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Determination of Favourite Market for 3D-Printer Product Based Online Platform

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ABSTRACT

The growth of the online market lately is very rapid due to the World Wide Web. Many crowdfunding-based companies are helping creative projects grow rapidly. To measure the success of a project based solely on the percentage of fundraising cannot represent the favourite market of the desired product backers. In this study, the measure of success is judged by the ratio of the funding amount and the ratio of the product amount in the period of time. After this, there are 4 quadrants that determine the success of the product including: Moderate favourite markets (quadrant I), the most favourite markets (quadrant II), not favourite markets (quadrant III), and moderate favourite markets (quadrant IV). Eight companies start-up with 68 selected 3D Printer products in this study. The results show that no single product is in "favourite market." 63 products are in "non-favourite markets." There are only 5 projects in the market "moderate favourites."

Keywords: Online Platform, Favourite Market, Crowdfunding
JEL Classifications: L260, M130, M310

1. INTRODUCTION

The product commercialization process, starting from concept, design, prototype and test, production, to product launch requires resources. The company uses 46% of resources for new product development, where the purpose of new product development is to increase the company's revenue and achieve success in the market, because 40% of the company's revenue comes from product launch (Cooper, 2000). However, the new product development process that has been done cannot guarantee the success of products in the market. The study found that the failure rate of products in the period 1985-1989 amounted to 42% and in 1995 by 40% (Griffin, 1997). The results of a study from Product Development and Management Association (PDMA) in 2003 concluded that the average product failure of 41% (Barczak et al., 2009), the percentage of product failure of about 40%, where for industries engaged in technology failure reached 42% (Castellion and Markham, 2013).

The development of World Wide Web (WWW) caused a new phenomenon in the growth of online market in the world. In addition to the growth of Start-up and higher competitiveness requires the company to determine the strategy to survive in the market. The Internet allows anyone to access the WWW presence even has a web page that can be used by start-ups to reach broad, fast, and economical markets. Currently, internet users in the world continue to grow rapidly, evidenced to reach about 3,885 million users in 2017, an increase of about 50.6% compared to 2010 (Internet World Stats, 2017). These developments have an impact on the development of online shopping community. Online shopping in China, for example, has risen 32% annually in the last 5 years, reaching $ 967 billion in 2016 (The Boston Consulting Group, 2017). There were at least 6 factors affecting buyers to select e-commerce website including ease of usage, privacy and security, product variety, past experience, customer service and brand image; and ease of usage was the first rank (Samira et al., 2018).

Crowdfunding-based company is one of the companies that take advantage of the development of the WWW.

Crowdfunding as a marketing tool (Brown et al., 2016). The company helps creative projects in various fields including technology. Some studies suggest that the success of the project at crowdfunding-based companies is influenced by campaigns (video, duration (Yuan et al., 2016), rewards (Kraus et al., 2016; Barbi and Bigelli, 2017; Forbes and Schaefer, 2017). Percentage of success by funding is <50% (Zhou et al., 2017) and 20% (Forbes

and Schaefer, 2017). Success parameters that are only based on percentage of funding achievement at the time limit of each project can not represent the favorite market of the desired product, because the variety of products in each start-up company has different amount and the number of products of interest is not a parameter of project success. From the data of success of funded amount, the percentage of success rate project is still low, seen from the achievement of technology category 19.96%, design category equal to 35.20%, and photography category 30.65% (Kickstarter, 2017). However, there was not clear whether the products produced by start-up companies in on-line platform was in the favourite market or other positions. These market positions would be important for the start-up company to gain product success.

2. METHODS

Product marketing through an online platform is passed by charging platform attributes by every start-up in crowdfunding-based company. The start-up can determine the time duration for the marketing process and the target funding. Consumers or backers whose investment interests channel funds through the online platform company. Funding can be accepted by start-up if the start-up product is declared successful. The measure of product success is determined based on the target funding within the specified time limit. Illustration of product commercialization process in crowdfunding based online platform shows in Figure 1.

This research uses quantitative descriptive approach method. Eight start-up companies based crowdfunding with 68 selected 3D Printer products in this study. Data retrieval takes place from August to November 2017 on the kickstarter.com. Target achievement data start-up company shows in Table 1.

