adaptive yet so that the level of productivity and competitiveness of the mat industry is still low.

**Keywords:** effectiveness, strategy, new product development, adaptive and efficient

Corresponding Author:

P. Eko Prasetyo  
 prasetyo.dr.eko@gmail.com

Received: 7 August 2018

Accepted: 15 September 2018

Published: 22 October 2018

Publishing services provided by  
 Knowledge E

© P. Eko Prasetyo et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICE-BEES 2018 Conference Committee.

## 1. Preface

In the millennium century and the 4.0 industrial revolution era nowadays, there has been a new technology that is the technology innovation result that is able to give great change in the economy and industrial sectors. In the digital economy system era, the competitiveness among the industries will be harder and more risky, so it requires the mature and strong preparation and it needs to force the industrial companies to make the new products that are not only efficient but also should be more effective and adaptive. An industrial company is demanded to keep creating the new product development in the form of effective, efficient, and adaptive industrial innovation

 OPEN ACCESS

result in order to make the industry keep existing in this digital economy era. It is enough for an industrial company to be efficient, because being efficient without effective and adaptive product will make it quickly fall.

The increase in global competition motivates the small and medium enterprises (SMEs) to develop the new products more quickly [14]. Nader's result of research explained that the application of the Research and Development (R&D) team in the New Product Development (NPD) has been the main necessity for SMEs. However, there is no simple method or model for the new product requires a strategic policy for the effective new product development. The policy strategy of effectiveness of the new product development on the creative innovation result will be one of the most important parts for the industrial growth and the industrial profitability development. The more effective the policy strategy of the new product development is, the much better the effort of increasing the competitiveness and profitability industry will be. The strategy of new product development is one of the commercialization policy behaviors of the industrial company in managing the product to meet the consumer's needs and to increase the industrial profitability, either in the short or long period.

The concept of new product development (NPD) is very complex and the researchers use it in different ways, but in general it is a process covering product design, production system design, product introduction, and commercialization. The new product development is widely acknowledged as the key for the industrial company wealth. However, the comprehensive approach seems not to exist ([10, 14, 15]; Dhargalkar, 2016; [3]). The approach of client supplier collaboration has been the important strategy in NPD [10]. The application of R & D team in the NPD has been the main necessity for SMEs (Nader, 2016). Kustubh (2016) suggested that the comprehensive work frame can be used for the new product and service by the company and conglomerate and for the process and also the organization design. Whereas, Didonet (2016) used the Market Orientation (MO) approach those are customer, competitor and coordinator among the functional in SMEs that use the different source of knowledge to innovate the new product development.

The problems occurring in the mat creative industry in Semarang Regency have expert labor resource and other rare resources to perform the complex duty in developing the new products that meet the market's needs. However, their success in acquiring the industrial profitability tends to be affected by the technical application in which their innovation knowledge has not been touched by the R & D yet. The important thing is that they consider that the new product development has been the main necessity for the life sustainability of the mat creative industry. However, their effort is

still limited in applying the knowledge for innovation and has not been much oriented in the market's or costumers' needs so their industry profitability is still low and high risky.

The main objective of all NPD team in general is the excellent market success for the new products because the product of innovation is very important in maintaining the competitive excellence of the industrial companies in the international market (Jeong, 2006; [1]; Nader, 2009, [14]). To compete in the global scale and to handle the quick change of technology in the variants of explosive manufacture products, SMEs is demanded to be able to survive with their product innovation [9]. The most important necessity is to enable the SMEs to create the new knowledge and to transfer it into their development through the environment and collaborative network to improve their innovative ability and to relate the components of market orientation with perspective innovation in the SMEs (Flores, 2006; [3, 10, 14]). Therefore, the important aspect of all networks is to optimize the industrial profitability that can be acquired from various managements of risk and benefit in business collaboration through capacity development, mutual competency in new product development and to be the supplier.

The main problem occurring in the mat creative industry in Semarang Regency is that the creation of new knowledge or innovation has not been conducted collaboratively and has not much connected to the market orientation yet, so it can be expected that the new product development is not effective, efficient, and adaptive yet. The research result of Didonet (2016) on the market orientation approach explained that the expansion of market development used by the SMEs has used different sources of knowledge to innovate, based on the interaction among the components in the market orientation. The research result explained that the interaction among three components those are customer, competitor and mutual functional coordination affects the existence that makes the SMEs keep using the different source of knowledge for the different innovation. So it can be expected that the new product development on the mat creative industry is not effective yet and the benefit is also still low and it still has high risk.

The new product development is one of the company's policies in the industry that aims at meeting the consumers' needs and certainly the new benefit for the industrial company itself. The new product development of innovation result may be in the form of the new product that has not existed yet before, which can be the product improvement, or the product modification in order to meet the consumers' needs and to increase the industrial company's benefit. Therefore, the new product development

in this article is an effort of new innovation of the industrial company on a product that aims at meeting the consumers' needs and increases the company's benefit.

