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Confirmatory Factor Analysis for the Terengganu Family Development Foundation (TFDF) Resident Responsibility Negligence Measurement Instrument

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Abstract*:* There are two ways to conduct Confirmatory Factor Analysis (CFA) using individual confirmatory factor analysis or group confirmatory factor analysis based on the measurement model. The number of items depends on the construct used in the study and the measurement model analysis is conducted separately if the number of items in the construct is more than four. Whereas, pooled CFA runs all measurement models at the same time. Items with a factor loading value of less than 0.6 are considered unimportant to the measurement of the construct and can be discarded Chik, Abdullah, Ismail and Mohd Noor (2024). A total of 250 study samples were involved in this research. Data were analyzed using the IBM-SPSS-AMOS (Structural Equation Modeling-SEM) version 24.0 program. Adjustment tests were conducted to ensure that the indicators tested truly represented the constructs being measured and Confirmatory Factor Analysis was conducted in this study as a prerequisite that must be met. The study findings showed that all correlations between Rent Payment Methods, Attitudes & Lifestyle Habits, Social Symptoms, Moral Collapse, Living Aid and Rent Arrears Payment had values less than 0.85 (<0.85) among residents of the Terengganu Family Development Foundation (TFDF) Rural Flats. The combined results of confirmatory factor analysis of all measurement models (Pooled CFA), proved that all constructs did not have a strong relationship with each other to avoid the existence of multicollinearity problems.

Keywords: Terengganu Family Development Foundation (TFDF), Confirmatory Factor Analysis (CFA), Pooled CFA

Introduction

Low-cost housing and social housing in Malaysia were created as a proactive government measure to provide affordable housing for low-income groups. In Terengganu, the Terengganu Family Development Foundation (TFDF) plays an important role by providing Family Village Flat units as a housing alternative for the urban poor and families in need. However, the problem of rent arrears has been identified as an ongoing issue that not only affects TFDF's financial flow, but also threatens the sustainability of social housing management. Previous studies have shown that the problem of rent arrears among low-cost housing residents is usually caused by unstable household income, rising cost of living, weaknesses in family financial management, and the absence of a flexible payment system (Mohd Noor, 2020; Abdullah & Daud, 2022). However, the phenomenon of rent arrears cannot be

seen only from a financial perspective, but also involves aspects of neglect of residents in various dimensions, social, economic, physical and moral. In the TFDF Family Village Flat, neglect of residents is evident in several forms:

1) Social: Lack of awareness of the importance of paying rent as a shared responsibility; there is a normalization of delinquency.
2) Economic: Priority is given to other expenses over rent; employment is precarious.
3) Physical: Damage to the unit is not reported or left to the point of compromising maintenance.
4) Moral: The perception that late or failure to pay rent will not lead to strict action from the authorities.

Although there are several studies related to the issue of low-cost housing in Malaysia (Ismail & Rahman, 2021; Omar et al., 2019), there is still a lack of research that specifically examines the relationship between tenant neglect and rent arrears in the context of social housing managed by TFDF. Most previous studies have focused more on affordability and housing policies, but have paid less attention to the behavioral dimensions, social vulnerability and moral implications of this problem. This knowledge gap is important to fill because rent arrears not only affect the financial position of TFDF, but also directly affect residents and the community. Prolonged arrears can lead to psychological stress, social conflict, community instability, and a decrease in the quality of life of residents. From a management perspective, the failure of TFDF to address this problem could undermine the credibility of the institution and the effectiveness of state welfare policies. Accordingly, this study was conducted to investigate the impact of occupant neglect on the payment of rent arrears in TFDF's Family Village Flats, using theoretical approaches such as the Theory of Planned Behavior (TPB), Behavioral Economics Theory and Social Vulnerability Theory. This study will fill the existing literature gap and provide an empirical basis for more effective rental management strategies and more sustainable social housing policies.

