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Women Competence on Home Gardening to Support Food Diversification

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ABSTRACT

The objective of this study is to analyse competence in home gardening among women in Minahasa and Bitung, North Sulawesi. The respondents were 267 housewives selected out of 803 women participating in home gardening intensification programs. Data was analysed using the Structural Equation Model. Results indicated that the level of competence is high and affected directly by extension and perceptions of home gardening, and indirectly by the environment and group roles.

Keywords: Competence of women, food diversification, home gardening

INTRODUCTION

The demand of food is always on the increase; on the other, there is a declining capacity of resources, especially those supporting food production. In addition, the impact of global climate change as well as land conversion has also threatened the provision of food. So far the government has been quite successful in ensuring the availability of food for the Indonesian people although very often it is through imports.

A home garden has a great potential to meet the family's food needs and increase family incomes. Nationally, the total area of home gardens is around 10.3 million Ha or 14% of the total agricultural land area. Undoubtedly, home gardens are potential sources to be food providers for various foodstuffs with high nutritional values, and, at the same time, they can be economically profitable (BP2TP, 2011).

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Indonesian women have great potential to achieve food security at the household level. To achieve household food security, the housewives require competencies on food diversification, which can be achieved through the utilization of the home gardens in a sustainable manner.

Results of 13 case studies by Howard (2006) on home gardens in South America reveals that women are the main managers of home gardens in the region. As the manager of the home garden, they need to have useful knowledge on the needs of the family.

Optimising the utilisation of home gardens in a sustainable manner should be supported with the competence or ability of the owners (women). However, most women still have relatively low competence in managing their home gardens, resulting in the low productivity of their home gardens.

Competence is an integration of knowledge, attitudes, and skills needed someone to do the job (Boyatzis, 1982; Spencer and Spencer, 1993). Competence can be developed through training and practicing the skill. This study aims to analyse the level of competence among women in the utilization of home garden to support food diversification and analyse factors that influence the competence.

LITERATURE REVIEW

Competence is a combination of knowledge, attitudes, and skills that people need in carrying out their work. According to Spencer and Spencer (1993), competence shows the underlying characteristics of behaviours that describe the motives, personal traits, self-concept, values, knowledge or skills that a superior performer brings into the workplace. According to Boyatzis (1984), competence is the ability and skills that a person has to achieve his or her goal. To meet the standards, the three aspects of competence can be developed through training and development (Sumardjo, 2008). Thus, in the context of home garden management, it can be stated that women's competence in utilising a home garden to support food diversification is a combination of accumulated knowledge, attitudes, and skills in women that make them able to utilise their home gardens well in their effort to meet the family's food needs. This study used the following concepts and theories to achieve its objectives: (1) perception (Asngari, 1984); (2) Competence (Boyatzis (1984), Spencer and Spencer (1993) and Sumardjo (2008), (3) application of technology, group solidity and behavioural change Hare et al. (1962); Kerlinger (2000).

Competence or ability based on knowledge, skill and supported by attitude measured in this research are (1) technical competence, that is woman's knowledge and skills level related to technical norms in managing the home gardens as source of food diversification; (2) managerial competence, the level of knowledge and skills women have in organising and developing existing resources to utilise their home gardens; (3) Social competence, that is woman's knowledge and skills in communicating, interacting, building relationships and networking with others.

Sajogyo (1994); Bachrein et al. (2000); and Elizabeth (2007) found women contributed greatly to agricultural development. Anna (2011) stated that there was a positive impact in every activity involving women's empowerment, especially in social, economy and health. Komalawati et al. (2012) showed women have a dominant role in the planning, management and decision making related to their home gardens. Suhartini (2012), Zainap et al. (2012), Belem (2002), Jannah (2013) and Metalisa et al. (2014) reported that many factors affected women's participation and management of their home garden, such as their age, education, income, motivation, technology and information, extension, socio-culture, home ownership status, agroecosystem condition, time devotion to home garden utilisation, availability of production facilities, group atmosphere, and cosmopolitan-like behaviour.

