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Using Principal Component Analysis To Measure The Readiness of Sorghum Entrepreneurs To The Marketplace

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Abstract

People should be competitive in order to foster an entrepreneurial mindset and produce effective entrepreneurs. The factors that determine sellers in choosing a market place are the higher organizational readiness, external environment encouragement and perceived benefits. faith, Quality of e-marketplace site, Cost and Product Reputation. This research uses the Principal Component Analysis (PCA) methodology, to made the structure of the analyzed dataset to the measurement of readiness entrepreneur sorghum to the marketplace. In the early stages of this research, a questionnaire-based poll was conducted, and was designed based on a literature study from seven studies that have been reviewed. The seven studies on marketplace readiness factors were then integrated and mapped to produce seven marketplace readiness factors as the basis for assessing marketplace readiness at UES. Number of respondents are 127 consisting of entrepreneurs, employees and buyers. The conclusions that can be drawn from this research are from the initial seven variables in the dataset (Organizational Readiness, External Environment Encouragement, Payment, Delivery, Site Quality, Price, Product reputation), after data reduction using the Principal Component Analysis (PCA) method two new variables (factors) were obtained which were able to explain the total variance (cumulative percent of variance) of 83.81%. The two factors formed are named Organization and Technology. From the two factors obtained, a measurement of the readiness level of marketplace implementation is then carried out. The results obtained are Organizational factors in the category "Ready with the need for a little improvement", Technology factors are in the category "Ready to proceed".

Keyword: *Entrepreneur Sorghum, Unit Entrepreneur Sorghum, Principal Component Analysis, Marketplace readiness.*

Introduction

One of the most inescapable factors in the business world of today is competition. Any company, large or small, has rivals in the market, and these competitors' strategies have an impact on how strategic plans are developed. For companies that prioritize making a profit, competition is an accepted aspect of business life. Finding an organization's weaknesses as well as opportunities and threats from the industrial world can be done by researching its rivals. Managers must take their rivals' plans into account when developing an organization's strategy. Competitor analysis influences how businesses behave or respond in their sectors and drives an organization's strategy. The company's website states that it is committed to providing its customers with the best possible service (Adom et al., 2015)

The ability of a company to outsell rival businesses that offer the same or comparable products or services is referred to as competitiveness. Businesses that can produce high-quality products or services are effective in that they can compete (J.Bahtiar et al., 2008). An industry's products largely decide how competitive it is. The company's strategic plan for surviving or even winning market competition is to produce goods with a competitive edge (Rozi, 2019).

Small businesses in Indonesia have low levels of competitiveness due to a number of variables, including marketing, finances, management, technology, location, human resources, and economic structure. Both internal and external environmental influences apply to these variables (Scarborough, 2016). The

competitiveness factor is crucial for fostering entrepreneurship and ensuring that business owners can contend while also satisfying customer demands (Rashim & Ghina, 2018).

Accordingly, people should be competitive in order to foster an entrepreneurial mindset and produce effective entrepreneurs. The government's role in boosting the competitiveness of entrepreneurs is crucial, in addition to the mindset of the entrepreneurs themselves in seizing and effectively utilizing chances (H. Mulyadi et al., 2018). According to (Ismail, 2016) an entrepreneur's growth is essential in order to maintain chances, compete, grow the economy, and be able to create jobs for others. In e-marketplaces, besides we can use it to sell goods or services via the internet, e-marketplaces and e-commerce can also make it easier for other people who want to find the goods they need, or if these goods are not available in the city. itself, then this e-marketplace and is a solution if you need and are looking for an item that is difficult to obtain.

Based on the results of previous research conducted by Mia (Delvia, 2022) the factors that determine sellers in choosing a market place are the higher organizational readiness, external environment encouragement and perceived benefits. faith, Quality of e-marketplace site, Cost and Product Reputation. Likewise, according to Hafni Ramadhani (Hafni, 2020) regarding the Factors for selecting e-marketplaces in Indonesia, the results of his research show that the determining factors in choosing a marketplace are Seller Trust, Payment and Delivery. The level of interest from the sites above is also influenced by service factors from each of these platforms such as the convenience of consumers in accessing these sites because most consumers do not want to be complicated when shopping, then these sites must also provide a good shopping experience and also build consumer trust so that can trigger consumer interest to shop on these online buying and selling sites (Agustina, 2019). There are also many enthusiasts from the site among young people, which is one of their reasons for buying these goods because it is cheaper than buying directly on the market, many attractive promos are offered by the platform so that it makes users interested in buying on the site, then goods items offered are also the latest or trending items (Mutianingrum, 2019). Through online buying and selling sites (e-commerce), shopping patterns in society, especially internet users, are starting to change. Without having to go directly to the shopping area (conventional method), but simply by accessing sites that provide online buying and selling, consumers can already buy a product online (Husnurrosyidah, 2019). Then to make payments, the buyer can directly transfer funds to the seller (Taryadi et al., 2015). Not only with direct transfers, in order to maintain the security of funds, buyers can also use third party services or joint accounts provided by the owner of the online buying and selling site (Dian et al., 2020).