Research Methodology

The research method used is quantitative and uses research instruments that have been adapted according to the suitability of factors Rent Payment Methods, Attitudes and Lifestyle Habits, Social Symptoms, Moral Decline, Living Assistance and Explanation of Rent Arrears among residents in the Terengganu Family Development Foundation (TFDF) Family Village Flats. Data were analyzed using Structural Equation Modeling (SEM) with the help of the IBM-SPSS-AMOS version 21.0 program. SEM is formed with two (2) main models namely Measurement Model and Structural Model. Before the SEM test is performed, an adaptation test should be conducted to ensure that the indicators tested truly represent the construct being measured. Confirmatory Factor Analysis (CFA) is a measurement model test to ensure that each construct meets procedures such as validity and reliability for each construct tested (Kline, 2016; Hair, Black, Babin, Anderson & Tatham, 2006; Schumacker & Lomax, 2004). The fit of the measurement model is very important to ensure that each latent construct in this study has fit with the data studied before SEM can continue (Kline, 2016; Schumacker & Lomax, 2004).

Using the CFA method can assess the extent to which the observed factors are significant to the latent construct used. This evaluation is done by examining the value of the strength of the regression structure path from the factor to the observed variable (ie Factor Loading value) instead of the relationship between the factors (Byrne, 2013). Through the use of CFA, any item that does not fit the measurement model is dropped from the model. This discrepancy is due to the low value of the load

factor. Researchers need to perform the CFA process on all the constructs involved in the model, either separately or in a pooled CFA model (Alias & Hartini, 2017). The suitability of the tested hypothesis model was verified by using Fitness Indexes to see the value of Root Mean Square Error of Approximation (RMSEA<0.08), Comparative Fit Index (CFI>0.90) and Chi Square/Degrees of Freedom (chisq/df<5.0). According to Hair et al. (2006) if the χ2 value is less than 2.00 but significant, then it is necessary to state whether the sample size is large or vice versa. A sample size that exceeds 200 can cause the χ2 value to be significant. Because of that, Hair and his colleagues suggested two other indices namely CFI and RMSEA to ensure that the CFA analysis forms the unidimensionality of the study model (Hossen & Pauzi, 2025b). If the CFI value exceeds 0.90 and the RMSEA is less than 0.08, it is said that there is unidimensionality for the formation of each construct.

Findings

Confirmatory Factor Analysis (CFA)

There are two models that need to be analyzed in carrying out Structural Equation Modeling (SEM), namely the Measurement Model and the Structural Model. Chik et al. (2024) suggest two steps that need to be carried out in a Structured Equation Modeling (SEM) namely:

1) Confirming the Measurement Model of all the constructs involved through the Confirmatory Factor Analysis (CFA) method.

2) Modeling all the constructs into Structural Model as well as doing SEM procedures (Chik et al., 2024; Hoque, Awang, Jusoff, Salleh & Muda, 2017; Kashif, Samsi, Awang & Mohamad., 2016).

The fit of the Measurement Model with the study data is important to validate a SEM. If the Measurement Model does not match the data from the field, then the constructed SEM is invalid. Therefore, the first step in SEM analysis is to determine the appropriateness of the Measurement Model to the data from the field. Analysis of the fit of the Measurement Model with field data is done by using Confirmatory Factor Analysis (CFA) to confirm the proposed Measurement Model of the construct. Testing the Validity and Reliability of the Measurement Model: Before evaluating the appropriateness of a constructed model, the evaluation of Unidimensionality, Validity and Reliability of the Measurement Model of the construct of this study needs to be carried out first. Unidimensionality: This requirement can be met through the items deletion procedure that has a low Factor Loading value until it reaches the set Fitness Indexes level. Items with a Factor Loading value of less than 0.6 are considered unimportant to the measurement of the construct and should be discarded. Validity: The three types of validity that must be achieved by a construct measurement model are Construct Validity, Convergent Validity and Discriminant Validity. Construct Validity: Refers to the accuracy of a measurement instrument used to measure the intended construct in the study. Construct Validity describes the extent to which a statement in the item used can measure the construct that the researcher wants to measure (Alam et al., 2025). Construct Validity is achieved when all Fitness Indexes for the construct in question meet the specified level (Chik et al., 2024). Table 1 below shows the three categories of fit index that need to be achieved by a construct measurement model, namely Absolute Fit, Incremental Fit and Passionate Fit.