The objective of this article is to analyze the strategy and effectiveness of the new product development on the mat industry in Semarang Regency. Various approaches of the new product development have been conducted by the experts as explained above. The strategic concept of product development has also been improving and is often seen as the main instrument to increase the industrial company's performance. In this strategic concept, the Ansoff matrix model has been able to take the great enough place in this strategic research revolution (Ginevicius, 2012; Kipley, 2012; Gianos, 2013; [5]; Koks, 2016). Therefore, this article uses more the strategic approach method of Ansoff matrix. It is used to answer the new product development, the new offer, the new modification, to replace the existing products in order to increase the market share compared with the competitor's industrial company. Besides, in this research, the Ansoff matrix with the existing performance matrix elements are used to evaluate the performance position of the industrial company in present time and in future time.

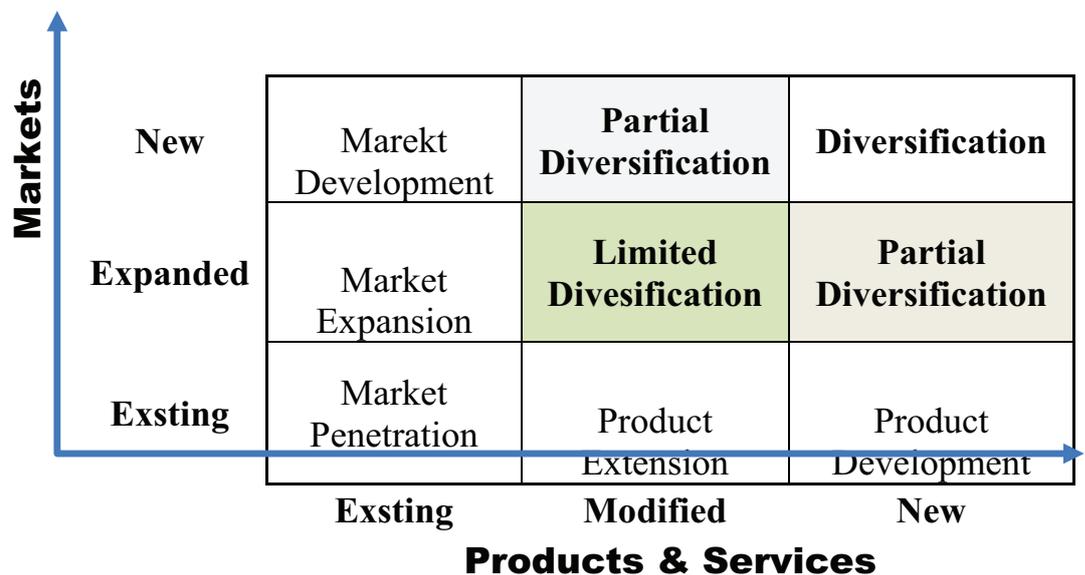
## 2. Research Method

The main data source in this research is the primary data with 50 units of sample of the household artisans of mat creative industry as a unit of analysis of respondents taken in the simple random sampling and is considered representative to represent 100 populations of artisans living in the area of research. The analysis technique used in this research is productivity multifactor method of Mudel and APC model, the analysis of competitiveness, the SWOT analysis especially the life cycle product, and the QSPM matrix and the Ansoff matrix. Besides, it also uses the index value of new product development. However, in accordance with the research objective as mentioned above in this article, which is analyzing the strategy and level of effectiveness of new product development, this analysis instrument used and explained in this article is mainly the Ansoff matrix method and the index value of new product development without reducing the role of other analysis method.

The strategic analysis method of new product development in this article uses the Ansoff matrix model with the order of 3 x 3 with assumption that is more comprehensive and representative in representing various strategy choices that can be used. The definition of strategic operational of new product development in this article is involving the existing product modification with the new motif and design or presenting the real new product formula in order to meet the consumers' desire and

the limited market (Niche Market). The Ansoff matrix is used to explain the intensive growth strategy into the new product or the new market. In this article, Ansoff matrix is considered as the supporting instrument of the most important strategic planning analysis in assisting to determine the best product and market strategy. Besides, the Ansoff matrix theory is used as the analysis technique of work frame that enables various business opportunities into each cell of the existing matrix value, and the research uses nine cell alternative choices of the Ansoff model business matrix.

Based on Figure 1 of the Ansoff matrix model, it seems that it offers nine alternatives of potential strategies for the performance growth of the mat industrial company those are market penetration, product extension, product development, market expansion, market development, limited diversification, partial diversification product, partial diversification market and diversification. Hence, diversification is a strategy that is considered the most risky one because it places the new product development in the new market. To reduce the risk, it requires various activities of business alternatives before determining the strategic choice of diversification.



**Figure 1:** Work Frame Model of Matrix Ansoff Analysis. Source: Ansoff Matrix, Manktelow, (2011). MindTools.com

The performance of products referred to in this article may actually be seen from three dimensions those are efficiency, effectiveness and adaptive. Product development efficiency is interpreted as how far the time and resources are available and required to launch the new products. The effectiveness of product development reflects the degree to which the product is appropriately addressed to the customer or market, thus it is able to increase the industrial profitability while, adaptive product

is that the new product created has been standardized as desired by the customer or the market. Furthermore, to measure the performance it requires at least three basic questions objectively and actually asked those are: 'How many activities are conducted?', 'How quickly are the activities conducted?', and 'What kinds of resources are used?'