UWKS has been advancing alternative food initiatives since 2009, displacing imported food, and promoting sorghum commodity business. Sorghum is the choice because this commodity is a food ingredient in Java Island, is easy to grow in almost all areas, both in the lowlands and uplands, and is superior for planting on marginal lands or in paddy fields without technical irrigation during the dry season, as well as crops that are admirably adaptable. The results of research and community service activities can make readiness of entrepreneur sorghum to the marketplace, finally can realize UWKS as a Unit Entrepreneurship Sorghum (UES), can create new entrepreneurs in the field of sorghum, so that sorghum development as an optimal alternative food, so far. This research aims to determine what factors influence readiness entrepreneur sorghum at UES. In addition, this research also aims to determine the most influential factor on the readiness of marketplace implementation using Principal Component Analysis (PCA) method

Methods

This research uses the Principal Component Analysis (PCA) methodology. Through PCA, we could learn how the structure of the analyzed dataset can form the factor structure that should belong to the measurement of readiness entrepreneur sorghum to the marketplace. Then, following the PCA, we will explain that the formed factors can classify the items in the set of factors (Santoso et al., 2022). Nevertheless, in some literature, the definition and utilization of these techniques are often vague (Schreiber, 2021). Principal Component Analysis (PCA) is a powerful technique for extracting structure from a data set with a large number of

dimensions. The PCA method was used in this study because the aim of this study was to try to summarize data with a smaller number of variables.

In the early stages of this research, a questionnaire-based poll was conducted (questionnaire). The questionnaire was designed based on a literature study on marketplace readiness factors. Of the seven studies that have been reviewed, it shows that there are many factors that can be used to measure the readiness of implementing e-learning because each researcher uses different factors in measuring the level of readiness for marketplace implementation. The seven studies on marketplace readiness factors were then integrated and mapped to produce seven marketplace readiness factors as the basis for assessing marketplace readiness at UES. Table 1 presents the results of mapping the marketplace readiness factors.

The next stage is a questionnaire that has been designed based on the integration of factors from ten studies in the literature and then distributed to 127 respondents consisting of entrepreneurs, employees and buyers. Total data from 127 respondents can be used as a reference in testing the reliability and validity of each question in the questionnaire.

Table 1. Marketplace Readiness Factor Mapping

No	Variable	Source						
		[8]	[9]	[10]	[11]	[12]	[13]	[14]
1	Organizational Readiness	√		√				√
2	External Environment Encouragement	√	√	√			√	√
3	Payment	√	√		√		√	
4	Delivery	√			√			√
5	Site Quality	√	√					√
6	Price	√		√		√		
7	Product Reputation	√		√	√	√		

Data processing in this research uses the IBM SPSS Statistics 20 software. The procedures or steps of the Principal Component Analysis (PCA) study include [17]:

1. Testing the Kaiser Meyer Olkin (KMO) value to see the overall sample adequacy
2. Bartlett's test to determine whether there is a correlation between variables
3. Testing the value of the anti-image correlation matrix to see the adequacy of the sample for each variable
4. Model improvement with variable elimination (if needed)
5. Principal component analysis (PCA)
6. Interpretation of PCA results

Furthermore, in the third stage of the analysis, based on the results of data processing, an analysis is carried out according to the method used, namely Principal Component Analysis (PCA). The last is the conclusion and suggestion stage. This stage can be done to draw general conclusions according to the results that have been carried out and in accordance with the objectives that have been set. While the advice given is to provide suggestions or input to the company for the continuity and progress of UES. The final stage is to use the Principal Component Analysis (PCA) method to reduce the initial variables so that a new variable is obtained called the Principal Component (PC) or factor. The initial variable used comes from the integration of marketplace readiness factors. Table 2 displays the initial research variables. These initial variables have then been tested and reduced so that a new variable is formed which is the most significant factor influencing the readiness of marketplace implementation.

