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An Assessment of Food Access among Paddy Farmers in Muda Irrigation Area, Malaysia

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ABSTRACT: *Food security exists when every individual, at all times, whether physically, socially and economically have sufficient food to lead an active and a healthy life. In order to ensure food security in a house, food access is one of the most important components in this context. Food access refers to the ability of households to get enough and the right food to meet their dietary needs. However, the poorer households depend totally on agriculture as a source of income, having problems to meet their food security. This scenario took place because this group of households has inadequate resources to meet their grocery needs. This paper aims to evaluate food access among rural households and for this purpose, a total of 225 paddy farmers in the Muda irrigation area, Kedah were randomly selected. The study found that paddy farmers to access food from grocery stores, markets and night markets / farmers- markets than supermarkets and mini-markets. The findings of the study through Structural Equation Modeling found that all three locations have access to food showed a positive relationship to the food security among paddy farmers in the Muda irrigation area. Grocery is the highest contributor to the value by 0.38 on food security than other locations. The congruity index model shows the value* χ^2 *= 34.89 CMIN / DF = 0.918, while the value of Goodness of fit index (GFI), Incremental fit indices (IFI), Index Tuckers-Lewis (TLI), Comparative fit index (CFI) exceed the value of 0.90, while the RMSEA value less than 0.08. Index results indicate that the model has reached a good correspondence and can be accepted*

KEYWORDS: *food access, paddy farmers, Structural Equation Modeling*

I. INTRODUCTION

Food security is the main agenda for convergence in economic development. Implementation of this concept emphasizes the ability of each individual to get enough food, whether physically, socially or economically. Importance of food security is given in order to ensure that every individual have enough food to eat and able to meet the nutritional needs of the diet. The ultimate goal of the implementation of this concept is to ensure a healthy and active life in the community is preserved. Access targets have led to the importance of food as a main source to ensure food security. This is because food is a basic need and a major contributor to the nutrient for the human body (Olarinde & Kuponiyi 2005). In the context of food security, food access is one of the components that is given substance. Food access refers to the ability of individuals to abundant resources and consume the right food to meet the nutritional needs. Access and adequacy of food produced through a combination of production and stocks in the household, purchase, gift, loan or through food aid. The ability to achieve an adequate amount food is dependent on household income and prices of the groceries. At the national level, food access met through imports and the ratio of imported food is done through total exports. While at the household level, food access is considered adequate when each individual in the household is able to obtain consistent and sustainable food (Bickel et.al, 2000). This article aims to assess food access among the household of paddy farmers in the Muda irrigation area. This discussion will also analyze the question of where do these people get their main source of food. The distance between the residence to get food locations will also be touched. At the same time, the relationship between the location to access food on food security among paddy farmers in the Muda irrigation also assessed through the Structured Equation Model.

II. THE CONCEPT OF FOOD SECURITY

Food security is defined as all residents have physical and economic access to sufficient food sources, safe and nutritious food to meet their food needs at any time and have a choice of food variety to lead an active and healthy life (World Summit on Food Security , 1996). It has three (3) components, adequacy of food production, food shortages as well as physical and economic access by those who need (FAO 1983). United States Department of Agriculture (USDA) (1996) also explained that food security exists when all people at all times have physical and economic access to sufficient food to meet dietary needs for a productive and healthy life. According to the USDA, food security has three (3) dimensions, namely the availability of food in

sufficient quantities of appropriate quality (supply through domestic production or imports), access by households (households) and individuals with adequate resources to obtain appropriate foods nutritious diet and the use of food through adequate diet, water, sanitation and health.

III. FOOD ACCESS AMONG HOUSEHOLDS AND INDIVIDUALS

In the concept of food security, access to food is one of the highly stressed components. Important food access of households to determine the ability to buy enough food through earned income. The individual's ability to achieve food refers to an individual's ability to obtain resources and the right to appropriate food to meet nutritional needs. The right to food is defined as any individual to obtain food in the community include the legal, economic and social conditions in which they live, including the right to reach a food source (Stamoulis & Zezza 2003, FAO 2006).To ensure the adequacy of the food it is determined through a combination of production and stocks in households either through raising cattle and planting food sources, hunting, fishing, wild plant use, exchange of goods, purchase, gift, loan or through food aid. However, for some people might not be able to access adequate food if they do not have the diversity of mechanisms for food (World Food Programme (WFP), 2009). Meanwhile, other factors of income sources or ownership is found to be the major factor determining food access is obtained to maintain a diet that is required. At the same time, loss or no job, inadequate training or skills, less credit for the exchange of assets, loss of volume due to inadequate food supply, storage, processing and grading also affects the ability of households to access food (United States Agency for International Development (USAID) in 1992).

