
Binary Logistic Analysis: Empowerment of Rural Household Craft Industry in Bangli Regency, Bali, Indonesia

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The aim of this study was to analyze the variables that may affect the application of the technology to produce handicrafts. The method used to determine the sample unit of craft businesses of rural households that will be interviewed are accidental sampling.

This study uses a quantitative analytical approach. Quantitative analysis using descriptive statistics and regression of binary logistic analysis. Based on the analysis, it can be concluded that the variables that significantly influence the application of technology in rural craftsmen in Bangli Regency is the income and education level.

The higher the income level, the higher the possibility of craftsmen applying modern technologies. Likewise, the education level, the higher the education level, assuming other variables constant, the possibility of applying the technology will be higher. While the age and type of business does not significantly influence the application of technology.

Keywords: Empowerment, Household Industry, Income, Education, Technology

Introduction

Empowerment of poor communities through strengthening capital, coaching, and mentoring has been done by the government through the relevant institutions. However, these efforts have not been felt by all households in rural craftsmen. This occurs because the craftsmen of rural households enormous amount of funds available to conduct training is still very limited, so the government programs related to community development primarily to the craftsmen of rural households is not optimal. In addition, the craftsmen who have produced results should be followed up by helping craft or facilitate the marketing of craft. This is also the problems faced by the craftsmen during this time.

Problems also arise because of the use of the existing opportunities optimally has not been achieved, which is more caused by the weak managerial capability of human resources. This will have an impact on the inability of small entrepreneurs run their business well. In addition to the importance of increasing the role of economic capital/financial and human capital as a factor of production to increase productivity handicraft business is generated, then the social capital, culture and skills of artisans in utilizing existing technology also needs to be improved. Social capital as an asset to the organization in creating value or an asset to the organization's members through improved job skills, including influence the success of the work, the creation of intellectual capital, and efficiency of multifunctional teams to strengthen relationships with suppliers, production network and organizational learning [3]. Social capital from time to time need to be developed, otherwise the company will not be able to compete [6]. Social capital of the poor people can also be expanded by combining with financial capital, human and physical capital to help them participate in development decisions that affect their well-being [13]. Social capital can be seen from the structure of liabilities, expectations, and beliefs, and social capital can play a role it must interact with the social structure [23]. In addition to financial capital, human capital, and social capital, then the use of technology is very important for this rural Small and Medium Enterprises (SMEs). Although the technology is still very simple, but it can speed up the production process.

Development of the use of technology for developing countries compared with developed industries are very different [21]. Developing

countries in the use of technology is still labor intensive, while the state industry, the use of advanced technology tends capital intensive. Technology can cause a shift in the nature of human materiality. For some people technology can help them to developing more advanced economies and may bring classes in public life [7]. In the long term, the use of appropriate technologies can enhance the role of business industry and be able to maintain the sales of products, services, and market share [1]. Technology can provide value and benefits of a strong impact to produce a better performance of the industry. In addition, strong social capital also have an impact on productivity improvement efforts [1] [5].

Weak empowerment of the poor people in accessing financial resources to improve the work is also found in the study [4]. In fulfillment of the capital of the business activities carried out in its efforts to obtain business credit is still very low. This has an impact on their weaknesses to improve empowerment efforts. By looking at the weaknesses of small businesses for poor households, the role is more real than the government through relevant institutions which can be done by providing credit without collateral in order to improve the empowerment of the business.

Poverty in rural areas is indicated from less helpless communities to improve the lives of more viable, low ability to access venture capital, and the low level of productivity of the effort that have done. The low level of productivity of the work done can also be demonstrated by the lack of their ability to absorb technology. Weak absorption technology is also due to their helplessness in accessing capital, and skills. For the craftsmen sometimes the technology used to be very simple and limited, however there are also craftsmen who have been using a number of technologies as needed. Therefore research conducted related to the application of technology can improve the craftsmen of empowerment efforts. Presence or absence of the application of technology (modern or traditional) in producing handicrafts, examined in this study.