Steps to determine the market's favourite product, among others: Determine the funded ratio of time at each startup (RFs), the ratio of the number of products to the time at each startup (RPs), the ratio of the number of products to the time in each product range (RPp), the ratio of funded to time in each product range (RFp), determines the ploting favourite market expressed in terms of units and percentages.

2.1. The Ratio of Funded to Time (RF)

The funded amount is sourced from funding all the products at each start-up. Funding achievement is determined based on the percentage value of the target funding. Normalization of funding is based on US $ currency unit and time duration in online platform. The ratio is derived from the ratio between the percentage of funded (*NF*) and the amount of time duration (*ND*) of each start-up. Funding would work if the *RF* value is high.

$$RF = \frac{NF}{ND} \tag{1}$$

Figure 1: Illustration of product commercialization process in online platform

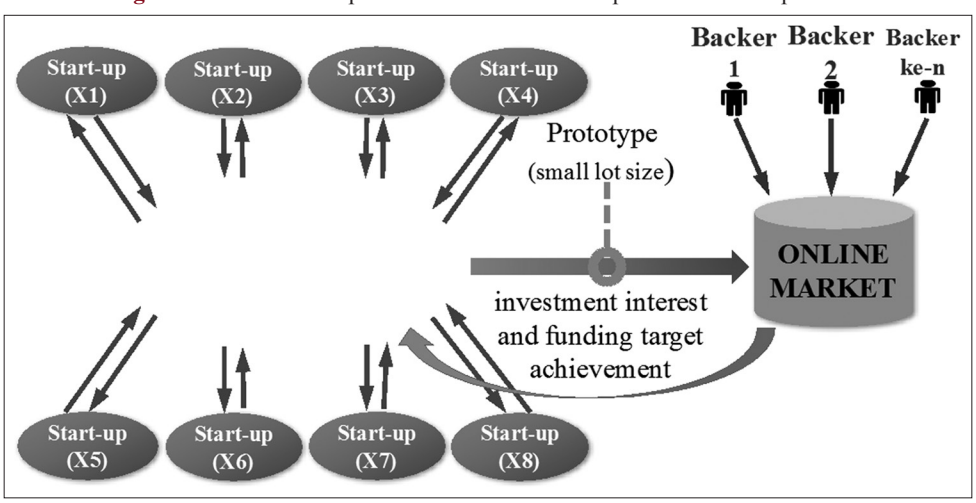


Table 1: Target achievement of product success

Start-up company	Product variety	Time duration (day)	Funding target (US $)
Hot Orange 3D (X1)	*X1a, X1b, X1c, X1d, X1e, X1f, X1g, X1h	20	111,606.00
Scribbler 3D Pen (X2)	*X2a, X2b, X2c, X2d, X2e, X2f, X2g, X2h	45	15,750.00
Gemguk 3D (X3)	X3a, X3b, X3c, X3d, X3e, X3f	45	60,000.00
Mag (X4)	X4a, X4b, X4c, X4d, X4e, X4f, X4g, X4h, X4i, X4j, X4k	33	58,740.00
Kodama, Inc (X5)	X5a, X5b, X5c, X5d, X5e, X5f, X5g, X5h	33	100,000.00
3DMate (X6)	*X6a, X6b, X6c, X6d, X6e, X6f, X6g, X6h, X6i, X6j, X6k, X6l, X6m, X6n, X6o, X6p	30	7,500.00
SH IP (X7)	*X7a, X7b, X7c, X7d	28	28,132.99
WOW (X8)	*X8a, X8b, X8c, X8d, X8e, X8f, X8g, X8h, X8i, X8j, X8k, X8l	45	238,644.00

*The variety of products is not used in determining the market position because the variety is not a 3D-Printer product

2.2. The Ratio of Product Number to Time (RP)

The number of products is calculated based on the total units of the entire range of products that the backer is interested in at each start-up. Normalize the number of products based on the duration of each start-up time on the online platform. Ratio The number of products is obtained from the ratio between the number of products (*NP*) and *ND* of each start-up. The start-up product is said to work if the RP value is high.

$$RP = \frac{NP}{ND} \tag{2}$$

2.3. The Ratio of RF to RP (RFP)

RFP as one of the parameters used to determine the market quadrant position. The higher the *RFP*, the more favourite a product and vice versa.

