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INCLINATION TOWARDS THE USE OF TECHNOLOGY AMONG RURAL WOMEN ENTREPRENEURS IN THE AGRICULTURE SECTOR

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ABSTRACT

The use of technology in Malaysia is now widespread in the agriculture sector and agro-based industries, particularly in the food processing one. Processing technologies include refrigeration, curing, drying, bottling and canning. Handling and packaging technologies are also widely used in the food processing industry. The use of technology and innovation is practised not only by large-scale food producers, but also in micro, small and medium enterprises (MSMEs). The food processing industry in Malaysia is an industry that is increasingly dominated by women. Based on this background, this study focuses on rural women entrepreneurs who do business in the food processing and agro-based industries. The study seeks to understand their tendency towards technological usage in their businesses. It has been carried out in line with the national agenda of achieving productivity-driven growth and innovation which involved rural women. The scope of this study includes the technique of primary data collection that combines quantitative and qualitative approaches. It was inclusive of questionnaires and face-to-face interviews. A stratified sampling procedure was used to select respondents. An analysis on the characteristics of the respondents, and a logistic regression were performed using the SPSS software. The study found that 44% of women entrepreneurs tend to use technology in their business operations. This trend was positively and significantly influenced by factors such as age, women development programs that respondents were associated with, and their membership period of these programs. The information from this study can be used by marketing agents and technology generators to form suitable marketing strategies. The distribution of new technologies can also be directed more to its target group. Innovation and diffusion of technology are indeed necessary for women entrepreneurs, particularly in the rural areas where they can improve their productivity and diversify their products.

Keywords: Food Processing Industry; Small and Medium Enterprise; Women Development Program; Malaysia.

1. INTRODUCTION

The Oxford Dictionary defines technology as "the study and use of science for practical tasks in industry, business, etc." (Oxford, 2011). In other words, technology can be defined as a technique, method or process used in the production of a product or service or to achieve an objective. Technology may be embodied in machinery, computers, manufacturing equipment, production processes and others.

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Technology has played a big role in developing the agriculture industry. The use of technology is widespread not only in farms but also in processing factories, particularly in food processing. Processing technology in the food industry includes refrigeration, curing, drying, bottling, canning and sugar coating (Omar, 2010). This technology has not only been used by processors and large-scale food producers, but it has also spread to industrial use by the micro, small and medium enterprises. Food processing operations involves separating, stabilising, structure-forming, converting, and packaging operations. In fact, high-technology applications are also available in the food processing industry. For example, chromatographic separation, ohmic heating, ultrasound processing and intelligent packaging (Hightech Europe, 2009).