The definition of operational in analyzing the level of effectiveness of the new product development in this article is mainly conducted based on the generic standard, which is measured by the general index value of the effectiveness of new product development those are NPI, IFF, MTMI, and RDSI. Furthermore, to increasingly strengthen the argument, it uses the level of effectiveness of sales that is measured based on the index as follows: Sales Opportunity Index (SOI) and Customer Retency Index (CRI). Afterwards, to find out the level of responsive of the customers, it uses the index value as follows: On Time Delivery (OTD) and Order Fill Rate (OFD). And for the level of effectiveness of the suppliers, it uses the SOTD and SOFR index. While to find out the level of effectiveness of the operational, it uses the index as follows: Index Conversion Cost (ICC) and Asset Utilization Index (AUI). Afterwards, the operational definition and the calculation method of index value of the level of effectiveness of new product development in this article can be calculated as follows [17, 18]:

1. New Product Index (NPI). It indicates the effort of the mat industrial company in product adjustment and its service to the consumers or market. The calculation of  $NPI = (\text{Product and service income released in the last 12 months}) / (\text{Total income of mat industrial company})$
2. Feature Function Index (FFI). It indicates the level of change in each new product or service offered to the consumers. The calculation of  $FFI = (\text{Item of new component for product released last year}) / (\text{Amount of item components of feature or motif for mat product during period of measurement})$
3. Time to Market Index (TMI). It indicates the functional ability of the new product or service development conducted by the industrial company in the punctual time. The calculation of  $TMI = (\text{Average of time required to launch each new product})$ . Afterwards, in this research the value of TMI is conversed to make it about 0 and 1 so this article mostly uses the index formulation of TMI Modification where the index value of  $MTMI = 1 - (TMI / \text{the lowest limit of time of the recommended product development})$
4. R & D Success Index (RDSI). It indicates the functional ability of product development that can be conducted by the mat industrial company to realize and bring the

new product to the market. The calculation of RDSI = (Amount of new product that can be launched to the market in 12 months) / (Amount of product development targeted to be finished in 12 months)

5. On Time Delivery (OTD) indicates the ability of the mat industrial company in meeting the consumers'/customers' expectation/hope related to the punctual time of delivering the new products. The calculation of OTD = (Amount of order delivered in time) / (Total of order accepted). In this research the average of calculation is conducted in seven circular time in one week.
6. Order Fill Rate (OFR) indicates the ability of the mat industrial company to meet the consumers' hope related to the quantity of product by the consumers/customers. The calculation of OFR = (Total amount of order filled correctly) / (Total amount of order). In this research it is assumed that there is no order delivered more than or under the amount demanded. The order is filled correctly if the quantity of delivery = the quantity of customers' demand, and this calculation is used with the average bases of seven days.
7. Sales Opportunity Index (SOI). It indicates how successful the mat industrial company is able to develop the prospect for the product and service. The calculation of SOI = (Contact by prospect of last month) / 2 X (Average prospect rolling in 12 months)
8. Customer Retention Index (CRI). It indicates how good the customers' needs can be met by the mat industrial company. The calculation of  $CRI = 1 - \frac{\text{Existing customers without buying in purchase cycle}}{\text{Total of customers}}$ . The purchase cycle is the time cycle of buying for the mat industry in the industrial organization competition. The CRI value indicates that the higher means increasingly satisfying the consumers.
9. Index Conversion Cost (ICC). It measures the ability of mat industrial organization measured in managing the procurement cost for all materials and service used for providing the product and service offered. The lower the ICC value indicates that the ability of the mat industrial organization is increasingly good in controlling the procurement cost. The calculation of ICC = (Amount of direct and indirect service cost) / (Income produced by the product and service given by the mat industry)
10. Asset Utilization Index (AUI). It measures the ability of mat industrial organization in managing the asset effectively. The calculation of AUI = (Total income of product and service last month x 12) / (Total net asset)

### 3. Result and Discussion

The new product development reflects the importance of effectiveness in introducing the new product of innovation into their old or new markets. Thus creativity is the most important part or pre-requirement in innovation. Therefore, creativity in this case is not just ideas, but there must be implementation that can be called innovation. Because there will never be innovation without the realization of creativity ideas, and creative ideas will never be realized without innovation. In this article, the new product of the creativity value modification in the mat industry in the research area is the implementation of the creative ideas of the artisans in the mat creative industrial company. The creativity owned will be able to create solutions to improve industry profitability and job creation for people in the surrounding area. The problem is how the strategy and the level of effectiveness of the new product development is referred to in this article. To describe the strategy in this article, it uses the Ansoff matrix model analysis, and the index value of effectiveness of the new product development.