To ensure access to adequate food obtained, position location's distance to get food also affect household food adequacy. Many researchers such as Bailey (2010), Kershaw et al. (2010) and Bitto et al (2003) explains the position of the distance from home to get food is defined as a food deserts. Food deserts is a situation where households face difficulties in raising adequate food as a result of the poor have a shop or a place to get food needs (Bailey 2010). In addition, the area is also experiencing a shortage of food deserts of material and social amenities, including a lack of access to food and food high equilibrium (Kershaw et al. 2010), especially in rural areas. Meanwhile, Bitto et al. (2003) also explained that the area was food deserts which occurs when an area has limited access to the food and the people lost access or physical ability, economic and health to get enough food (Muamba et al., 2010) and nutritious (Treuhaft & Karpyan 2010). These constraints will cause a shortage of food access, especially among low-income populations and encourage these people marginalized in society. This food deserts area also influenced and determined by the transport factor. Conveney & Dwyer (2009) explains the food deserts is an individual's ability to access food that is cheap and accessible through transportation provided. In other words, consumers should pay the freight to get food. At the same time, households living in these areas have no choice and focused on a small shop where the prices are high and limited choice (Wringley 2002). This statement gives a clear picture that households who do not have transport and depend entirely on the available transport (public transport) were categorized as those who threatened to get enough food to eat.

Morton & Blanchard (2007) also examines the food deserts from the point of the distance between the place of residence to a place to get food. They explained that the food deserts occurs when households have to drive more than 10 miles (16km) to get food from the supermarket chain / supermarkets nearby. This situation explains that if households have or will have to drive more than 10 miles (16km) to get food needs, these people are also exposed to the problems of food deserts. Morton & Blanchard (2007) also explained that most people in this area consist of the elderly, the poor and less educated, high poverty rates and low family income. his situation explains that the food deserts is a situation in which households are constrained to obtain sufficient food and supermarket chain stores / supermarkets nearby.

The distance to obtain / buy food and groceries by the residents is also an important factor, as it will determine the ability of households to obtain enough food and in this context, many more researchers use supermarket/hypermarket as a proxy to access food. This is because the supermarket / hypermarket can provide a variety of fresh, nutritious food choices compared cutting over the place to get food sources such as grocery stores. In addition, the distribution of food also differs between supermarkets / hypermarkets, convenience stores and the like (Treuhaft & Karpyan 2010). Difficulties in accessing adequate food will have an impact on healthy food access and affect the health of the population. In the long run it will affect people's health, family and community (Bailey 2010) due to loss of access to food (Morton & Blanchard 2007). Conveney & Dwyer (2009) also explained the relationship between health and vital nutrition for food security

While the distance between the place of residence to get food (shops, supermarkets / hypermarkets) shows the impact on the quality of food eaten. Households walk to the restaurant shows households have a low diet in which it will contribute to the difficulty to buy food. This situation will contribute the nutritious food access among households. Ironically, households in rural areas face difficulties in accessing adequate food. This arises as a result of the position of the distance between the place of residence and the place to get food. In addition, the problem of transportation is also a major constraint faced by households in obtaining adequate food. While in Malaysia seldom discussed about the ability of households to access food, this does not mean these people especially in rural areas get enough food from the resources identified.

IV. FOOD ACCESS STATUS AMONG PADDY FARMERS IN MUDA IRRIGATION AREA

To assess the level of food access among vulnerability group in the state, a study using questionnaires. A total of 225 paddy farmers in the Muda irrigation area was randomly selected for this study. In the course of this study, researchers found that there are six main sources used as a place among the respondents to access food. These resources include retail shops, fishmongers come to the village, market, night market / farmers' markets, supermarket and a mini market. According to the *Dewan Bahasa dan Pustaka (2010)*, the researcher briefly detailing the main source of food access as shown in Table 1.