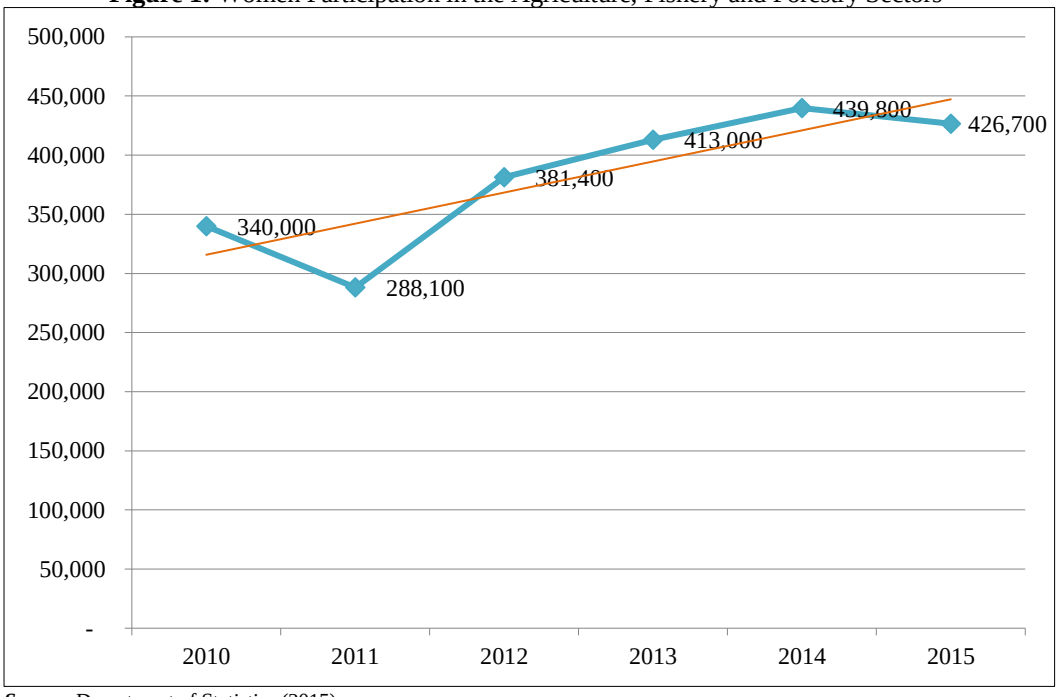
It is noted that the food processing industry in Malaysia is increasingly being dominated by women. The participation of Malaysian women in the labour force is relatively low (45.7%) as compared to neighbouring countries such as Thailand (70.0%), Singapore (60.2%) and Indonesia (51.8%), as reported by the Economic Planning Unit of Malaysia. The government, through the 10th Malaysia Plan (RMK-10) agenda, seeks to empower women to be more involved in the economy. Among the main ideas in the 10MP is the achievement of productivity-driven growth and innovation. This can be attained through increased use of technology. This scenario is the basis for the study with the focus on rural women entrepreneurs who conduct businesses in the food processing and agro-based sector and to understand their inclination towards the use of technology in their business operations. This study was carried out in line with the national agenda to achieve productivity-driven growth and innovation involving rural women.

2. LITERATURE REVIEW

The labour force is one of the main factors contributing to Malaysia's economic growth. As the economy has shifted from the agriculture sector to the industrial sector and then to the services sector, the structure of the labour force has also changed. Most of Malaysia's labour force participation over the past 30 years had been dominated by men. Several scholars concluded that lack of local participation is often associated with lack of information and communication on resource conservation and management (Kunasekaran, Ramachandran, Yacob, & Shuib, 2011; Johari, Ramachandran, Shuib, & Herman 2015; Ng, Chia, Ho, & Ramachandran, 2017). However, these studies failed to focus the significance of women participation.

The women workforce had evolved a long time ago even before Malaysia's independence in 1957. However, the participation of women in the labour market was low because of the role they held in a traditional family unit such as bringing up their children and doing domestic chores (Nor and Said, 2016). Most of them had engaged in non-market activities at home or in an informal sector such as the family labour in the paddy field/cultivation which did not require approval, certification or specific academic achievements (Shaheen et al., 2011). Moreover, the occupational segregation and discrimination in the career of women may have led them to abstain from the job market (Wye and Ismail, 2012). However, as economic structures change, a lot of improvements have occurred in the development of human capital. This, together with the growing demand for female workers have led to an increase of women participation in Malaysia's labour force. Furthermore, various incentives and programs have been created to attract more women to get involved in the working world, especially in the small and medium-sized enterprises (SMEs). Women participation in agriculture, fisheries and forestry had increased by 26% in 2015 from the year 2010 as shown in Figure 1.

Figure 1: Women Participation in the Agriculture, Fishery and Forestry Sectors



***Source**:* Department of Statistics (2015).

According to Abu Bakar and Rajuddin (2006), most of the women involved in SMEs are operating on a small scale and are typically involved in the food processing industry. As the economy becomes knowledge-based, there is a huge investment on modern technology, Information and Communication Technology (ICT) and innovation which have transformed the agricultural sector into a more modern and innovative one. Technology thus has played an important role in enhancing the productivity and income of entrepreneurs.

Based on a study done by Wright et al. (2007), the use of technology commercialization is increasing sharply as a platform for creating new businesses. Technology is also another important indicator to measure the competitiveness of a firm, as well as for its production, marketing, labour and product development (Ling, 2000). These measurements are important to assess the performance firms (Dodge & et al.1994, Capon et al.1990, Hayes & Wheelwright 1984).