There are several variables that can affect the possibility of applying a technology. Several variables that affect SMEs in applying computer technology [20]. The results showed that gender, age, experience and nature of use (mandatory or voluntary) is a moderating effect on the use of information systems (the use of computer technology). Entrepreneurship technology as well as mediating variables also need to be further proof as endogenous or exogenous variables [1]. The purpose of this study was to

analyze the variables that may affect the application of the technology to produce handicrafts.

Literature Review

Empowerment

Empowerments often seen as a tool to achieve certain goals and as an end in itself. Empowerment involves the ability to make choices and communicate the change process of all components that make up the social structure and reproduce the power relationships and subsequent unequal distribution of opportunities and community resources. Some experts postulate that there are three dimensions of empowerment: empowerment through individual action, collective empowerment that is interpersonal, and social empowerment in generating social action, all three dimensions are interdependent.

Empowerment is energizing to be concerned is able to move independently [16]. Empowerment basically have the intent to create a climate of fair competition and fair, which will provide opportunities to live and thrive for cooperatives and SMEs. The concept of empowerment is the result of an interactive process both at the ideological level and at the level of implementation. On an ideological level, the concept of empowerment is the result of interaction between concept of the top-down and bottom-up, the growth strategy and people-centered strategy. In terms of implementation, the interaction will occur through the struggle between autonomy. The concept of empowerment but it also contains the context to side with layers of society who are under the poverty line [4]. The study of empowerment stated [17]. aims to investigate multiculturalism in the workplace by using a method based diversity training and development of empowerment. A method based on the empowerment proved useful in directing the creation of an exclusive work organization. Empowerment is efforts were made, including the dissemination of information, providing knowledge and efforts made to improve the performance of the entire elements needed for everything. To increase employee competency we need a policy to act appropriately and can increase their services, thus the management is very important to give them the expertise, information and rewards required.

Technology

Technology generally produce or create a certain effect, thus to be able to use it required considerable knowledge. Someone applying certain technologies certainly have the knowledge of how to use these technologies. Technology is part of the culture of knowledge and be able to do it right [22]. Technology can cause a shift in the nature of human materiality [1]. Thus the application of technology in producing a particular product is needed by the industry in general. If knowledge of the application of these technologies, properly understood, the production process would be more efficient.

Technology also can help employees to speed up the production process to produce a particular product. The use of technology can promote the development of small and medium enterprises to diversify the economy of a country. Information technology is very useful in Small and Medium Enterprises (SMEs) [2]. Information OF Technologies have a significant effect on small and medium business sector, especially in the when decrease of industrial or when there is a high unemployment rate. Small and medium businesses in India using information technology very quickly [18]. For small entrepreneurs who understand the benefits of information technology, then by adopting technology entrepreneurs can take advantage of the promised benefits as a result of the adoption of information technology, including improving the efficiency and effectiveness of the organization. However, as a criticism in creating jobs and employment opportunities, small and medium enterprises are still lagging behind compared to other countries.

Regression with Qualitative Response (Analysis of Binary Logistic)

Binary Logistic Analysis is a statistical technique that the dependent variable is in the form katagorikal (nominal or nonmetric) and the independent variable is the metric or nonmetric [9]. Regression Logistic Analysis is also called "Binary Logistic" Regression analysis," Multinomial Logistics Regression Analysis "and "Ordinal Logistics Regression Analysis", depending on the type of scale of the dependent variable that is used. For example, to classify the dependent variable, a nice guy working or idle, he is a member of the group or not, from the ruling party both from the right wing or left wing; a student either graduates or not [14]. Binary Logistic Regression Analysis is the regression analysis applied to the analysis, where the dependent variable in the form categorical, or the dependent variable is qualitative. the

dependent variable is qualitative (categorical) quantified by making variable artificial or dummy variable, with a value of 1 for the variable that appears and 0 for the other. If the answer to the dependent variable yes = 1, no = 0, or applying technology = 1, not to apply technology = 0. this analysis resulted in a regression equation makes it possible to make an accurate estimate of the likelihood that an individual falls mistake one category (Yes or no).