The Ansoff matrix in this article is used to present the products and market choices available by the mat industry in the research area. In this article, an existing market is considered as the customer, and a product as the item sold to the customer. The Ansoff' matrix in this article is also referred to as a market or product matrix. In other words, Ansoff matrix in this article is used to look at strategies that may be able to reduce the gap between the creative mat industries without changes to the mat creative industry with various change efforts, especially to the new product development. The main task of the mat industry is to choose between the options available and in the simplest and the most strategic form. This choice is part of the strategy formulation process studied and analyzed in this article. The Ansoff matrix in this research is used along with the SWOT model and the QSPM matrix and the life cycle product analysis, but to abbreviate the presentation and to adjust to the objective of this article, only the Ansoff matrix model is presented. The Ansoff matrix in this article uses nine strategic combinations of product development as explained in the above research method. The basic concept of product development as referred to in this article includes product design efforts, production system design, product modification with new motifs, and new product introduction process. The main objective in the new product development on the mat industry in this research area is as a strategic effort to increase the market share and the profitability of the mat industry. This article aims at explaining the best strategy and the level of effectiveness of the new product development in the mat creative industry in the research area.

The result of research explains that the mat creative industrial company in the research area mostly considers the importance of new product development to maintain the growth rate and excellence of the mat industrial company and to replace the old product with various kinds of the best strategy and innovation efforts. The argumentation of the need for new product development is as one of the strategies to extend the life cycle product, so that the product will not decline. In the mat industry, the new product development is conducted through the new product design, production system design, and the most widely conducted is the old product modification with new motifs and colors.

The result of research confirms that various kinds of efforts to change the creation of new products in the research area tend to be much simply conducted because of the application of new knowledge that is the mat artisans tend to try to be creative, and not based on the consumers' demand. They consider that by trying various kinds of modification of the new products and new designs of innovation, the consumers and customers will be more interested, so the product is generally not boring and able to increase the sales in the same (old) market. Meanwhile, the old products and new designs are also sold to the new markets or the new customers. The result of research explains that the mat industrial artisans actually realize that the strategy of product diversification and at the same time the price diversification they are doing is very high risky. However, they assume that choosing a diversification strategy is the most profitability strategy for the mat industry.

The argument that they dare to choose this diversification strategy is because previously their products have been standardized to integrate the elements in different manufacturing systems, so the risk can be reduced. They consider that the strategy is the best choice based on the ability they have to increase the manufacturing base and the market share. The result of research supports the research of Chen (2017), which stated that the availability of an effective knowledge base is still an obstacle in the application of intelligent technology; standardization is required to integrate differences of the manufacturing elements and systems, including hardware and software. Massis (2016) and Chen (2017) and Nezhad (2017) also asserted that in many countries the public and private sector partnerships are very important and should work together to improve the manufacturing base and to increase the market share as a sign that the fourth new industrial revolution is being realized and demonstrated. According to Chen (2017), what is characterized in a complete integration system is information technology and communication. Whereas, according to Nezhad (2017), the main components are integrated through three levels those are micro level (company,

industry and cluster), middle level (project formulation at institutional level), and macro level (general environmental level, government policy and business).

In their view, most of these artisans, based on their creativity and new knowledge, are constantly innovating to create the new products that they think have not existed yet before. This strategy seems to be effective enough so that the products created have a strong appeal and competitiveness and are able to survive in the middle of the dense market competition. To reduce the risk, besides creating the new products, the artisans also develop the existing products into more attractive ones with new designs and new motifs of modification. In an effort to reduce the risk, the development of this kind of modification products can be conducted by improving the quality, renewing its shape, or beautifying the packaging of its products various kinds of motifs and new colors that previously did not exist. This strategy is even the most widely one conducted by the artisans, so the mat products will not be boring.

In the Ansoff matrix analysis model, the choice of diversification strategy is often considered as a risky choice (Ginivicius, 2012; [20]; Babenko, 2014). The research result of Ginevičius (2012), with the Ansoff matrix model stating that diversification strategy is the most risky and distracts the company from its production and marketing. Ginevičius suggested that market penetration, product development and market development should always be evaluated. According to FME team (2013), diversification strategy often fails because they have uncompetitive products in the market, so there is no balance between the risk and reward. The FME team explained that in order to reduce the failure in choosing a diversification strategy, the industrial company should make an honest risk assessment, the idea must be clear, and it needs skill and good experience and balance. Meanwhile, Babenko, (2014) suggested to reduce the risk so that diversification strategy should be divided into several types of diversification those are diversification of companies, vertical diversification, horizontal diversification or conglomeration diversification based on different main objectives and deficiencies. If it is based on the previous three researches, it seems that the research results in this article tend to be more similar to those of Ginivicius (2012) and Babenko (2014).

The result of research explains that there are various strategic efforts that have been conducted by the mat artisans in the area of research as follows:

1. Product development strategy of modification result with new motif and new design

This strategy is the most conducted by the artisans to reduce the risk of declining products. Based on the Ansoff matrix, this strategy is conducted by market penetration and also product extension. Especially for the new designed product with new standardized motifs, they also use the strategy of price limited diversification especially for the new consumers. This strategy is conducted with the argument that the product is not boring and also able to add the new profits. However, the research result explains that the strategy of price limited diversification is considered still high risky enough, then they just dare to do more to the new consumers and not on the old customers.