RESEARCH METHODS

The survey was conducted from March 2015 to December 2015. The study location was purposively selected in two areas in North Sulawesi province, namely Bitung, the urban area, which cover three sub districts - Matuari, Ranowulu and Girian, and Minahasa District, and the rural area which covers 12 sub districts, namely East Tondano, North Tondano, Eris, West Kakas, East Langowan, South Langowan, North Langowan, Kawangkoan, North Kawangkoan, West Kawangkoan, Tombulu and Tompaso. Those locations were selected by the local government to carry out their food intensification programmes (Acceleration of Food Consumption Diversification Program–P2KP and Sustainability Food House Area Model- MKRPL). This study looked at sample of 267 housewives out of 803 housewives participating in the Slovin formula programme. Respondents were selected using a random sampling method among active housewives in each village.

Data was collected through observations, interviews using valid and reliable questionnaires, observation, as well as in-depth interviews. The following are the variables:

Characteristics of the housewives ($X_{1.1}$ Education, $X_{1.2}$ Non-formal education, $X_{1.3}$ Number of family members, $X_{1.4}$ Household income, $X_{1.5}$ Time allocation on home garden, $X_{1.6}$ Motivation); Accessibility to information ($X_{2.1}$ Information availability, $X_{2.2}$ Information conformity, $X_{2.3}$ Credibility of the informants); Environment ($X_{3.1}$ Acreage of the home gardens, $X_{3.2}$ Availability of production facilities, $X_{3.3}$ Social culture, $X_{3.4}$ Family support); The role of the women's group ($X_{4.1}$ Learning class, $X_{4.2}$ Production unit, $X_{4.3}$ Cooperation); Extension activity ($X_{5.1}$ Material, $X_{5.2}$ Extension method, $X_{5.3}$. The intensity of extension, $X5_{.4}$ Ability extension); Perception ($Y_{1.1}$ Perception of utilisation of the home garden, $Y_{1.2}$ Perception about food diversification, $Y_{1.3}$ Perception about healthy foods) and Competencies of the housewives

on the utilisation of home garden ($Y_{2.1}$ Technical competence, $Y_{2.2}$ Managerial competence, $X_{2.3}$ Social competence).

Reliability test was conducted on 30 respondents. The reliability coefficient was calculated using Alpha Cronbach. The reliability coefficient value obtained is 0.991 which means 90.60% (270 of 298 questions) of the items were valid. The questionnaire is structured as a tool to measure the level of female competence in their home gardens. Data processing and data analysis using descriptive analysis and Structural Equation Model (SEM) were useful in modelling what factors affected women's competence in the utilisation of home gardens to support food diversification. Data was processed using Lisrel. Re-specification model was done by removing non-significant variables with reference to t-value and goodness of fit model.

RESULTS AND DISCUSSION

Women's Socioeconomic Characteristics

Table 1 shows women's socioeconomic characteristics. Most of the women have formal education up to senior high school level. Hardinsyah (2007) stated the level of formal education reflected the person's ability to understand various aspects of knowledge. Galhena et al. (2013) found the level of female education in Sri Lanka determines the level of available opportunities to improve their livelihood strategies and managerial capability in production. Education is positively correlated with agricultural productivity and household welfare (Yamasaki, 2012).

The frequency of women attending non-formal education is in a low category (1-5 times in the past year) and is significantly different between the two locations. Abdullah (2013) stated that the frequency farmers participates in extension, dealing significantly with competence of seaweed farmers. The average family size is not more than 4. According to Taridala et al. (2010) the size of household is the most important determinant in achievement of household food security.

The average household income of the women is less than IDR. 2.827,5 million per month and considered low. According to McLachlan et al. (Adenkule, 2013), socio-economic conditions play an important role in household food security because it not only depends on food supply, but also on purchasing power. Suryastiri (2008) also stated purchasing power is a prominent factor in determining food consumption variation and balance. This is supported by Weol et al. (2014) who found household income in South Minahasa Regency significantly affected their consumption of meat and eggs. Meanwhile, Baiyegunhi (2015) noted that household income has statistically significant and positive effect on adoption of water harvesting technology (RWHT).