Table 1 *Three (3) Categories of Matching Indexes and Recognized Index Types*

Name of Category	Name of Index	Level of Acceptance

Absolute Fit Index	RMSEA	RMSEA < 0.08
Incremental Fit Index	CFI	CFI > 0.90
Parsimonious Fit Index	Chisq/df	Chi-Square/ df < 5.0

Source: Chik et al. (2024)

Convergent Validity: Refers to the relationship of a measurement model with other measurement models in theory. Convergent validity of a construct will be achieved if all Average Variance Extracted (AVE) values reach a minimum value of 0.50. Discriminant Validity: Explains the extent to which a construct does not have too strong a relationship with another construct in the same model so that it can be said that a construct is a shadow or repetition (redundant) of another construct. Discriminant Validity is assessed through the discriminant validity index summary. According to Chik et al. (2024) and Hoque et al. (2017), discriminant validity for a construct can be achieved if all diagonal matrix values are greater than other values in row cells and also in column cells. The diagonal value of the matrix is the square root of the AVE, while the values in the matrix are the correlations between the constructs in the model. Average Variance Extracted (AVE): The AVE value is calculated from the factor loading value for each item in a certain construct and needs to reach a minimum limit of 0.50 (AVE > 0.5) to prove the reliability of the Measurement Model of a latent construct in this study, which can be achieved (Chik et al., 2024; Hoque et al., 2017). Reliability: SEM uses the Composite Reliability (CR) value to verify the reliability of the Measurement Model according to the factor loading value of each item. Each construct that has a value of CR>0.6, has achieved Composite Reliability (Chik et al., 2024; Hoque et al., 2017).

CFA Analysis for the Rental Payment Method Measurement Model

The analysis of Fitness Indexes in Table 2 below shows that the Rental Payment Method Measurement Model has reached the level of the Fitness Index level as stated in Table 1 above. This means that Construct Validity has been achieved (Chik et al., 2024; Hoque et al., 2017).

Table 2 *Analysis To Determine Validity for Rental Payment Method*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.018	Reach the set level
2. Incremental fit	CFI	0.956	Reach the set level
3. Parsimonious fit	ChiSq/df	1.861	Reach the set level

The Measurement Model for the Rental Payment Method has reached the value of the Conformity Index level. This means that Construct Validity for this construct, has been achieved (Chik et al., 2024; Kashif et al., 2016).

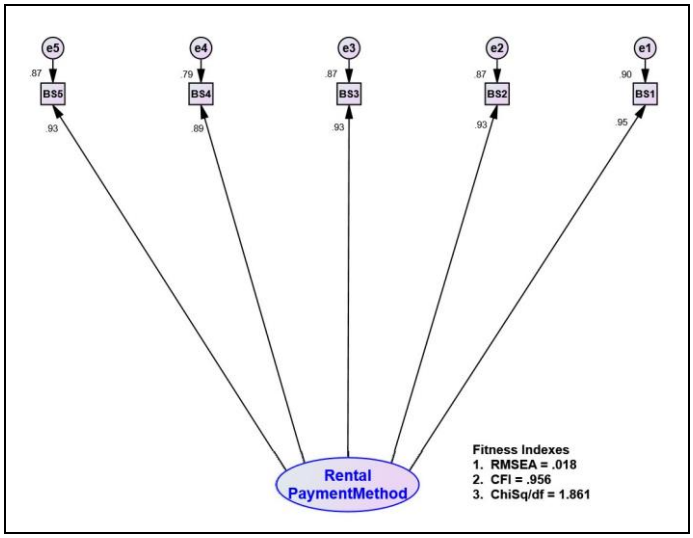

Figure 1. The Measurement Model of Rental Payment Method

CFA Analysis for the Attitudes and Lifestyle Habits Measurement Model

The analysis of Fitness Indexes in Table 3 below shows that the Attitudes and Lifestyle Habits Measurement Model has reached the level of the Fitness Index level as stated in Table 1 above. This means that Construct Validity has been achieved (Chik et al., 2024; Hoque et al., 2017).

Table 3 *Analysis To Determine Validity for Attitudes and Lifestyle Habits*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.065	Reach the set level
2. Incremental fit	CFI	0.995	Reach the set level
3. Parsimonious fit	ChiSq/df	2.061	Reach the set level

The Measurement Model for the Attitudes and Lifestyle Habits has reached the value of the Conformity Index level. This means that Construct Validity for this construct, has been achieved (Chik et al., 2024; Kashif et al., 2016).