#### 2. Unique new product creation strategy and attractive knowledge creativity

This strategy is a product creation strategy with a completely new model that has never existed yet before. This new product is created due to the application of creative ideas and their new knowledge created in the form of new products. Most kinds of the new product mimic the cartoon character or various kinds of animals. The weakness of this product is that they have not had product standardization yet, so the product is less adaptive. The strategic policy choice of price diversification on this kind of product besides acquires the greater profit also has the higher risk. The risk is high because besides not having had the standard yet and being more complex so it takes longer time, the quality of product is not guaranteed yet. The positive side in this new product is that it is more interesting, unique and effective, so that new product created has a strong competitiveness and is more able to survive in the middle of the dense market competition industrial production of the similar mat production. Based on the Ansoff matrix analysis model, the alternative strategies that are mostly conducted and chosen on this kind of new and unique product in the area of research is the strategic model of product development and partial diversification.

#### 3. Strategy of customer service improvement

Besides conducting the new product development strategy of innovation and creativity as the main objective, the artisans in the research area also perform strategies of improving services to the customers and consumers. Some service strategies often conducted are delivery order, *tuna satak bati sanak* strategy, one stop service after sales through cooperatives, facilitating product improvements, training, and also customer complaints and fewer order services via online media.

#### 4. Strategy of capacity building of human resources

This strategy is conducted to make the products more innovative according to the artisans' and the consumers' desires. They realize that without creative and innovative workforce resources, it is impossible for a new product that is unique and attracts the consumers to be realized properly and adaptively. However, the result of research shows that only about 22% of the mat artisans who are ready to create a new product that is unique and has enough quality according to the times.

##### 5. Strategy of utilizing modern technology for product innovation

In the era of this fourth phase of industrial revolution, the mat industrial company is demanded to be able to utilize modern technology to produce product innovation. However, the results of research indicates that the mat creative industry in the area of research has not much used the computer technology to create the new product design of innovation that is unique and interesting following the theme of animal model and or cartoon character, so that the product result created has not had good standardization yet. Besides, the marketing model has also not widely used the social media and internet facility assistance, so the extent of market coverage is still narrow and is not localized enough to do the business collaboration well.

The result of research on the mat creative industry insists that the artisans' creativity has been able to create many new product innovations that are unique and interesting and also the new products modified with new designs. Nevertheless, the objective of the new product creation still tends to be oriented only on involving the application of the creativity side of the internal mat industrial company only and has not been much involving the needs and desires of the consumers or the market. Besides, this unique kind of product still has a high risk, and the level of profitability of the industry obtained is also still low. It means that the result of this research has not supported the theory of marketing management and some previous researches that tend to choose more strategy-oriented to meet the consumers' necessity and desires.

In other words, the result of this research is rather different from Kolter (2012) and Didonet (2016), which stated that the main objective of the industrial companies in innovating the new products is to maintain the life sustainability of the industrial companies, which is more encouraged because the existing products are already vulnerable to the consumers' or customers' necessity, so that new products are more oriented to meet the consumers' interests rather than the internal side of the industry or the application of knowledge and technology of the industrial enterprise. In theory,

Kolter (2012) explained that the marketing department can be set based on the following ones: function, geographic area, product, and market or customer. Kolter (2012) asserted that the marketing effectiveness and the strongest benefit is that marketing activities are set more to meet the needs of different consumers or customer groups. The philosophy is to meet the needs and desires of the customers and remain integrated with other major marketing departments. Thus it becomes natural that the new product development strategy undertaken by the mat industry in the research area has not been effective and adaptive yet, is still at a high enough risk, and the benefit gained is still low.

Various stages in the new product development has been conducted by many artisans of mat industry in the research areas such as; the creation of ideas, the filtering of ideas, the creation of the product of ideas, the development of marketing strategies, business analysis, product standardization, new product development, market testing and product commercialization. Based on the Ansoff's matrix analysis, all the Ansoff growth strategies have contributed significantly and are able to help improve the profitability performance of the mat industry. Nevertheless, they are also aware that in facing the intense industry competition, this risky product diversification is one of the absolute choices they choose without overriding the other Ansoff product development strategy.

They, the artisans, choose this diversification strategy with their following arguments: (1) the existing products have started to get bored and to get the slow growth, (2) the new products can still be offered at a more competitive price and may increase the sales of the existing products or receipts, (3) the artisans have basic capital knowledge and basic skills and competitiveness ability to create the new products that are their real creativity. Meanwhile, the main objectives of this diversification strategy are;

1. Adding new kinds of new products that connect to each other for the same market or customers (new product and existing market). This kind of strategy is conducted by modifying the product with various colors and new designs on existing products into the kind of new products of innovation into the diversified products. The weakness of this way is the limitations of the raw white patchwork material as the basis for other colors and special colors that is difficult to do. As one solution, the artisans also often do merger or acquisition of the raw materials with other artisans to be able to create the new products that are unique and interesting. In theory, this kind of diversification model can be categorized into a diversified type of concentric model.