Table 1
Characteristics of women

Characteristics of women	Category	Frequency		Total	U Test
		Minahasa	Bitung		
Education (year)	Low (0-6)	19	18	37	0.162
	Moderate (7-9)	30	17	47	
	High (10-12)	82	78	160	
	Very high (>12)	9	14	23	
Non-formal education	Never (0)	0	1	1	0.001**
	Seldom (1- 5)	132	100	232	
	Often (6 – 10)	8	25	33	
	Very often (11 -16)	0	1	1	
Number of family members (people)	Small (1 – 2)	30	16	46	0.028*
	Middle (3 – 4)	79	72	151	
	Big (5 – 6)	30	36	66	
	Very big (7 – 8)	1	3	4	
Income (IDR)	Low (<2.827.500)	92	71	163	0.120
	Moderate (2.837.501–5.225.000)	41	49	90	
	High (5.225.001 – 7.612.500)	5	6	11	
	Very high (>7.612.501)	2	1	3	
Time allocation on home garden (hours / week)	Less (0.25-5.43)	108	73	181	0.219
	Middling (5.44-10.62)	21	39	60	
	Often (10.63-15.81)	8	12	20	
	Very often (15.82-21)	3	3	6	
Motivation	Low	0	0	0	0.502
	Moderate	1	5	6	
	High	138	119	257	
	Very high	1	3	4	

Note: * = Significant α = 0.05 ** = Significant α = 0.01

Women allocated 4.67 hours per week on their home gardening. Their motivation is high and it is to ensure the sustainability of home gardening and efforts to increase its productivity.

Accessibility of Information, Environment, Group Roles, Guidance and Perceptions

The availability of information on utilisation of the home gardens and food processing are in adequate category. Women access related information from field officers of the food intensification programmes, printed matters and electronic media. Information obtained through print and electronic media are in line with their need, but the information from field officers of the programs are inadequate. This finding contrasts with that of Nwankwo et al. (2010) who showed that Nigerian farmers trust the biotechnology information from their extension officers.

The credibility of informants is in low category, as the information provider (programme officers) are not active in providing the needed information. However, they provide guidance on technical matters and programme implementation.

The majority of women have limited land acreage, i.e. less than 120 m^2 in Bitung and 120 m^2 - 400 m^2 in Minahasa. The limited land acreage in Bitung is because their home gardens are in the residential area. The required production inputs are available, but the price is high. Socio-cultural conditions though support home gardening.

Family support in home gardening and food processing are limited, because the husband, as head of family, spends limited time in supporting activities of home gardening. Similarly, children spend their time on school activities. However, all of the family members support the women to participate in extension activities and training. Galhena et al. (2013) stated household members participate in home garden management. When household members are empowered with better skills and knowledge, they are able to reduce crop losses and other negative implications of home gardening.

Women's groups play a role in home garden management. They are mostly social and religious groups and have been established before the implementation of food intensification programmes. Routine weekly group meetings mainly are for religious purposes and other social activities, and occasionally, they discuss home gardening activity. The women's group is an asset to extension activity in improving the competence of women in home garden management. Baiyegunhi (2015) stated farmers who are members of associations or groups adopt water harvesting technology (RWHT) more efficiently and quickly than the others. Nwankwo et al. (2010) also stated that the information technology derived from the cooperative farmers positively correlated with the farmer's adoption rate of biotechnology.

Women consider extension materials, methods, frequency and capability of extension officers are appropriate with their needs. However, the extension are mostly on production technology. They however, need more information on post harvested technology, marketing product, as well as home gardening management.

Extension methods utilised are field school and demonstration plot on a piece of land which functions as a nursery for the women's group. Other activities such as training on using home garden technology is also conducted in the nursery. Through the demonstration plot approach, the women are expected to change their attitudes to accept the introduced new technology (Tjitropranoto, 2005). Demonstrating the results of specific practices is a strategy to improve awareness of farmers (Leeuwis, 2009). The demonstration advantage, among others, is to attract, retain their attention and

convince farmers (Suprijanto, 2011). The women perceive that the extension methods are appropriate. Field school provides opportunity for the women observe directly the stages of cultivation technique, and gain knowledge to boost productivity of their home gardens. They also suggest visiting other home gardens as learning site for strengthening communication and exchange experiences on home gardening.

Women feel that the frequency of monthly extension meeting is appropriate. They suggest, however, that the extension activity on home gardening will not be limited during the implementation of the programme in order to boost their competence level.