Logistic regression is a model of cumulative distribution function (CDF), which is able to guarantee the value of the dependent variable lies between 0 and 1 in accordance with the theory of probability. CDF has two properties, namely: 1) if the independent variable goes up, then $P(Y_i = 1 | X_i)$ also rose, but never past the range 0-1, and 2) the relationship between P_i and X_i is a non linear so that the rate of change is not the same, but the gains were bigger, then smaller. When the probability is close to zero, then the rate of decline is getting smaller, as well as the probability value close to one, then the rate of increase is smaller [19].

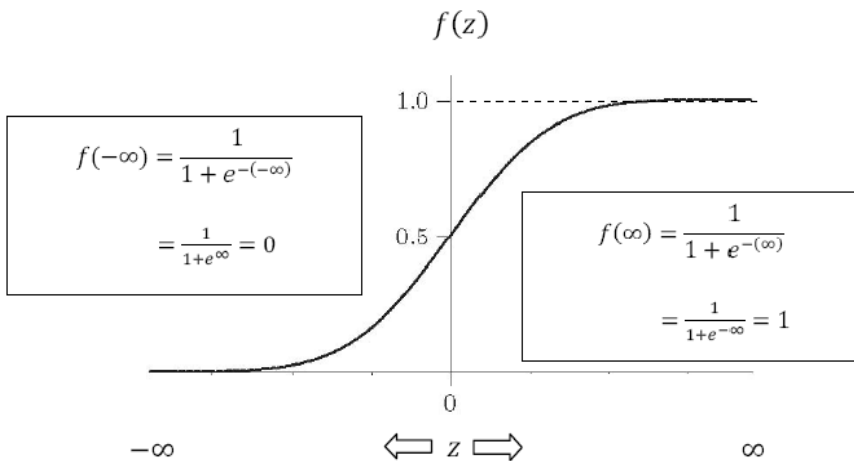


Figure 1: Cumulative Distribution Function (CDF)

In general logistic regression equation for the dependent variable k can be written as follows:

$$\ln[\text{odds}(T/X_1, X_2, \dots, X_k)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2, \dots, \beta_k X_k \tag{1}$$

$$\ln \frac{p}{(1-p)} = b_0 + b_1 X_1 + b_2 X_2, \dots, b_k X_k \tag{2}$$

$$\text{odds} = \frac{P_i}{1 - P_i} = \frac{e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}}{1 + e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}} \quad (3)$$

The probability P_i must be a value between 0 and 1, because it has a limit: $0 \leq E(Y_i/X_i) \leq 1$, which is the conditional expectation (conditional probability) must be a value between 0 and [8].

Research Methodology

The study was conducted using a quantitative approach. The relationship between the independent variables affect the dependent variable is the associative nature. The study was conducted at the handicraft industry of rural households in Bangli Regency of Bali Province. The election of rural household handicraft industry as the research object because the majority of people in rural areas are classified as less able to be in this business group. In addition, this business is able to absorb labor is relatively large. Although there have been economic crisis in a sustainable manner, but these efforts still survive and produce. The results of this effort is a product that is mostly used for the benefit and in the interests of supporting tourism and religious ceremonies. The research location chosen is Penglipuran tourist village that has business units as supporting the tourism sector, which represents small businesses in rural areas.

The population in this study is the number of business units in Bangli regency. Number of sample units to be chosen to represent this population using a quota sampling as many as 40 respondents. The method used to determine the sample unit of craft businesses of rural households that will be interviewed are accidental sampling. The number of samples that have met the requirements for using binary logistic regression analysis techniques. This research was conducted as an application of the strengthening of the course Econometrics, with examples of this research students will be more interested in using binary logistic analytical techniques of research they do.

The collection of data used in this study using interviews. Structured interviews were used to collect primary data through interviews to the respondent, using the list of questions prepared in advance. Besides, it also conducted in-depth interview to the informant craftsmen who represented the respondents.

In this study, there are two types of variables: 1) Variable independent dan, 2) the dependent variable. The independent variables were age, income, education, type of business and the dependent variable is the application of technology. When applying modern technologies dummy = 1 and when traditional technologies, dummy = 0. This study uses a quantitative analytical approach. Quantitative analysis using descriptive statistics and binary logistic regression analysis.