Aziz et al. (2000) revealed that technology usage among the SMEs in Malaysia is still low because of the lower capacity of machines being utilised. Most of the entrepreneurs used semi-automatic equipment and/or mobile ones for the production and processing technology which would limit the scale of production to be lower. Dangiran (2000) stated that there was moderate usage of technology for bakeries. The obstacles to the use of technology are financial and lesser demand among the Chinese entrepreneurs. Abdullah and Abu Samah (2013) explained the factors affecting technology usage. Perceptions and levels of education, as well as extension-workers' knowledge, the management of extension programs, and physical conditions of the area, are all factors that affect technology adoption within the agriculture industry.

The technologies used by women participation in the SMEs were at the higher level of the processing technology and needed more improvement of the packaging and marketing for the processing of food products (Abu Bakar and Rajuddin, 2006). Mohamad et al. (2010) stated that there was a need for new innovation in technology, especially for the optimum scale production, in order to improve the productivity level. Porter (1990) mentioned that one of the factors that had influenced competitiveness among the firms is innovation. Entrepreneurs should consider this in the management of their firms and also in the marketing of their products in order to adapt with the changing trends in globalisation.

3. RESEARCH METHODOLOGY

Data for this study include primary data collection that combines the quantitative approach via questionnaires, and the qualitative technique through face to face interviews. The respondents comprise members or participants of rural women development programs, namely Kumpulan Pembangunan Wanita (KPW), Kumpulan Peladang Wanita (PeladangNita), and Kumpulan Wanita Nelayan (KUNITA). These members were selected to participate as respondents for the study because 65% of them have been identified as entrepreneurs engaged in the food processing industry in the Malaysian rural areas (Nik Rozana et al., 2014).

Access to conducting the surveys and interviews with the respondents was obtained with assistance from the Malaysian Department of Agriculture, Farmers' Organization Authority, and the Malaysian Fisheries Development Board. Probability sampling was used for this study, whereby stratified random sampling of respondents was chosen, in order to ensure proper representation of different participants from each program. Characteristics of the respondents were analysed.

The Statistical Package for Social Sciences (SPSS) software provided the logistic regression that was performed in order to examine the relationship between women entrepreneurs in rural area and the factors of their inclination towards the use of the technology. This regression was used because the dependent variables of this study were dichotomous, whereby '1' would denote the respondent's or individual's inclination to use technology in their enterprises, and '0' if she would not be using the technology. The logistic model adopted is specified as in Gujarati and Porter (2009):

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = z_i$$

$$= \beta_1 + \beta_2 X_i + \mu_i$$

L_i allude to the logit which spell out the odds ratio. It is linear in the dependent variables X_i and β_i. When the odds ratio is less than 1, the logit becomes negative and when it is more than 1, the logit becomes positive (Peng and So, 2002; Nor et. al, 2015).

Hence, in order to determine factors that influence the inclination of women entrepreneurs using technology in agricultural entrepreneurship, the model specification by Nor and Said (2016) was adopted. The model estimated is focused on the relationship between inclinations of women entrepreneurs and their demographic behaviour as follows:

$$WInc = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{WDP} + \beta_3 \text{MS} + \beta_4 \text{DMP} + \mu_i$$

where

WInc	=	inclination of using technologies (1 = if the person uses the technology; 0 = otherwise)
Age	=	Age (dummy)
MS	=	Vector of 3 marital status (dummy)
WDP	=	Vector of 3 women development program (dummy)
DMP	=	Vector of 3 durations of membership in the program (dummy)
β_0	=	Intercept
β_n	=	Coefficient of independent variable
μ_i	=	Stochastic disturbance term

B_1, β_2, β_3 and β_4 measure the changes in *WInc* for a unit change in the independent variable (X). It denotes how the odds ratio in the women inclination changes as X changes by a unit. The intercept β_0 is the value of the log odds in women inclination if X is zero. The model incorporating independent variables consist of demographic factors such as the dummy variables of age, marital status, women development programs and duration of membership. Age is likely to influence the use of new technology to which younger women are usually more vulnerable and receptive to as compared to older ones who are more accustomed to old methods. The duration of membership in development programs plays an important role as it represents an individual who has long been involved in the program and has a lot of experience, skills and knowledge. Marital status is another factor which affects the inclination of women. The various government efforts through women development programs are given mainly to single mothers. A women development program is also seen as one of the methods that can increase the likelihood of the use of technology in view of it exposing new ones to rural women entrepreneurs to enhance their business and income.