Most of the women consider that extension officers are capable in implementing extension activities, particularly in collecting and processing data of potential area, planning extension programs, preparing and mastering extension materials establishing and using extension media, develop guidance techniques, provide technical guidance, the ability to interact with the community, manage time, and work cooperatively with other officials.

Women's perception of utilisation of the home gardens is high. Home garden is considered important to support food diversification. All of the home garden products are not only for daily family food consumption; some are sold to increase household income.

Competence of the Women on Home Gardening

Technical competence of women respondents is high, and significantly different between the two locations. They are highly competent in: (1) selecting commodities of home gardens; (2) arranging commodity in home garden for sunlight; (3) processing to food; and (4) meeting the target in terms of food quantity. Technical competence is still low and the areas that need improvements are: (1) maintenance of plants in a sustainable manner; (2) control of plant pests and diseases; (3) the arrangement commodities home garden area for aesthetic looks and land area; and (4) waste management. The low technical competence relates to the level of knowledge on planting medium, seed quality, the ability to produce seeds from the home garden, pests and diseases, environmentally friendly pest control techniques, as well as awareness of the need in processing household waste.

Table 2
Competency level of home gardening

Indicator of Competencies	Category	Frequency		Total	U Test
		M	B		
Technical	Low	0	0	0	0.000**
	Moderate	70	38	108	
	High	70	87	157	
	Very high	0	2	2	
Managerial	Low	0	0	0	0.218
	Moderate	40	22	62	
	High	88	100	188	
	Very high	12	5	17	
Social	Low	0	0	0	0.698
	Moderate	10	5	15	
	High	111	106	217	
	Very high	19	16	35	

Note: * = Significant α = 0.05 ** = Significant α= 0.01 M = Minahasa, B= Bitung

Managerial competence of the women respondents is high in the arrangement of land uses based on the suitability of soil type and rainfall intensity. The level of managerial competence is in moderate category and needs improvement in: (1) required production input; and (2) crop rotation. These are due to their lack of knowledge of production inputs and crop rotation.

Social competence relates to women's ability to communicate, interact and build relationships with others. Women's social competence is high, but the relationship is still in medium category as it is still limited to the relationships among members of the group.

Factors Affecting the Housewife Competencies in Home Garden Utilisation to Support Food Diversification

The hypothesis of this study was: competency on utilisation of the home gardening is influenced by characteristics of women (X_1), accessibility to information (X_2), the environment (X_3), the role of the group (X_4), extension (X_5), and perception (Y1). Through the stages of the path analysis, women characteristics (X_1) and accessibility to information (X_2) showed no significant effect on the perception and competence of utilizing home garden. The accepted model is shown in Figure 1 that show competence in utilisation of home gardens is directly

influenced by Extension activity (X_5) and perception on the utilisation of home garden (Y_1) is indirectly affected by environmental factors (X_3) and the role of the women group (X_4) through perception on the utilisation of home garden (Y_1).

Figure 1 shows the availability of production inputs are most influential in determining positive perceptions of women on utilising their home gardens. This means that the availability of production inputs, both in quantity and price, will facilitate the women in adopting technology in a sustainable utilisation of their home garden as a source of diverse and healthy food for the family. The availability of production inputs is a basic requirement in agricultural development (Mosher, 1987).