2. Adding products that are completely new, unique and interesting but not interconnected and for different markets (new product and new market). This strategy is conducted by creating a mat product mimicing the design of cartoon characters especially like Doraemon, Winnie the Pooh, Hello Kitty, Scooby doo, Teletubbies, and also various types of animals like elephants, fish, hippos, zebra, komodo, pandas, cows, cats, chickens, ducks, butterflies, owls, bees, frogs and also fruits like mangoes and apples, In theory, this kind of diversification model can be categorized into the conglomeration diversification type.

Other strategic policy is adding the new products that are not related to the main product that aims at much satisfying the same customers. This kind of strategy is conducted because the existing industrial networks can be used to market the new products to the existing customers, and may increase the competition and profit (new product and market expanded). In this case, besides creating the mat products as the main product, the artisans also produce dust cloth for motorcycles and cars, tablecloths, children's clothes, mattresses and pillows, and other patchwork-based products. In theory, this kind of diversification model can be categorized into a horizontal diversification model and this is in line with the alternative choice of diversification strategies suggested in Babenko's research (2014).

Thus, based on the Ansoff matrix, it can be stated that the strategies often chosen by the mat artisans in the research area is the limited diversification strategy model (slightly diversified or limited diversification strategy). Furthermore, based on the objectives, situations and conditions in order to reduce the risk and to increase the profitability of the mat industry, in practice the limited diversification strategy model can be developed into several alternative strategies as follows: the partial diversification strategy, the new product development strategy, and the potential diversification strategy, as described above, while most artisans have always been partially diversified at the market expansion level. The result of this research confirms that most of the mat industry artisans almost 60% or more have long chosen a limited diversification strategy without knowing and specifying in details and consistently how many percent of the mat artisans who always choose the specific strategy, the limited strategy, and the best one they choose. The argument is considering the full diversification strategy, it has high risks and the completely new market for the new products has not been found yet steadily, so their choice seems to still choose the limited diversification strategy as the best strategy for the effectiveness of the new product development of their handicraft products.

Then, based on the method of measuring the level of new product development as described in the above research method, it will be known the level of new product development of the mat handicraft that is efficient, effective and adaptive. This aspect is related to the activities of the mat industrial companies with their new innovations. To understand easier, there are three aspects that must be considered related to the product development that is efficient, effective and adaptive as follows: how many activities undertaken exactly, how fast the activity is conducted, and how the product is able to match the consumers' needs. The important implication of the effectiveness of new product development is that it can improve the profitability of the mat industry in the research area in a sustainable manner.

The results show a positive correlation between the revenue received from the new products launched with the total revenue received by the mat handicraft industrial company during the period of this research. The new product index (NPI) indicates the strength of the mat industrial organization in adapting its products with services provided to the potential customers or consumers, markets and customers. The greater the value of NPI is, the better the ability of the new products will be in providing the value added industry or the industrial profitability. The research result shows that the total value of NPI is 50.35%, which consists of the NPI of new product of the new motif and design modification of 16.59% and the NPI value of new product that is unique and interesting of 33,76%. Based on the NPI value, it indicates that the new product launched during this research period is able to provide the additional income to the artisans of 50.35% and the rest of 49.65% of revenues is obtained from the existing old products.

Based on the feature function index value (FFI), it indicates that the functional ability of the new product development conducted by the mat industrial company in the research area during the research period can also be stated well with the FFI value of 78.95%. Changes to the features referred to in this research include the component (feature) change of the product from the simplest one such as adding a little new motifs, or the new packaging to produce completely different, new, unique and complex products that were not yet available. The product is a change of skills and services creatively provided by the artisans to the consumers and the prospective customers. During the research period the mat industrial organization is able to launch 38 new feature items, in which 30 items of them could be launched in the last year period before the research was conducted.

If the NPI and FFI values above are high enough, then it can be stated that the level of effectiveness of the new product development in the mat industry is good and

effective. However, whether the development of such products is efficiently absorbed by the market, it still needs to be measured by the market index time value of market penetration (TMI). The value of this TMI index indicates the functional ability of the product development of the mat industrial company in launching the new products and services in punctual time. To find out any improvement, then the value of TMI needs to be converted and modified in advance so that it becomes MTMI ranging from zero to one.

The higher the TMI value indicates that the functional ability of the new product development is getting lower. On the contrary, the higher the MTMI value actually indicates that the functional ability of the new product development of the mat industry organization is getting better. Based on the research results, during the research period the mat industry has been able to launch a new product of 8 items, with the time required for the launch of each new product to be counted from the approval of product development until the product reaches the customers, and with the time limit agreed on the new product development of 5 years. If it is known that the index value of  $TMI = 11/8 = 1.375$ , then the value of  $MTMI = 1 - (1.375 / 5) = 0.73$ . This means that the amount of MTMI value of 73%, then the functional ability of the new product development of the mat industry can be stated good or efficient.