Analysis and Result

Descriptive Analysis

Descriptive analysis described in this study correlated with age, income, education, type of business and application of technology. Each respondent characteristics are presented as follows.

1. Characteristics of Respondents by Age

Overall respondents belong to the age group 25-68 years of productive range as instructed in Table 4.1. Cumulatively, about 84.5 percent of respondents less than 50 years old. At that age range can be said respondents are in the productive age, because productivity tends to increase and will tend to think at the age of 50 years. At the age of 50 years, will tend to start sickly which would result in a decrease in productivity. Stated age range are at high productivity is between 40-49 years, who shown by about 90 per cent of respondents. The characteristics of the respondent's age is presented in Figure 2.

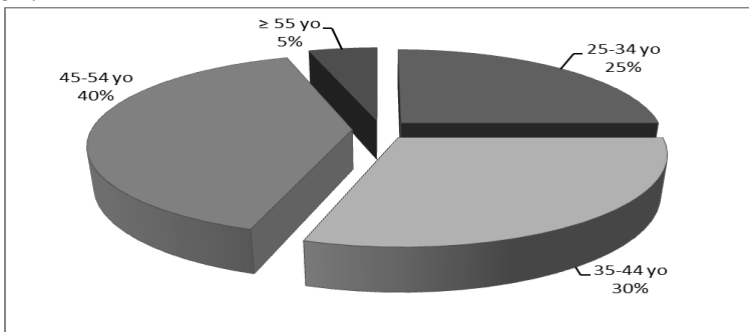


Figure 2: Characteristics of Respondents by Age

2. Characteristics of Respondents by

Revenue in this study is the income received by respondents for one month in running its business as a craft industry in rural households. The results showed that the respondents' income ranged between Rp. 300,000 - Rp. 8.000.000. Distribution of respondents based on income level are shown in Table 4.2. On the average income of respondents Rp 2 million per month. When traced further indicated only a small percentage of respondents had pendapata above average, which is around 25 percent, and the rest is mostly income \leq average income. Thus it can be said that the respondents' income is still very low.

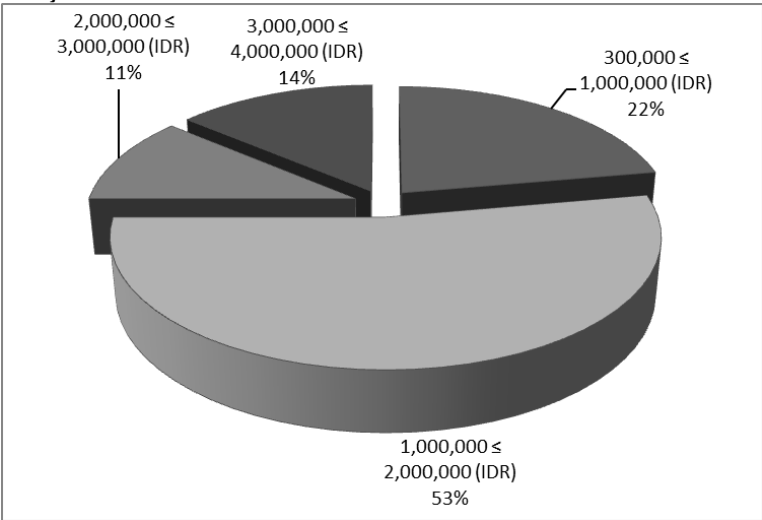


Figure 3: Characteristics of Respondents Based on Revenue

3. Characteristics of Respondents by

Education respondents in this study is measured by years of success. The majority of respondents surveyed are educated finished elementary school (6 years), and only 2.5 percent were educated College (graduated Diploma). Distribution of respondents based on the level of education can be shown as Figure 4.