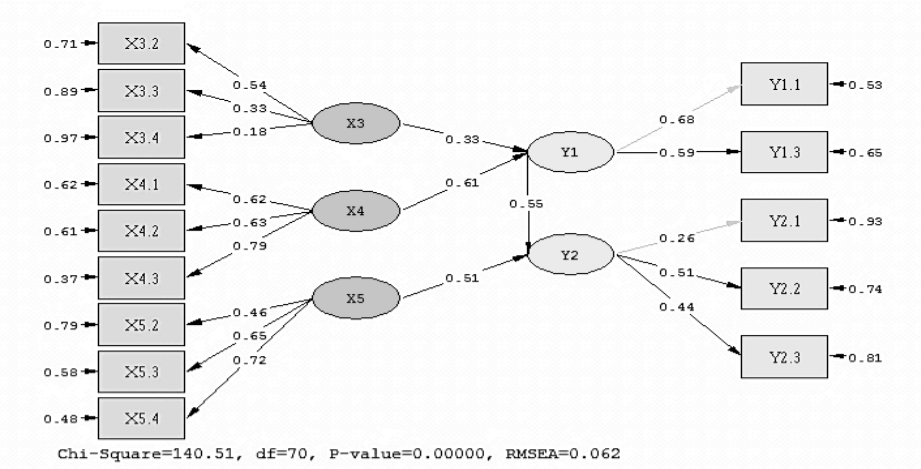

Figure 1. Diagram of competency model of the housewives in the home garden utilisation to support food diversification

Notes:

X_3 = Environmental
$X_{3.2}$ = Availability of production facilities
$X_{3.3}$ = Social culture
$X_{3.4}$ = Family support

X_4 = Group roles
$X_{4.1}$ = Learning class
$X_{4.2}$ = Unit production
$X_{4.3}$ = Cooperation
X_5 = Extension
$X_{5.2}$ = Extension Method
$X_{5.3}$ = The intensity of extension
$X_{5.4}$ = Ability extension
Y_1 = Perceptions of utilization of the home garden
$Y_{1.1}$ = Perceptions of the functions and benefits of the home garden
$Y_{1.3}$ = Perception of healthy foods
Y_2 = Competence utilisation of the home garden
$Y_{2.1}$ = Technical competence
$Y_{2.2}$ = Managerial competence
$Y_{2.3}$ = Social competence

The social function of home garden is to foster closer relations among the neighbours. Communication among neighbours strengthen the relationship between the women as the owner of the home garden. Any time a neighbour who requires certain food commodity such as lemongrass, basil, lime leaves, turmeric leaves, chili or other commodities that is not available in her home garden, they should be able to obtain them from the neighbouring garden. Khan et al. (Shaheb et al., 2014) stated to strengthen social relationships, harvested vegetables from the home garden should also be distributed to neighbours.

Family support in home gardening for diversification of food could be provided through direct involvement in the activities of utilisation of the home gardening. Each family member has certain tasks on the utilisation home garden. Their direct involvement in home gardening would help the success of utilisation of home gardening and also improve women's competence in home gardening.

The role of women's group indirectly affects utilisation of home garden. Women groups in the study site are social and religious groups. Regular meetings and interaction in the group, and other group activities have positive impact for the members. An exchange of information through interaction during weekly meetings provide positive impact among the members. Baiyegunhi (2015) stated participation in group activities show positive correlation with the use of new technology. He also noted the higher the level of interaction of members of the community / group, the easier it will be to transfer information and obtain the information needed. The social and religious functions of group improve as farming groups include home garden in their efforts. The group may be a good medium in the dissemination and implementation of activities of food intensification programmes and improving efficiency of home gardening.

Local government support is needed to ensure availability of production inputs such as highly quality seeds of specific location variety, affordable price of production inputs, encourage active involvement of community leaders and village officials in activities of utilization of the home gardens, as well as family support through direct involvement of family members in the activities of utilization of home gardens. The general regression equation of factors that influence the perception of utilisation of home gardening is as follows:

$$\widehat{Y}_1 = 0.33\, X_3 + 0.61\, X_4 \text{ with } R^2 = 63\%$$

Environmental factors (X_3) and the role of a group (X_4) simultaneously have significant effect as much as 63% on the perception of women in utilisation of home gardening; while the other factors that are not included in this research influence the rest. Findings show that not all exogenous variables have significant effect on the competence of women in the utilisation of home garden to support food diversification. Only two variables are significant, namely extension activity (X_5) and respondents' perceptions

of utilization home gardening (Y_1). The regression equation competency model (see Figure 1) can be expressed as follows:

$$Y_2 = 0.55\ Y_1 + 0.51\ X_5 \qquad \text{with } R^2 = 93\%$$

The coefficient of determination (R^2) of the equation model indicates that women perception on the utilisation of home garden and extension account for 93% and the rest are effects of other variables that are not included in the model. Extension has direct influence on competence in home gardening. The extension indicator variables are: methods, intensity, and extension capabilities, which significant affect the competence of women in the utilisation of home gardening. It means that extension activities to support home gardening are needed in order to change women's behaviour and in increasing competence of the women.