4. FINDINGS AND ANALYSIS

4.1. Profiles of Respondents

Table 1 shows the profile of respondents. All respondents were women who participate in development programs for women in rural areas in Peninsular Malaysia. Almost 65% of them are adults aged between 41-60 years, while 80% of them are married women. Almost half of these women entrepreneurs are likely to use technology in their businesses. This is an indication that the use of technology is well received in the food processing and agro-based enterprises. Nevertheless, the use of technology can still be improved among these women entrepreneurs. This study was conducted to identify factors that affect their propensity to use technology in their business operations.

Table 1: Respondent Profile

	Frequency (n = 256)	**Percentage (%)**
Age:		
18-40 (Youth)	41	16.0
41-60 (Adult)	165	64.5
>60 (Elderly)	50	19.5

Table 1: Respondent Profile (cont.)

	Frequency (n = 256)	Percentage (%)
Status:		
Single	10	3.9
Married	204	79.7
Single Parent	42	16.4
Program attended:		
KPW	32	12.5
PeladangNita	149	58.2
KUNITA	75	29.3
Duration of membership in the program:		
>10 years	38	14.8
5-10 years	73	28.5
<5 years	145	6.6
Inclination to the use of technology:		
Yes	113	44.1
No	143	55.9

Source: Field work

4.2. Level of Technology Usage

Results show that 44 percent of women entrepreneurs in rural areas incorporate the element of technology in their food processing businesses. Information obtained through both interviews and observations found that the drying and freezing technology are widely used among these entrepreneurs. However, a majority of these entrepreneurs, especially those operating micro and small-scale businesses, still use manual methods such as blending and mixing of raw materials by hand without the aid of machines. At most, they will only use small machines for packaging purposes. It can be seen that a lot of waste like skin and seeds of fruits from the processing of raw materials are wasted.

A logistic regression analysis was conducted encompassing variables which include respondents' inclination to the use of technology, age, marital status, women development programs, and duration of their membership in these programs. Information about these variables is presented in Table 2.

Table 2: Variables included in the Logistic Regression Analysis

Variables	Description
Dependent variable	
Women inclination to the use of technology	1 = use of technology 0 = do not use technology
Independent variables	
Women development programs	Dummy set categorized into: 1. Kumpulan Pengembangan Wanita (KPW) 2. Kumpulan Peladang Wanita (PeladangNita) 3. Kumpulan Wanita Nelayan (KUNITA) (category omitted)
Age	Dummy set categorized into: 1. Youths (18-40 years) 2. Adults (41-60 years) 3. Elderly/Senior citizens (61 and above) (category omitted)

Table 2: Variables included in the Logistic Regression Analysis (cont.)

Variables	Description
Marital status	Dummy set categorized into: 1. Married 2. Single parent 3. Single (category omitted)
Duration of membership in programs	Dummy set categorized into: 1. Less than 5 years (category omitted) 2. 5 -10 years 3. More than 10 years

4.3. Result and discussion of regression analysis

The components of age, marital status, development programs, and the membership period were entered into the logistic regression model as variables. The determination coefficient, R^2 measures the proportion of the variation in the dependent variable explained by the independent variables. A higher R^2 would imply that the calculated Y equation line fits closer to the data points (Ahmad, 1994). Findings showed that 44% of respondents who use technology in their businesses were driven by several factors such as age, women's development programs they had joined and the duration of their membership.