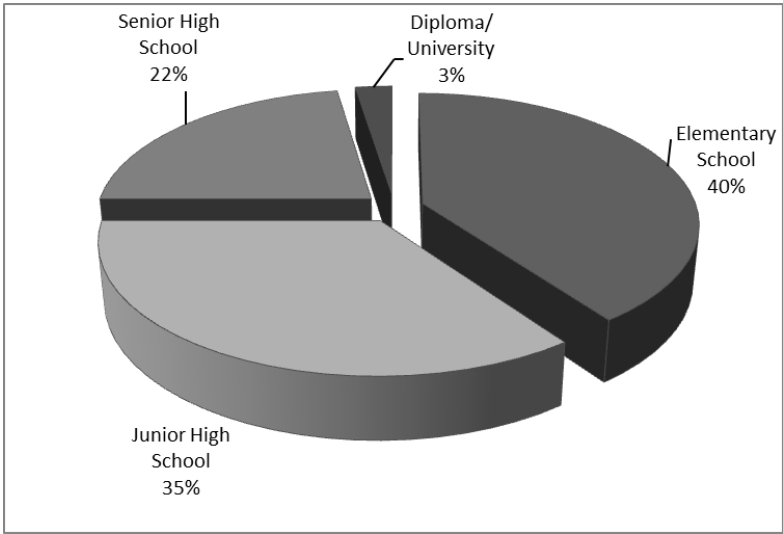


Figure 4: Characteristics of Respondents by Education

4. Characteristics of Respondents by Type of Business

Type of business in this study was measured using dummy variables, one for the type of woven handicraft businesses and 0 for types other craft businesses. The results showed that only a small proportion of respondents who pursue woven bamboo crafts and others pursue handicrafts besides bamboo crafts such as wood carvings, household appliances from wood.

5. Characteristics of Respondents Based on Application of Technology

The use of technology that is intended in this study are craftsmen who use the technology in producing handicrafts. The technology in question is modern technology (using an electric mower, electric drill, electric saw), and traditional technologies. If craftsmen using modern technology given dummy 1 and using traditional technologies given dummy 0. The results showed that 70 percent of respondents are still using traditional technology and only 30 percent are using modern technologies.

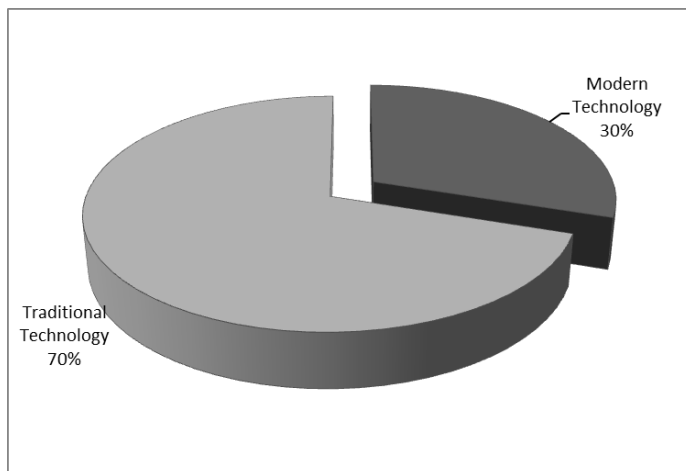


Figure 5: Characteristics of Respondents by Application of Technology

Analysis Binary Logistic

Data were analyzed with binary logistic using the program Eviews results simpler, as shown Table 4.1.

Table 1: Logistic Regression Analysis

Dependent Variable: TECHNOLOGY

Method: ML - Binary Logit (Quadratic hill climbing)

Date: 03/03/15 Time: 10:34

Sample: 1 40

Included observations: 40

Convergence achieved after 5 iterations

Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-10.17468	5.085410	-2.000759	0.0454
AGE	0.040612	0.082509	0.492217	0.6226
INCOME	0.737675	0.357230	2.064985	0.0389
EDUCATION	0.660678	0.294722	2.241699	0.0250
BUSINESS_KIND	-0.574676	1.536242	-0.374079	0.7083
McFadden R-squared	0.455051	Mean dependent var		0.300000
S.D. dependent var	0.464095	S.E. of regression		0.343239
Akaike info criterion	0.915780	Sum squared resid		4.123449
Schwarz criterion	1.126890	Log likelihood		-13.31560