Table 1 Food Access Sources

No.	Sources	Explanation
1	Grocery stores	Shops selling all kinds of goods or little directly to consumers.
2	Fishmongers come to the village*	People who sell fish with small vehicles such as motorcycles or small truck. Moving from one place to another place in the area.
3	Market	A usual cluster of stalls selling food items daily needs.
4	Night market	Selling all kinds of places that are open for a specific number of days at night.
	Farmers markets	Specific markets for agricultural produce farmers markets continue to the public.
5	Supermarket	Large and modern shop located in the center of town that sells a wide variety of goods.
6	Mini market	Store not need that sells food and daily necessities for self-service

* Based on observations in the study area

4.1 Source of food supply

In terms of getting food, the study found, most of the respondents sourced food from the grocery store compared to the market, farmer / night markets or supermarkets. For paddy farmers of 216 people or 96 per cent of respondents, buy food from the grocery store. However, the total of 72.4 per cent or 163 paddy farmers to source food in the night market / farmers market (Table 2). In the context of getting / buying food, this study also found that paddy farmers were supplied with food from the market, supermarket and the supermarket. Fishmongers come to the village was in use as resources to stockpile supplies. A total of 18.7 per cent among respondents of paddy farmers get food supplies from fishmongers come to the village. Based on the studies conducted, it clearly shows other than the grocery store, night markets/ farmers markets, fishmongers who come to the village has an impact on food access among rural households in the state especially the paddy farmers. This scenario doesn't explain directly about the importance of fishmongers come to the village in ensuring food security among households.

4.2 Frequency of food supply

Frequency of respondents to get food supplies within a week at the grocery store is high compared to other places. On average this group of respondents indicated the frequency to the grocery store every day. For paddy farmers they go to the grocery store three (3) to four (4) times a week showed a high frequency of 41.7 percent or a total of 90 people. Frequency of paddy farmers to get food sources from the fishmongers also showed a high percentage of 42.9 percent. At the same time the frequency of paddy farmers going to the supermarket for food sourcing is low. On average respondents get food sources are only one to two times a week. Meanwhile, the frequency of paddy farmers get the food source from the night market / farmers market is high and more than 85 percent. (Table 2).

The findings of this study make it clear that rural households in this study prefers to buy food at the grocery store than anywhere else. Proximity factor and quantity of goods purchased cause most households in the study prefer retail stores to get the food needed.

4.3 Distribution of food resources

The study also found that the distribution of the number of retail outlets among paddy farmers is high and there are even more than seven retail outlets in some areas. Number of fishmongers come to the village also affect the food supply at home. The study found that in the area there are paddy farmers fishmonger exceed three to four people. Details on getting their food distribution points are shown in Table 2. Distribution of resources to high food supply explains that the poor in the state (in the study) had no problem to get an adequate supply of food.

4.4 Distance and transport to get food supplies

Distance between residence and place of their food supply is an important factor that determines the food supplies of households. Distance will affect the ability of households to obtain adequate food. The study found the average minimum distance for paddy farmers to the market is 4.24 km. While the minimum distance and the maximum distance to the grocery store for paddy farmers are at 0.1 km (minimum) to 7 km (maximum). Average distance to the night market paddy farmers / farmers' market to get food supply is far 3.44 miles. Meanwhile, the average distance from the residence to the supermarket is 8.03 km from paddy farmers' houses. Based on the findings, it appears that paddy farmers in irrigated area's have no difficulties to access food. At the same time, is found to be as much as 85.3 percent or 192 paddy farmers, using the motorcycle as a mode of transportation to get food.

V. STRUCTURAL EQUATION MODELING (SEM) ON LOCATION ACCESS FOOD AMONG PADDY FARMERS

Based on the study conducted, it was found that there are three main locations of the farmers in the Muda irrigation for food access. The location is a grocery store (KR), markets (PB) and the night market / farmers market (PM). Accordingly, the three locations were used for the analysis of structural equation models. To test the validity and consistency of the questionnaire, two major tests of exploratory factor analysis and factor confirmatory analysis was done. Factor analysis to determine whether the items in the questionnaire represent constructs the food access. Before the factor analysis carried out, two important tests was done in the Meyer-Olkin test Keiser (KMO) and Bartlett's Test of test Sphercity (BTS). KMO test results show the value of 0.671, is higher than 0.5, while the BTS test resulted the value of 0.00 and the significant value less than the value of 0.05. χ^2 = 576.08 and df = 36. Tests performed exploratory factor analysis using the conventional method of principal component analysis with varimax rotation. Item analysis results based on the exploratory factor analysis are classified into three main groups, as shown in Table 3. Components produced by the varimax rotation are categorized into three types of locations to get food from retail stores (KR), markets (PB) and the night market / farmers (PM).