Variable of capability extension officers (Figure 1) has the biggest loading factor in determining the extension of the latent variables. This means the key success of extension education is determined by the capability of extension officers. Extension officers as a mediator, should be good communicator and motivator, to encourage women groups to play active role in utilisation their home gardens in a sustainable manner. Amanah (2007) stated the extension is a behavioural transformation approach through non-formal education. Sumardjo (1999) also stated behavioural changes can be achieved through a series of efforts made through non-formal education. The intensive extension activity, will improve women's competencies to utilise their home garden. The method used is in line with the needs of the extension audiences to ensure the success of the programme. Good extension materials will not be able to change the behaviour of extension audiences if the extension methods used are inappropriate. The competence and performance of agricultural extension officers significantly affect behavioural changes of corn farmers. It can be concluded that the extension activity using extension method suitable with the audiences, supported by the extension officer's competence, as well as sufficient extension intensity are deciding factors to improve the competence of respondents in using home garden to support food diversification.

Perceptions of the housewives on the functions and benefits of the home gardens and the importance of a healthy diet significantly influence their competence. The positive perception of housewives on the functions and benefits of the home garden as a source of food diversity determine intensity in the activities of utilisation home gardens. The proper utilisation of home gardens in planting and maintaining diverse commodities determine the production of home gardens, and continuous utilisation of home gardening will increase the women's competence. Thus, the positive perception of housewives on the function and benefits of home garden as a source of food diversity, as well as the importance of healthy food for the family impact on the housewife's

competencies in utilisation of the home garden.

CONCLUSION AND RECOMMENDATIONS

The level of competence of women in the utilization of home gardening to support food diversification is high. Competence aspects that are still low are: (i) sustainable maintenance of plants; (ii) plant pests and diseases control; (iii) the arrangement commodities of home garden based on aesthetic value and land area; and (iv) waste management. The low technical competence relates to the level of knowledge of the respondents to the maintenance of plants, especially on planting medium, quality seeds, the ability to produce seeds from the home garden, the knowledge of the respondents about the types of pests and diseases, environmentally friendly pest control techniques, ways and purposes of processing household waste is still low, and they do not understand the purpose of identifying the needs of facilities before starting the home gardens business, as well as the plants they plant are the plants they need so they do not need the rotation of crops. Local governments need to support through sustainable extension activities on utilisation of the home gardens.

The improvement of the utilisation of home gardens for women can be done by increasing their perception on the function, the benefit of home garden and the importance of healthy food, as well as .extension support. Extension using appropriate methods became a determining factor in increasing the competence of respondents in using the home garden to support food diversification.

Increasing competence of women in utilising their home garden are affected by environmental factors and the role of community groups. Additionally, production inputs, involvement of community leaders and village officials, family support, women cooperative works as well as improving roles of women's groups in the utilisation of home garden all play a role.

POLICY IMPLICATIONS

The policy recommendations of this study based on its findings are: (1) Human resources strengthen transformation. Women and local community as well as extension workers should be encouraged to change their mindset to innovate by utilising the potential of local resources for creative and sustainable home gardens; (2) Coordination and networking between related sectors on home garden business should be encouraged and the support of central and local governments are important to encourage the implementation of technological innovation model for sustainable home gardens; (3) Institutional empowerment at community level in the area of sustainable utilisation of home gardens; (4) The necessity of developing a village nursery garden managed by women and the community. (5) Active involvement of stakeholders, along with consistent monitoring to encourage technological innovation for sustainable utilisation of home gardens. (6) Village nurseries that

are managed by women and the community should be developed and supported by local government technical institutions. (7) Need substantial action from sub-district and village government, and religious institutions for better utilisation n of home gardens in sub-district offices, village offices, health centres, schools and houses of worship with cultivation of food crops.

The strategy to increase women's competence in the utilisation of a home garden to support food diversification has policy implications for the development of science: (1) Developing relevant curriculum from elementary school up to university, especially on local content aimed at inculcating the love of young generation to planting culture via home gardens as food source; and (2) Encouraging more research and development for efficient ways to process local food-based products that meet the needs of the community.

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