$$RP = \frac{NP}{ND} \tag{3}$$

2.4. The Ratio of the Product Number to the Time of each Product Variety (RPP)

RPP is a parameter in the determination of favourite markets. Normalize the number of products based on the time duration of each product on the online platform. RPP is derived from the comparison between the number of products in each product variety (*NPP*) and *ND*. The higher the *RPP*, the more favourite a product.

$$RPP = \frac{NPP}{ND} \tag{4}$$

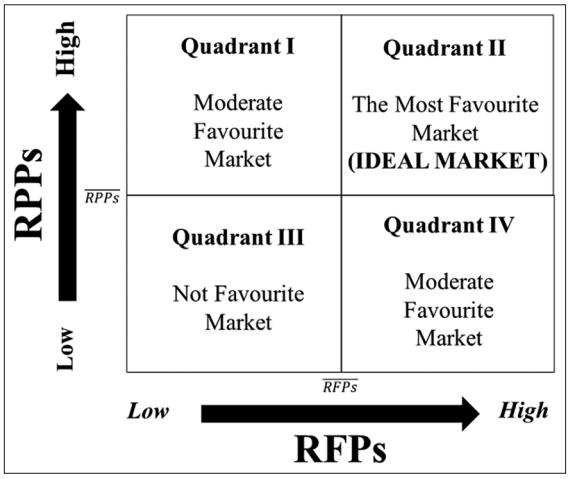
2.5. Ploting Market Position Quadrant

Normalization of RPP value and RFP value on a scale of 0-1. The RPP scale (RPPs) is derived from the calculation of the RPP value in the period of time divided by the highest RPP value, while the RFP (RFPs) scores obtained from the calculation of the RFP value in the period of time divided by the highest RFP value.

$$RPPs = \frac{RPP}{RPP\,maximum} \tag{5}$$

$$RFPs = \frac{RFP}{RFP\,maximum} \tag{6}$$

Figure 2: Ploting of market position quadrant



The value is plotted in the Cartesian diagram as shown in Figure 2 in which the results are expressed in unit and percentage form. The success of the product is determined by the quadrant position occupied by the value, such as: Moderate favourite market (quadrant I), the most favourite market (quadrant II), not favourite market (quadrant III) and moderate favourite market (quadrant IV). The higher the value of RPPs and RFPs the higher the success rate of the product or in other words can satisfy the market position. The range of each quadrant is determined based on the following values:

- Quadrant I, If the value of RPPs ≥0.5 and RFPs <0.5
- Quadrant II, If the value of RPPs ≥0.5 and RFPs ≥0.5
- Quadrant III, If the value of RPPs <0.5 and RFPs <0.5
- Quadrant IV, If the value of RPPs <0.5 and RFPs ≥0.5

3. RESULTS AND DISCUSSION

Favourite market of a product is determined based on the value of RPPs and the value of RFPs in the form of quadrants I, II, III, and IV. The values residing in the quadrant are determined based on RF, RP, RPP, and RFP values.

3.1. RF Value of each Start-up Company

The RF value in Figure 3 is the result of normalization calculated using the press (1) of 8 start-ups (X1, X2, X3, X4, X5, X6, X7, and X8). Based on RF values, the highest RF gain start-up is X8 (WOW) of 784.00 and the lowest is X1 (Hot Orange 3D) of 0.1. So it can be concluded that WOW start-up is a start-up that has the highest success rate when compared with other start-ups.

3.2. RP Value of each Start-up Company

Based on the cumulative number of products at each start-up, X5 (Kodama Inc) obtained the highest product number of 5,909 units, while X3 (3D Gems) earned the lowest amount of 9 units. However, the achievement of the number of products at each start-up company has a different duration of time, therefore it is necessary to normalize the achievement of the number of products by using the ratio calculation as shown in the following Figure 4. Based on the value of RP at 8 startup, it can be concluded that the product that has the highest success is X8 (WOW company) of 784.00 while the lowest is X3 (3D Gems) of 0.20.

3.3. RFP Value of Each Start-up Company

The RFP value of 8 start-ups is about 0.043–2.167. The RFP value is used to determine the favourite market. SH IP is the start-up of the most favourite market because it has the highest RFP value of 2,167, while the lowest RFP value is X1 (Hot Orange 3D) of 0.043. The development of RFP values at each start-up shows in Figure 5.