Food access through factor analysis was translated into Figure 1. Maximum likelihood estimation is used to estimate the latent variables. The results of the analysis in this way make it clear that the critical ratio (CR) for the regression of the latent variable PM with the three observed variables (PM1, PM2, PM3) is outside the range of ± 1.96. Thus all three of the observed variables are a significant predictor variable for latent variables PM at $p < 0.05$. Observed variables for KR (KR1, KR2, KR3) and PB (PB1, PB2, PB3) showed similar results in which all the latent variables CR ratio is outside the range of ± 1.96. These results confirm that the latent variables in the measurement model are significant structural similarities can be represented by the observed variable. Analytical results obtained showed a good correspondence of the index where CMIN / DF = 1231, CFI = 0.990, AGFI = 0.946, TLI and RMSEA = 0.985,0.032. This value reflects the result there is no difference or incompatibility between the model in this study. Therefore, analysis of adaptation index (modification index-MI) is not required to improve this model. Impact on the relationship of the three locations for food resources has a positive relationship with the existence result (HK). Rationally, when there is an increase or improvement on location for food, it will increase the level of food security of paddy farmers. The findings of this study showed that KR is the highest location contribute to the food security of the farmers with a load factor of 0.381. While the PM components with load factor 0.141 is the second highest component contributing to the livelihood of PB followed by load factor of 0.118.

As a result of this relationship suggests that the relationship between KR and KS has a significant relationship at the level of $p < 0.05$. The impact of the three locations to obtain food resources on food security (KS) has been translated into a positive relationship between KS1 (health) and KS with a load factor of 0.412 and, KS2 (food sufficiency) 0.686. Both of these relationships were significant at $p < 0.05$. The relationship of the location of food sources to get over food security paddy farmers in Muda area described in Table 4. Table 5, has shown index models has been achieved in this model compared to the values recommended by the authors.

VI. CONCLUSION

Based on the studies conducted, the paddy farmers in the Muda irrigation area had no difficulty in securing food supply. At the same time, this situation also expressed in positive impact government's intervention to improving the living standards of rural communities. Through the National Key Result Areas (NKRA) in sub Improving Rural Basic Infrastructure for example, has enabled the rural population with water supply clean and well maintained and reliable supply of electricity. Was followed by the development of the Rural Transformation Centre (RTC) also provides a level of availability, security and stability of food. Implementation of *Kedai Rakyat 1 Malaysia* is seen as a catalyst that helps the population's ability to access sufficient food.