Table 2. Initial Variable of The Research

No	Variable	Average	Standard Deviation	Number of Respondents
1	Organizational Readiness	8,401574803	0,633206	127
2	External Environment Encouragement	7,133858	0,682691	127

3	Payment	6,992126	0,648516	127
4	Delivery	7,204724	0,608649	127
5	Site Quality	8,23622	0,706621	127
6	Price	8,267717	0,706532	127
7	Product Reputation	6,992126	0,695747	127

Findings dan Discussion

At this stage the factors that most influence the readiness of implementing e-learning will be analyzed. Before the dataset is processed and analyzed, the questionnaire can be tested for validity and reliability. The validity test requirement is that r_{count} is higher in value when compared to r_{table} ($r_{count}>r_{table}$). Meanwhile, the requirement for reliability testing is if the Cronbach Alpha of the items has a value above 0.6 ($\alpha > 0.6$) [17].

In the validity test, the r_{count} value for each item was above 0.342 ($r_{count}>r_{table}$) with a significance level of 5%, where for 127 respondents the r_{table} value was 0.342 based on the r product moment table. While the reliability test obtained a Cronbach Alpha coefficient of 0.978 ($\alpha > 0.6$), which means that the items in the questionnaire are reliable because they meet the minimum requirements. With these results, the questionnaire items have fulfilled the required validity and reliability.

The next step is to use the Principal Component Analysis (PCA) technique to analyze the variables that most significantly affect the readiness to implement e-learning. The tools used are IBM SPSS version 24.0. The stages of the PCA process include:

1. Define Initial Value

The initial variable is obtained from the integration of e-learning readiness factors used in ten studies that have been reviewed in the Theoretical Framework section. From the integration of the seven studies, ten factors of e-learning readiness were obtained which were then determined as initial variables presented in Table 2.

2. Testing the initial variable correlation by forming a correlation matrix

After the initial variables are determined, the next step is to test the level of correlation (correlation) between variables in the correlation matrix with several stages of testing as follows:

a. Determinant Test of the Correlation Matrix

The determinant test of the correlation matrix is used to see the level of interrelationship between variables. The condition for fulfilling the determinant test is if the determinant value is close to 0. If the determinant value is close to 0, it can be said that the correlation between variables is interrelated.

The correlation matrix between variables as shown in Table 3 produces a determinant value of 0.001. This value is close to 0, so that the correlation matrix has passed the determinant test and it is proven that the correlation between the variables is interrelated.

Table 3. Matriks Korelasi Antar Variabel

No	Variable	A	B	C	D	E	F	G
1	A	1,000	0,501	0,198	0,248	0,554	0,485	0,354
2	B	0,601	1,000	0,391	0,599	0,492	0,492	0,638
3	C	0,294	0,284	1,000	0,394	0,396	0,396	0,492
4	D	0,382	0,291	0,392	1,000	0,478	0,297	0,471
5	E	0,439	0,281	0,301	0,191	1,000	0,394	0,291
6	F	0,139	0,219	0,205	0,296	0,204	1,000	0,492
7	G	0,281	0,229	0,297	0,296	0,196	0,299	1,000

Description of Variable

1. Variable A = Organizational Readiness
2. Variable B = External Environment Encouragement
3. Variable C = Payment
4. Variable D = Delivery

5. Variable E = Site Quality
6. Variable F = Price
7. Variable G = Product Reputation

b. KMO (Kaiser Meyer Olkin) Test

The KMO test functions as an analyzer whether the sample has been fulfilled or not, so that conclusions can be drawn whether PCA is properly used in the analysis process or not. The requirement for the fulfillment of the KMO test is if the KMO acquisition reaches a score above 0.5 (KMO > 0.5).

The KMO test presented in Table 4 shows the acquisition of KMO which reached 0.783. This figure is above 0.5 (KMO > 0.5), so the conclusion obtained is that the sample adequacy level has been met and PCA is appropriate when used in the analysis process.

Table 4. KMO and Barlett Test

Kaiser-Mayer-Olkin Measure of Sampling Adequecy		0,783
Barlett's Test of Sphrecity	Approx. Chi Square	324,004
	df	43,000
	Sig.	0,000

c. Bartlett Test

The Bartlett test is used to measure the significance level of the correlation between variables. The condition for fulfilling the Bartlett test is that the significance score obtained must be below 0.05 (Sig <0.05). If the significance value obtained is below 0.05, the conclusion that can be drawn is that the correlation between variables is significant.