Hannan-Quinn criter.	0.992110	Deviance	26.63119
Restr. Deviance	48.86914	Restr. log likelihood	-24.43457
LR statistic	22.23795	Avg. log likelihood	-0.332890
Prob(LR statistic)	0.000180		
<hr/>			
Obs with Dep=0	28	Total obs	40
Obs with Dep=1	12		
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The processed data may be presented in the form of the following equation:

$$\ln \frac{p}{1-p} = -10.175 + 0.041(\text{age}) + 0.738(\text{income}) + 0.661(\text{education}) - 0.575(\text{business kind})$$

$$S_b = (5.085) \quad (0.083) \quad (0.357) \quad (0.295) \quad (1.536)$$

$$Z = (-2.000) \quad (0.492) \quad (2.065) \quad (2.242) \quad (-0.374)$$

$$\text{Sig} = (0.045) \quad (0.623) \quad (0.039) \quad (0.025) \quad (0.708)$$

$$\text{McFadden } R^2 = 0.455 \quad \text{LR statistic} = 22.238 \quad \text{Sig.} = 0.000$$

Substituting these figures, then made the following equation:

$$\frac{p}{1-p} = e^{(-10.175+0.041\text{age}+0.738\text{income}+0.661\text{education}-0.575\text{businesskind})}$$

$$p = 1 / (1 + e^{(-10.175+0.041\text{age}+0.738\text{income}+0.661\text{education}-0.575\text{businesskind})})$$

Simultaneously independent variables as age, income, education, and business types significantly affect the application of technology. This can be demonstrated by LR statistic = 22.238 (equal to $\chi^2 = 22.238$) at SPSS, greater value $\chi^2_{\text{table}} = 9.488$ (df = 5-1 = 4) at the level of significant 5 percent. The processed data can also be seen that McFadden R^2 for 0455 the same as the coefficient of determination in the usual regression model. This means that 45.5 percent of the variation application of technology is affected by variations in age, income, educational level, and the type of business and the remaining 54.5 percent is influenced by other variables outside the model. Thus there are many other variables that affect the actual implementation of technology for the craftsmen. For example the experience as craftsmen, the need to apply modern technology, or other variables.

Discussion

The influence of age on the application of technology

Age may affect the craftsmen to use technology in conducting business activities. A young age tend to be very innovative and productive in production, so they tend to more quickly adopt the technology compared to the old age. Results of research conducted showed that age influence the application of technology in the management of SMEs [20].

The results of this study, when analyzed using binary logistic craftsmen showed that age does not affect the use of technology in producing handicrafts. Descriptively, the average age of the respondents tend to be still very productive. Respondents in this study had a statistically significant probability/possibility that in the application of modern technologies. This means that age does not determine a craftsman in the application of modern technology or traditional in this study. The results of statistical analysis indicated by the value of $z = 0.492$ and a probability value/significance $0.623 > 0.05$, not significant. This means that age does not significantly affect the craftsmen within their possibilities to apply modern technologies. This study differs from studies Teddy et al (2009), which resulted in the conclusion that the age of the entrepreneur affect the use of technology in SMEs studied [20].

Influence Of Technology Application Revenue

Craftsmen revenue can influence their chances for adoption of the technology. The analysis showed that the income of a significant effect on the possibility of craftsmen to apply modern technologies. The higher the income level, the possibility of the craftsmen to implement the use of modern technology compared with traditional technology are also getting bigger. The results of this study, when analyzed using binary logistic showed that the craftsmen income effect on their likelihood to apply modern technology in producing handicrafts. Z value count = 2.065 , with a probability value $0.039 < 0.05$. The higher the income level there is a tendency craftsmen to implement the use of modern technologies. Until now, this research was conducted, mostly craftsmen still use traditional technologies to the production process. They are willing to use more modern technology, but the ability to purchase the equipment from the electricity is limited. Because of very limited capital owned then they still

carry out business activities as conducted sat. The desire to implement more modern technology than the actual craftsmen is their desire.