Through structural equation model found that, retail stores play an important role in ensuring food security needs among paddy farmers. To make sure food access among rural area, the government through the National Key Economics Area (NKEA) under through Entry Point Projects (EPP) -Wholesale and Retail has launched a Small Retailer Transformation Programme *(TUKAR) to to achive this purpose*. The program aims to modernize traditional grocery stores to increase competitiveness in the retail business environment more competitive. Implementation *TUKAR* also stressed on the development of a local grocery store mom and pop type, increase the competitiveness of small retailers and prepare retailers for implementation Goods and Services Tax (GST). This transformation certainly give impact to the new grocery store that is ready for more competitive and competitive in order to supply a secure food supply while ensuring that each individual gets enough food.To further enhance food access among rural areas, the government also launched the Community And Caravan Market *(PAKAR)* under the NKEA (Wholesale and Retail). PAKAR is an EPP that aims to modernise "markets" under one concept through (i). modernization and consolidation of the *Pasar Tani*, *Malam*, *Tamu* and *Minggu* under one roof, (ii). shopping experience offers modern and comfortable; (iii). the platform / infrastructure as a site to hold community events, and (iv). encourage hawkers business use vehicles with special design (mobile units). Although the findings does not indicate that the paddy farmers in irrigated areas are not facing a food shortage, this does not mean that rural areas in particular are not faced with the problem of access to food. On the other hand the implementation of government programs especially Rakyat 1 Malaysia Shop, Small Retailer Transformation Programme and the Community And Caravan Market should be expanded and cover all places, especially in rural areas. This is to ensure all residents are able to access adequate and sustainable food. In addition, the implementation of this program is capable to reduce the burden of the cost of living especially in rural areas to obtain sufficient and safe food. At the same time, a method should be developed to encourage more fish vendor from village to village (for example) and hawkers to change the way traditional business systems to Caravan Market. Through Caravan Market the marketable business results cover a wider area than ever before. At the same time, products sold better, neat, quality and sold at more competitive prices. Van participating dealers will be converted to Caravan Market and an external image indirectly gives confidence and to attract the consumers. Be an edge of the participants who participate in the program in which they will be allowed to trade at the site of existing farmers markets than ever before. This situation could indirectly enhance revenue traders involved. Ironically, the government is concerned about food security. Various strategies are outlined to enable residents to enjoy adequate food supply on an ongoing basis. Through the programs developed by the government not only to ensure adequate food supply alone but this effort is detected able to return more parties involved that the program developed by the government. Indirect two-pronged approach by the government should be commended and their implementation in a appropriate manner.

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Table 2 Food access among paddy farmers in the Muda Integrated Area

Information	Grocery store [No. (%)]	Fishmongers [No. (%)]	Market [No.(%)]	Night/farmer's market [No. (%)]	Supermarket [No. (%)]	Mini market [No. (%)]
Number of respondents	216 (96)	42 (18.7)	132 (58.7)	163 (72.7)	77 (34.2)	8 (3.6)
Frequency/week						
1-2	26 (16)	1 (2.4)	90 (68.2)	139 (85.2)	71 (92.2)	-
3-4	90 (41.7)	8 (19.2)	36 (19.8)	40 (12.3)	4 (5.2)	-
5-6	26 (12)	15 (35.7)	2 (1.5)	3 (1.8)	-	-
Every day	56 (25.9)	18 (42.9)	14 (10.6)	1 (0.6)	1 (1.3)	-
Seldom	1 (0.5)	-	-	-	1 (1.3)	8 (3.6)
Number of locations						
1-2	101 (51.4)	40 (95.3)	124 (95.5)	133 (81.6)	72 (93.5)	8 (100)
3-4	70 (32.4)	2 (4.8)	4 (3)	28 (17.2)	4 (5.2)	-
5-6	31 (14.4)	-	2 (1.5)	2 (1.2)	1 (1.3)	-
>7	4 (1.8)	-	-	-	-	-
Distance						
<1km	24 (11.1)	42 (100)	2 (1.5)	2 (1.3)	-	1 (12.5)
1km-2km	156 (72.2)	-	39 (29.5)	65(42.5)	18 (23.4)	5 (62.5)
3km-4km	21 (9.7)	-	38 (28.8)	63 (41.2)	9 (11.7)	2 (25)
5km-6km	14 (6.5)	-	35 (26.5)	14 (9.2)	19 (24.7)	-
7km-8km	1 (0.5)	-	5 (3.8)	7 (4.6)	8 (10.4)	-
>8km	-	-	13 (9.8)	2 (1.3)	23 (29.9)	-
Average (km)	1.68	0.05	4.23	3.44	8.03	1.5

Table 3 Rotated Component Matrix

Variable	Location			Commonalities
	Night/farmer's market (PM)	Grocery store (KR)	Market (PB)	
PM1-Distance from home to PM	.904			.819
PM2-Number PM	.892			.798
PM3-Frequency to PM/week	.824			.679
KR1- Distance from home to KR		.869		.766
KR3- Frequency to KR/week		.839		.705
KR2- Number KR		.822		.678
PB3- Frequency to PB/week			.758	.583
PB2- Number PB			.665	.458
PB1- Distance from home to PB			.662	.470