The measurement of the effectiveness of new product development can also be seen from the success index in the implementation of research and development (RDSI). Various researches indicate that there is a positive correlation between R & D with the increasing industrial income from the new products [7, 14, 15]. Nader (2011) explained that the research will be very useful for the SME product design managers to realize the competitive excellence, so that the new product development processes and procedures are more effective. Besides, the virtual role of R & D team of SMEs may offer the solutions to accelerate the time to the market for the new product development [7, 14]. While Suh (2012), Nader (2015), and Kim (2018) have examined the impact of collaboration, SME team innovation, R & D capabilities on patents and new product development. The result of research of Kim (2018) explained that innovative small businessmen need safe and functioning from the R & D to maintain the sustainable competitiveness and to secure the markets. Kim's research result (2018) suggested that there is a significant effect of investment in the number of external R & D on the new product launching that is increasingly concrete up to 0.7%.

In the mat industrial organization in the research area, it seems not to notice the importance of R & D in particular. The results show that the RDSI index value is still low of only 11.67% where RDSI indicates the functional ability of the product development

of the mat industrial company to realize the new product to the market. The research result indicates that of the 8 items of the new mat product items launched during the time period of research, no product item is targeted for being exactly finished in the period. The research result confirms that indeed the mat industrial organization has never conducted special research on this problem. It means that based on the comparison of this research with the previous one above, the level of achieving the effectiveness of new product development in this mat industry is very high risky. In fact, the basic risk of the mat industry is that it is easy to replicate and move because the mat industry is not based on the local wisdom, but only based on the availability of the raw materials from the patchwork only.

Furthermore, to further deepen the results of the analysis of the effectiveness level of product development above, and to know the responsiveness to the customers and the new products, this research used the supporting instrument of index value and customer responsiveness and the index value of supplier effectiveness. On time delivery indicates the ability of the mat industrial organization to meet the customers' expectations with the time required to meet the demand of a particular order or service. In this case, effective (on time) means that the delivery time is based on the date of customer demand, not the date negotiated. This on time delivery is very important for the mat industry because it may affect the income statement in terms of revenue and operating costs. Based on the research result, the index value (SOTD) that indicates the amount of on time orders compared to the total order is 95.67%. Meanwhile, the index value (OTD) that indicates the amount of orders that can be delivered on time compared to the total orders received by the mat industry company only reaches 91.13%.

Based on the SOTD and OTD index values above 90%, the responsiveness of the new product development conducted by the mat industry to the customers can be stated good and effective. Furthermore, there is a difference in value between the SOTD index and the OTD of 4.54% mentioned above, indicating there are some 4.54% of products capable of being made by the mat industry organization in accordance with the customers' order but not being able to deliver on time to the customers' order. This obstacle may occur mainly because of the reasons for the transportation and the staff delivering it that tends to be limited. While the ability of the mat industry to meet the customers' or consumers' expectations related to the amount of products ordered by the customer is very good and able to reach 100%. This value is based on the SOFR and OFR index that each is capable of reaching 100%,

## 4. Conclusion and Recommendation

New product development strategy in the mat industry in the research area is based on nine boxes of the Ansoff matrix model as a more sophisticated and complex analytical tool. It can be concluded that the main strategic choice in the product development is the limited modification diversification as the main choice strategy. All the growth strategies at the Ansoff matrix model's nine boxes have contributed significantly to improve the performance of the industrial profitability, which depend on the situation and conditions that occur and there is a tendency to always do the partial diversification strategy as part of the main strategy of limited diversification in question. This chosen partial diversification strategy tends to the situation and condition of the market expanded with the new product. Meanwhile, the partial diversification (product diversification) strategy is chosen on the situation and condition of the product modified with the new market, with the aim that the old product is boring (decline). Nevertheless, the partial diversification strategy with the product diversification type is getting higher and more competitive and responsive to the market, so that the effectiveness of the development of mat industrial product of modification result is more effective and adaptive and the cash operational tends to be more efficient and profitable rather than model of partial diversification strategy with the price diversification type.

The effectiveness level of the new product development based on the index value of effectiveness measurement achieved can be stated good and high (effective). The level of responsiveness of the product development from the index value of the customer response and the index value of the supplier effectiveness can also be stated good and effective. the customer responsiveness and index value of supplier effectiveness. However, the index value of the RDSI is still weak, so that the mat product industry in the research area can still be considered vulnerable to bankruptcy and has a high risk (the product is easy to replicate and to move places, as it does not have a strong local wisdom base). The impact is that the added value and the level of effectiveness of the new product development capability in general are still low and not adaptive yet, so that the level of productivity and competitiveness of the mat industrial products in the research area is still low.

Thus, the results of research provide many implications such as the need for the industrial actors to conduct their own research and development (R & D) or to have business collaboration to make the product feasible to penetrate the export market. With the improvement of professional human resources capacity for R & D, the existing

creativity will further support the technical innovation and value innovation and also the innovative policy of the industrial organization itself. The risk of this industry, which is easy to imitate and easy to leave, is an industrial fact that is not based on the local wisdom and more based only on the source of production factors of the material, the supply of patchwork and a little skill. Thus, the implication is that each product produced must be standardized so that the product is not only efficient and effective but also more adaptive and interesting. Besides, there should be a more detailed methodology to improve the capacity of professional human resources who are innovative and elegant, so as to adjust the development of the 4.0 revolution era industry in present time and future time.