The age factor appears to play an important role. Younger women under the category of youths (aged 18-40 years) are more likely to be engaged in the use of agricultural technology as compared to the older ones. The findings also indicate that youths are significantly more likely to use technology, in which the probability of the use of technology among youths is 2-fold ($p < 0.10$). This was expected because youths today are already exposed to the elements of technology in their daily lives when compared to the older generation. Naturally, youths are more willing to accept new innovations and technology in their agro-based operations. The trend is positive for the elderly, but this is not significant.

Additionally, the findings of the analysis also show that the development programs for rural women have managed to increase interest in the use of technology for its participants. The highest tendency is for 'Kumpulan Pembangunan Wanita' (KPW) which has correlated positively and significantly ($p < 0.01$). Exp (B) or the odd ratio that measures the likelihood for a predictor also shows that rural women entrepreneurs involved in the KPW program are 6 times more likely to use technology than women entrepreneurs in the KUNITA program. Meanwhile, members of the PeladangNita program are more likely to use technology by 3-fold. These indicate that women development programs have a positive impact on promoting the use of technology for rural women entrepreneurs. Such programs need to be further improved as an avenue to introduce the benefits of using technology in order to indirectly help increase the business capacity and income of rural women entrepreneurs.

Furthermore, participants who have long joined the women development program, appears to have a higher tendency to use technology. This may be driven by factors of trainings and courses organized regularly by the program. The probability of women entrepreneurs who have participated in the program for more than 10 years in the use of technology is three-fold, while those who have been members between 5 and 9 years, by 2-fold ($p<0.10$). The membership duration relates with experience and knowledge, which play an important role in the use of technology. This means that

the government's efforts via women development programs are worthwhile and has a positive impact. Conversely, the marital status of rural women entrepreneurs shows an insignificant result.

Table 3: Regression results for inclination of rural women entrepreneurs towards the use of technology

	Coefficient	**Exp(B)**
Constant	-1.916*	0.147
Women's Development Program		
Kumpulan Pengembangan Wanita	1.845***	6.331
Kumpulan Peladang Wanita	1.044***	2.841
Age		
Youths (18-40 years)	0.761*	2.140
Adults (41-60 years)	0.474	1.606
Duration of membership in the program		
5-10 years	0.704*	2.021
10 years and above	0.942*	2.564
Marital status		
Married	0.294	1.342
Single parent	0.188*	1.207

Notes: * significant at p<0.10, ** significant at p<0.05, *** significant at p<0.01.

5. CONCLUSION

The study has shown women entrepreneurs among youths are more open and tend to apply the usage of technology in their agro-based businesses. Technology transfer is important in order to attract more youths to become entrepreneurs who have the skills to operate and handle emerging technologies to enhance sustainability in the food processing sector. Women development programs have had a positive impact on promoting the use of technology for women entrepreneurs, especially those who have long been members and able to join courses and trainings through the development programs. Such programs need to be further improved as an avenue to introduce and build members' capacity to use technology to increase their productivity and quality of products, while indirectly helping them to increase their income.

Improvements to increase the effectiveness of technology transfer to women entrepreneurs in rural areas can be carried out by taking into account the needs of small and micro entrepreneurs there. Technology that is simple, inexpensive and able to solve problems will be more beneficial and affordable for this target group. In addition, technology transfer mechanisms that have been developed especially for the target group can be improved by strengthening the role of programs and associations in rural areas. Several representatives from women associations and development programs, for example, may be exposed first to the new technology that is easy, inexpensive and capable of solving the problems faced by small-scale businesses. After they have been exposed and have understood the technology, only then would these representatives be given the responsibility to introduce them to other members of the program. Introducing easy or user-friendly technology through a person they trust is the beginning of acceptance among the rural women towards more high-tech applications in the food processing industry.

In general, the use of technology and innovation still have plenty of room to be strengthened and accepted, especially among women entrepreneurs of micro, small and medium enterprises in rural

areas. It would be unfortunate if the absence of technology or innovation is the factor that hinders the growth of small-scale food processing entrepreneurs, when there is an abundance of resources and skills from the women community to be developed into bigger markets. Innovation and dissemination of technology, including the role of marketing agents are necessary for women entrepreneurs in the food processing industry, particularly in rural areas where they can improve productivity and diversify products.

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