3.4. The Ratio of the Number of Products to the Time of each Product Variety (RPP)

The highest product number of 68 products is X5c from Kodama Inc. of 2,190 units, while the lowest product is 0 units owned by several products, such as X6o, X3e, X8k products. The number of products obtained from the duration of time vary. The RPP value is required as the normalized value of all product varieties. Figure 6 shows the development of the RPP value in each product range.

Figure 3: RF values of start-up company

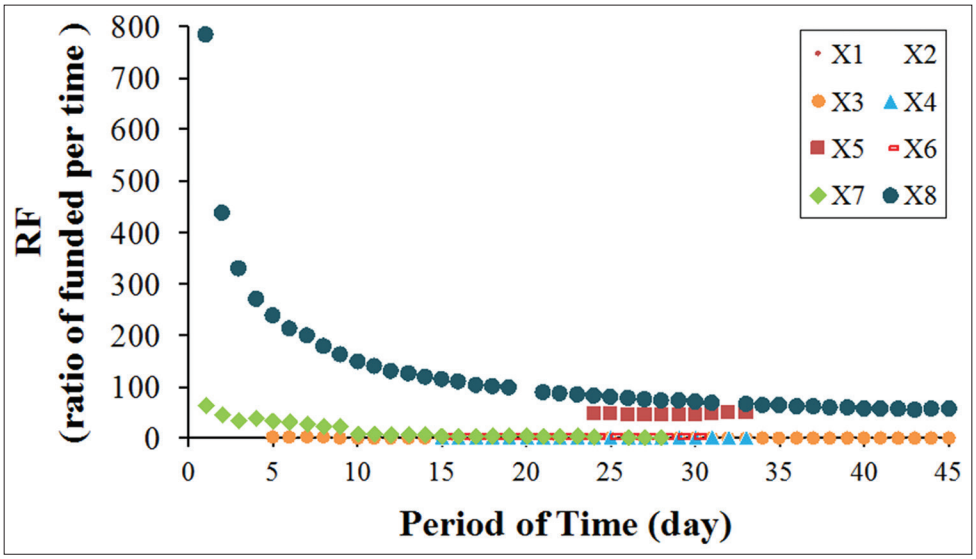


Figure 4: RP of each start-up company

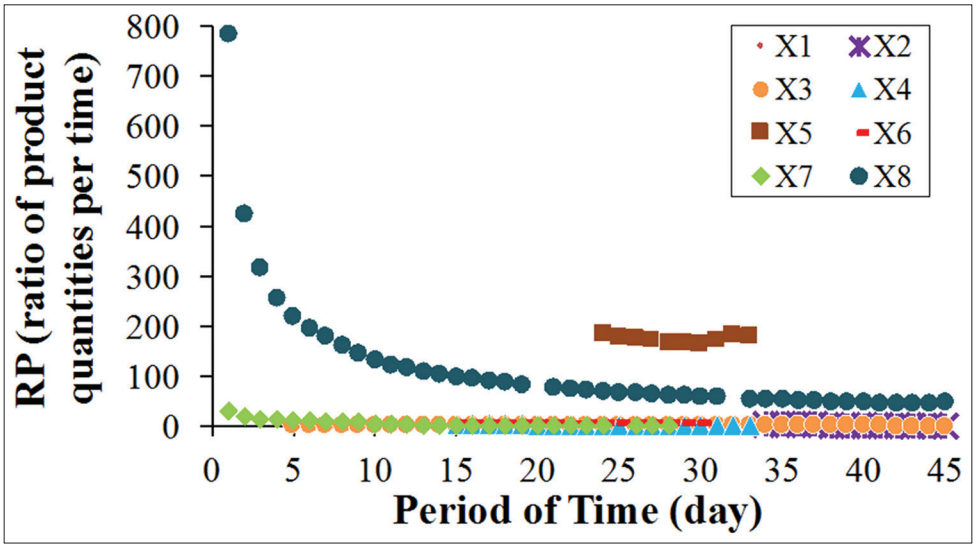


Figure 5: RFP at start-up company

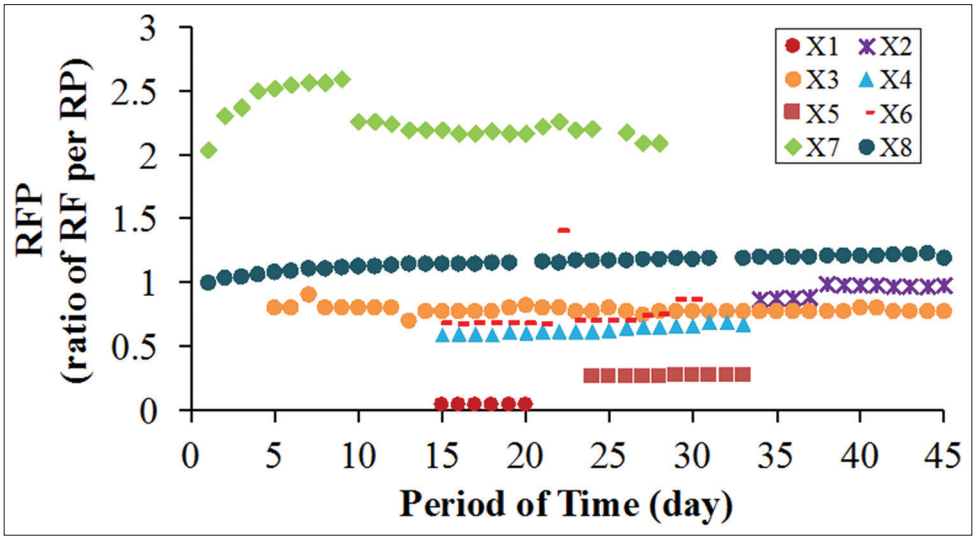


Figure 6: RPP of each product range

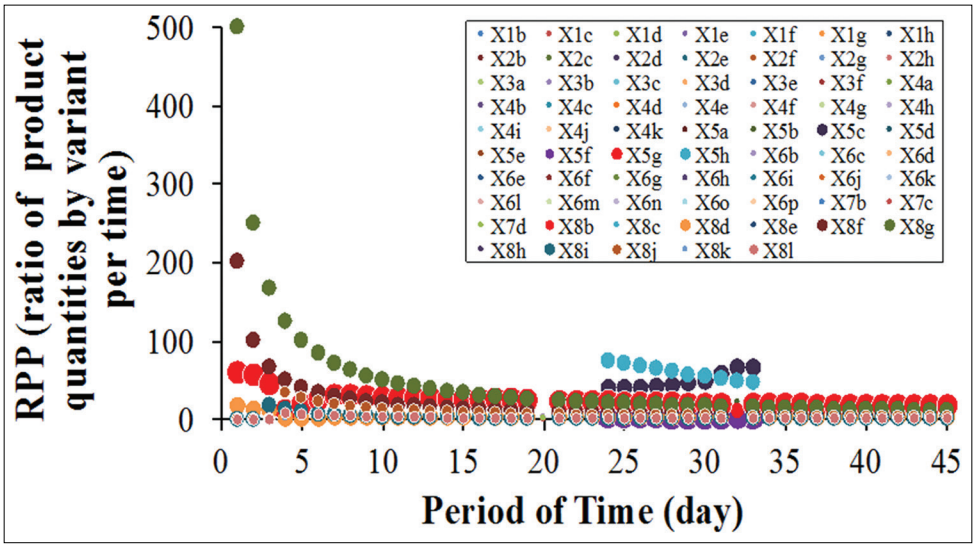
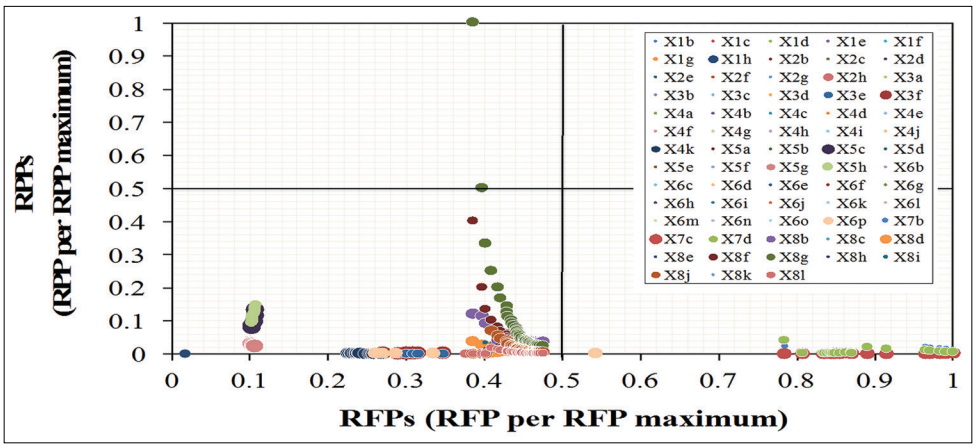