Keiser Meyer-Olkin (KMO) =0.671

Table 4 Maximum probability decision estimation

Variable			Estimate	Factor loading	S.E.	C.R.	P
KS	<---	KR	.194	.381	.087	2.243	.025
KS	<---	PB	.303	.118	.335	.907	.365
KS	<---	PM	.097	.141	.075	1.296	.195
KR2	<---	KR	.884	.681	.096	9.196	***
PB2	<---	PB	.991	.363	.326	3.045	.002
PB1	<---	PB	1.000	.400			
KR3	<---	KR	.911	.745	.094	9.665	***
KS1	<---	KS	1.000	.412			
KR1	<---	KR	1.000	.852			
KS2	<---	KS	2.549	.686	1.117	2.283	.022
PB3	<---	PB	1.155	.696	.499	2.313	.021
PM1	<---	PM	1.000	.870			
PM2	<---	PM	.977	.856	.077	12.650	***
PM3	<---	PM	.943	.698	.086	10.941	***

Figure 1: Relationship between the location of food access and food security

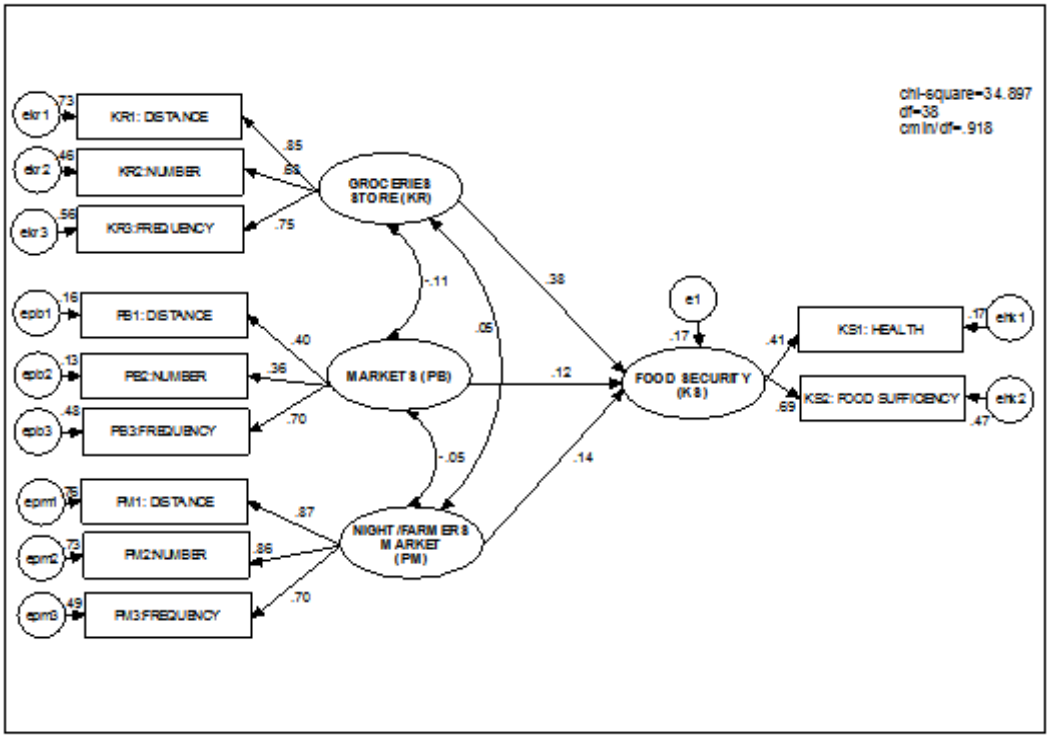

Table 5 Assessing Model Validity

Index's	Results	Suggested value	Author
Chi-square, χ^2	34.897	-	
Degree of freedom (df)	38	-	
Ratio Chi-square with degree of freedom (CMIN/df)	0.918	1-3	Carmins & Melver (1981)
Goodness of fit index (GFI)	0.97	>0.90	Hair et al.(2006)
Adjusted goodness of fit index (AGFI)	0.95	>0.80	Lin,H.F (2007)
Parsimony Goodness of fit index (PGFI)	0.56	>0.50	Byrne (2010)
Normed Fit index's (NFI)	0.94	>0.90	Hair et al.(2006)
Incremental fit indices (IFI)	0.94	>0.90	Hair et al.(2006)
Index Tuckers-Lewis (TLI)	0.93	>0.90	Hair et al.(2006)
Comparative fit index (CFI)	0.95	>0.90	Hair et al.(2006)