## References

- [1] Akgun, A. E., Lynn, G. S., & Yilmaz, C. (2006). Learning process in new product development teams and effects on product success: A socio-cognitive perspective. *Industrial Marketing Management*. 35, 210 – 224.
- [2] Chen, Yubao (2017). Integrated and Intelligent Manufacturing: Perspectives and Enablers, *Engineering*. journal homepage: [www.elsevier.com/locate/eng](http://www.elsevier.com/locate/eng), *Engineering*, 3 p. 588–595.
- [3] Didonet, Simone Regina, Guillermo Díaz, and Ana Maria Machado, (2016). Market Orientation and Sources of Knowledge to Innovate in SMEs: A Firm Level Study. *Journal of Technology Management & Innovation*. Volume 11, Issue 3, Negocios: Universidad Alberto Hurtado, Facultad de Economía.
- [4] Ginevičius, R. & R. Auškalnytė, (2012). The Evaluation Of A Company's Strategy By The Ansoff's Product Market Matrix. *Journal homepage*: <http://www.tandfonline.com>19, *Statyba*, 7:2, 158-165, DOI: 10.1080/13921525.2001.10531717
- [5] Hussain Sajjad, Jamshed Khattak, Arshad Rizwan, and M. Adnan Latif, (2013). Asoff Matrix, Environment, and Growth an Interactive Triangle. *Management and Administrative Sciences Review*. ISSN: 2308-1368 Volume: 2, Issue: 2, Pages: 196-206 © 2013 Academy of Business & Scientific Research.
- [6] Jeong, I. (2003). A cross-national study of the relationship between international diversification and new product performance. *International Marketing Review*. 20(4), 353-376.
- [7] Kim, Minseo, Ji-eung Kim, Yeong-wha Sawng, Kwang-sun Lim, (2018). Impacts of innovation type SME's R&D capability on patent and new product development, *Asia*

- Pacific Journal of Innovation and Entrepreneurship*. Vol. 12 No. 1, 2018pp. 45-61 Emerald Publishing Limited, [www.emeraldinsight.com/2398-7812.htm](http://www.emeraldinsight.com/2398-7812.htm)
- [8] Kotler, Philip, and Kevin L. Keller, (2012). *Marketing Management Millenium Edition*. 14<sup>th</sup> edition, United States of America: by Pearson Custom Publishing.
- [9] Laforet, S. (2008). Size, Strategic, and Market Orientation Affects on Innovation. *Journal of Business Research*. 61753-764
- [10] Lam, P.-K., Chin, K.-S., Yang, J.-B., & Liang, W. (2007). Self-assessment of conflict management in client-supplier collaborative new product development. [Research paper]. *Industrial Management & Data Systems*, 107(5), 688 - 714.
- [11] Manktelow, James, (2011), *Strategy Toolkit*, <http://www.mindtools.com/corp/index6.php>. Mind Tools Limited, 145-157 St John St, London, EC1V 4PY
- [12] Massis, Alfredo De, et al, (2016). Family Governance at Work: Organizing for New Product Development in Family SMEs, *Family Business Review*. p.1-25, Reprints and permissions: The Author(s), [sagepub.com/journalsPermissions.nav](http://sagepub.com/journalsPermissions.nav)
- [13] Mulebeke, J. A. W., & Zheng, L. (2006). Incorporating integrated product development with technology roadmapping for dynamism and innovation. *International Journal of Product Development*. 3(1), 56 - 76.
- [14] Nader, Ale Ebrahim, (2015). A. Virtual R&D Teams: A New Model for Product Development. *International Journal of Innovation*. v. 3, n. 2, p. 1-27.
- [15] Nader, Ale Ebrahim; Ahmed, S. & Taha, Z. (2011). Innovation and R&D Activities in Virtual Team. [Literature review]. *European Journal of Scientific Research*. 34(3), 297-307
- [16] Nezhad, et al. (2017). A New Approach to Challenges of Venture Capital in Financing the Industrial Clusters through Cooperative Models and Venture Funds in Iran, *International Journal of Economics and Financial Issues (IJEFI)*. vol. 7, issue 6, 111-119, <http://www.econjournal.com>
- [17] Smith, Michael, Saul Brand, and, Dale Kutnick (2016). Steps to Build a Value Model of Leading Indicators for the Digital Era. <http://www.gartner.com>, Gartner Headquarters, Gartner, Inc.
- [18] Smith, Michael Smith, Audrey L. Apfel, Richard Mitchell (2006). The Gartner Business Value Model: A Framework for Measuring Business Performance, Gartner, Inc. and/or its Affiliates,. All Rights Reserved.
- [19] Suh, Yongyoon, Moon-Soo Kim, (2012). Effects of SME Collaboration on R&D in the Service Sector in Open Innovation. *Innovation: Management, Policy & Practice*, Volume 14, Issue 3, © eContent Management Pty Ltd.

- [20] Team, FME, (2013). *Ansoff Matrix, Strategy Skills*. ebook. Released. ISBN 978-1-62620-950-3. <http://www.free-management-ebooks.com/dldebk-pdf/fme-ansoff-matrix.pdf>