So it can be concluded that there is a desire from the craftsmen to implement more modern technology to produce handicraft items, but their ability to buy more modern equipment is still inadequate, because the income received is still relatively low. The craftsmen aware of the use of more modern technology can increase the production of handicraft business is done, so as to increase empowerment of craft businesses that occupied so far. That view also reinforces the opinion of the [2], that technology very helpful in Small And Medium Enterprises (SMEs). Likewise reinforces the opinion expressed by Sanjay and Pravada (2013), that technology, as well as information technology have a significant effect on the sector of small and medium enterprises [18]. From the interviews that have been done by the craftsmen, it can be said that when income increases, the likelihood of their craftsmen to apply modern technology will be even greater.

Effect of Education Against Application of Technology

The level of education is also expected to influence technology implementation. If the respondent's educational level is high then the chances of them apply the technology also higher. The results showed that the respondents' education level as measured by years of success affect the application of the technology significantly. This is indicated by the count z-value 2.242, with a probability value $0.025 < 0.05$. This means that the higher the education level of respondents their chances to apply modern technology also higher.

Influence of The Type of Business the Application of Technology

This type of business is also expected to affect the application of technology. Using or not using modern technology is also determined by the type of business generated. If the type of business that is generated is willed into their use of modern technology, the craftsmen are trying to use it. However, when using simple technology craftsmen can still produce craft items they perceive that the use of traditional technology is still quite adequate. In this study, the processed data showed that the type of business does not significantly influence the application of technology. Type of business using dummy variables in the analysis. When this type of business are woven bamboo given dummy 1 and the other is zero. Turns craftsmen who produce

handicrafts such as woven bamboo, the possibility of applying modern technologies lower than those producing craft items instead of woven bamboo. Results of the analysis showed z-statistic = 0.374, with probability = 0.708 > 0.05. So it can be said that this type of business does not significantly influence the application of modern technologies.

Craftsmen who use traditional technology of the view that to produce handicrafts that occupied not have to use modern technology, although the production process more time consuming than using modern technologies.

The craftsmen who produce results woven bamboo crafts this did not have to use modern equipment, because they weave more use of hand skills. Another case when craftsmen that use materials from wood, may need more modern equipment higher. Craftsmen relationship with fellow craftsmen as friend connections are very strong. Mutual trust is very high and helping each other is a reflection of the strength of social capital in the business environment of the craftsmen. Relationship strong friendship can develop mutual respect between each other in a community. Sense of community and kinship form a network also helps artisans who lack the equipment to produce a product, can be helped by friends or other relatives in their environment. This indicates there is a relationship which reflects the strong social capital to run a business. With borrowed equipment with a neighbor or friend, then they can work more quickly and the time used to produce handicraft items are also shorter, thereby improving productivity. Social capital featuring the company's ability to benefit from the network. These advantages can include access to knowledge, resources, technology, market and business opportunities. A bond formed in the network as supply contracts between the companies with the other create social capital resources. When interactions in relationships between companies rose, social capital becomes better, thus potentially increase profits. This level of trust and dependence rational between companies in a special relationship is a qualitative indicator of the relational dimension. The higher the trust between each other, and the better relations can improve confidence.

Conclusion and Recommendations

Based on the analysis, it can be concluded that the variables that significantly influence the application of technology in rural craftsmen in

Bangli Regency is the income and education level. The higher the income level, the higher the possibility of craftsmen applying modern technologies. Likewise, the education level, the higher the education level, assuming other variables constant, the possibility of applying the technology will be higher. The existence of strong fraternal relations in a community environment craftsmen can form a bond of trust between the network and they reflect strong social capital. This can help the process of production due to modern equipment that is used to speed up the production process they can borrow from friends or relatives. Thus, the production process can run more quickly to support increasing empowerment of the effort by the craftsmen. While the age and type of business does not significantly influence the application of technology.

Craftsmen should be still consider the use of modern technology such as drill and electric planer to produce handicraft items, thus increasing productivity. By using modern technology, the time used to produce handicrafts shorter compared to just using traditional technology. The craftsmen are also advised to retain the social capital that has existed so far, and still maintain good relations with fellow craftsmen in the business environment.

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