Figure 7: Plotting of market position quadrant



The calculation of the RPP is used to view the favourite market in 68 different products. X5h product from Kodama Inc has the highest RPP value on day 25 which is 70.4. This means that X5h is the most favourite product market compared to other products when viewed based on the value of RPP.

3.5. Plotting Market Position Quadrant

Product success is achieved when a product meets the position in the favourite market quadrant as shown in Figure 2. The values of RPPs and RFPs of each product variety are plotted into Cartesian diagram as shown in Figure 7.

3.6. Quadrant I (Moderate Favourite Market)

There is 1 product or 1.471% product range that is X8g from WOW start-up which is in moderate favourite market (quadrant I). This quadrant contains attributes that are considered to have high product quantities but low funding amounts in the period of time. The dominant parameters are based on RPPs values. Scale range of RPPs ranges from 0.5 to 1.00, while the RFPs range from 0.386 to 0.398. This is still at the limit of the range range in quadrant I. Attributes and statements in this quadrant indicate that a product at start-up can be continued to the next stage of product development such as production process and product launch.

3.7. Quadrant II (the Most Favourite Market)

There is no single product in "the most favourite market" or in other words a percentage of 0%. The most favourite market quadrant can be achieved if a project has a high number of products and funding amounts in the period of time. Where the value of RPPs ≥0.5 and RFPs ≥0.5. In this quadrant position, a product can proceed directly to the stage of product development to market launch.

3.8. Quadrant III (not Favourite Market)

Most of the products are in the "not favourite market" quadrant, which is 63 kinds of products or 92.65%. This condition states that the product can not proceed to the next stage of development, because it is declared not feasible and has not fulfilled the requirements of product success. Scale range of RPPs ranges from 0.00 to 0.50, while RFPs range from 0.017 to 0.475. Although the value of RPPs and RFPs is still within the limit value of scale range in quadrant III, but the value is still low to declare the favourite market.

3.9. Quadrant IV (Moderate Favourite Market)

There are 4 product or 5.88% of the products are in "moderate favourite market." The product range is X6p from 3DMate, X7b

and X7c and X7d from SH IP company. Attributes and statements in this quadrant have a fairly successful product success rate. In this quadrant has low product quantity and high funding amount in period of time. The dominant parameters are based on the value of the RFPs. Scale range of RFPs ranges from 0.26 to 1.00, while RPPs range from 0.00 to 0.04. The value is still within the limit value in quadrant IV.

Based on the results of the analysis of the application of ploting favourite market, the success of the product can be determined based on the amount of funding and the number of products so that this way able to cover the range of products which are in demand by consumers or backer. While the existing method can not and only consider the amount of funding obtained so that it can not represent the success of the product but the success of the company's project alone.

4. CONCLUSIONS

Market position of the observed start-up company withtheir products have been plotted on the quadrant system. Determination of the quadrant has been carried out according to ratio of product number to duration time of each product variety, and ratio of funding obtained to duration time. The results showed that the percentage of product success in each project company was 7.353%. Based on the plots of RRPs and RFPs in the quadrant, none of the products of a project are in "the most favourite market" (quadrant II). Most of the products of a project are in the "not favourite market" (quadrant III) of 92.65%. There are only 5 products in "moderate favourite market" market in quadrant I of 1.471% and quadrant IV of 5.88%.

The product success parameters in the online platform can be determined based on the value of the RPPs, the value of the RFPs, and the application of data plots in the diagram of the 4 quadrants determining the favourite market as shown in Figure 2. The higher the value of RPPs and RFPs, the more favourite a product in the market.

This paper is one of the first to determine the market position in the crowdfunding platform. Furthermore, further research needs to develop a set of factors that affect the market position. These factors can be used by start-ups in designing and developing products as well as designing the information needed on the online platform.

5. ACKNOWLEDGMENT

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