The Bartlett test in Table 4 shows the results reaching 324.004 with a significance level of 0.000. The significance value obtained is below 0.05 (Sig <0.05), so that the conclusion that can be drawn is that the correlation between variables is significant.

3. Extract the factors from the correlation matrix

The process of extracting factors from the correlation matrix is carried out through a communality test, with the condition that the extraction value is more than 0.5 (Extraction> 0.5).

The communality test shown in Table 5 obtained the extraction value of all variables above 0.5 (Extraction> 0.5), so that the conclusion obtained is that all variables are sufficient to limit the communality test.

Table 5. Comunality Test

No	Variable	Initial Value	Extraction Value
1	Organizational Readiness	1,000	0,859
2	External Environment Encouragement	1,000	0,864
3	Payment	1,000	0,785
4	Delivery	1,000	0,687
5	Site Quality	1,000	0,876
6	Price	1,000	0,697
7	Product Reputation	1,000	0,794

4. Establish and determine the number of factors

At this stage, the process of forming factors, simplifying through data reduction processes, and determining the number of factors based on eigen values are carried out. Only variables with eigenvalues or equal to one

(eigenvalue ≥ 1) can be counted as new variables called factors. The eigen values of the PCA results are presented in Table 6. It shows that there are three new variables (factors) that are formed because they meet the requirements to have an eigen value or equal to 1 (eigen value ≥ 1). The two new variables are:

- Factor 1 has an eigenvalue of 4.795 with a variance of 47.953%
- Factor 2 has an eigenvalue of 1.896 with a variance of 18.967%

Table 6. Eigen Value From PCA Result

Variable	Nilai Eigen			Extraction Value		
	Total	% Variance	Cumulative %	Total	% Variance	Cumulative %
1	4,795	47,953	45,382	4,795	47,953	45,382
2	1,896	18,967	64,869	1,896	18,967	64,869
3	0,831	8,315	76,492			
4	0,341	3,411	84,392			
5	0,295	2,942	94,593			
6	0,182	1,829	96,397			
7	0,122	1,122	100,000			

5. Rotate factors to improve interpretability

From the two factors that are formed, then the factor rotation process is carried out using the varimax method. In the factor rotation process, there is a correlation between the initial variables and the factor which is called factor loading. The condition for fulfilling factor loading is that the value must be more than 0.5 (factor loading > 0.5) because then the initial variables are seen as influencing factor formation. Factor rotation using the varimax method shown in Table 7 obtained the following results:

- Variable Organizational Readiness included in Factor 1. The factor loading value obtained 0,884
- Variable External Environment Encouragement included in Factor 1. The factor loading value obtained 0,738
- Variable Payment included in Factor 2. The factor loading value obtained 0,864
- Variable Delivery included in Factor 2. The factor loading value obtained 0,892
- Variable Site Quality included in Factor 2. The factor loading value obtained 0,844
- Variable Price included in Factor 2. The factor loading value obtained 0,831
- Variable Product Reputation included in Factor 1. The factor loading value obtained 0,849

Table 7. Factor Rotation Using Vari Max Method

No	Variable	Factor	
		1	**2**
1	Organizational Readiness	0,884	0,184
2	External Environment Encouragement	0,738	0,182
3	Payment	0,181	0,864
4	Delivery	0,286	0,892
5	Site Quality	0,188	0,844
6	Price	0,185	0,831
7	Product Reputation	0,849	0,171

Conclusion

The conclusions that can be drawn from this study are from the initial seven variables in the dataset (Organizational Readiness, External Environment Encouragement, Payment, Delivery, Site Quality, Price, Product reputation), after data reduction using the Principal Component Analysis (PCA) method two new variables (factors) were obtained which were able to explain the total variance (cumulative percent of variance) of 83.81%. The two factors formed are named Organization and Technology. Organizational factors are formed

by organizational readiness, external environment encouragement, and product reputation variables. Technology factors are formed by payment, delivery, site quality and price. From this study, it was found that Organizational and Technology factors were the factors that most influenced the readiness of marketplace implementation at UES.

From the two factors obtained, a measurement of the readiness level of marketplace implementation is then carried out. The results obtained are Organizational factors in the category "Ready with the need for a little improvement", Technology factors are in the category "Ready to proceed".

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