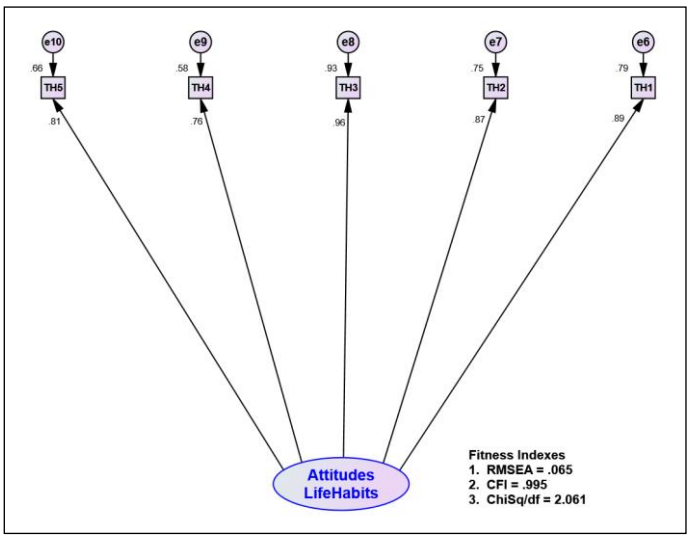

Figure 2 The Measurement Model of Attitudes and Lifestyle Habits

CFA Analysis for the Social Symptoms Measurement Model

The analysis of Fitness Indexes in Table 4 below shows that the Social Symptoms Measurement Model has reached the level of the Fitness Index level as stated in Table 1 above. This means that Construct Validity has been achieved (Chik et al., 2024; Hoque et al., 2017).

Table 4 *Analysis To Determine Validity for Social Symptoms*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.027	Reach the set level
2. Incremental fit	CFI	0.907	Reach the set level
3. Parsimonious fit	ChiSq/df	2.007	Reach the set level

The Measurement Model for the Social Symptoms has reached the value of the Conformity Index level. This means that Construct Validity for this construct, has been achieved (Chik et al., 2024; Kashif et al., 2016).

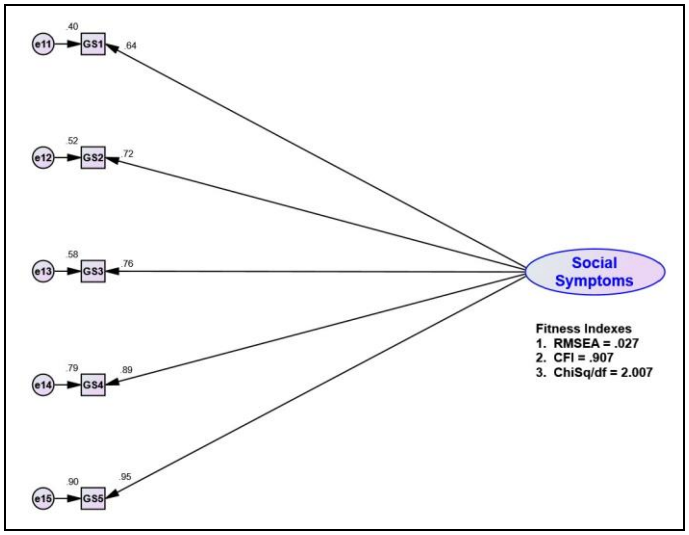

Figure 3. The Measurement Model of Social Symptoms

CFA Analysis for the Moral Decline Measurement Model

The analysis of Fitness Indexes in Table 5 below shows that the Moral Decline Measurement Model has reached the level of the Fitness Index level as stated in Table 1 above. This means that Construct Validity has been achieved (Chik et al., 2024; Hoque et al., 2017).

Table 5 *Analysis To Determine Validity for Moral Decline*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.014	Reach the set level
2. Incremental fit	CFI	0.966	Reach the set level
3. Parsimonious fit	ChiSq/df	1.215	Reach the set level

The Measurement Model for the Moral Decline has reached the value of the Conformity Index level. This means that Construct Validity for this construct, has been achieved (Chik et al., 2024; Kashif et al., 2016).

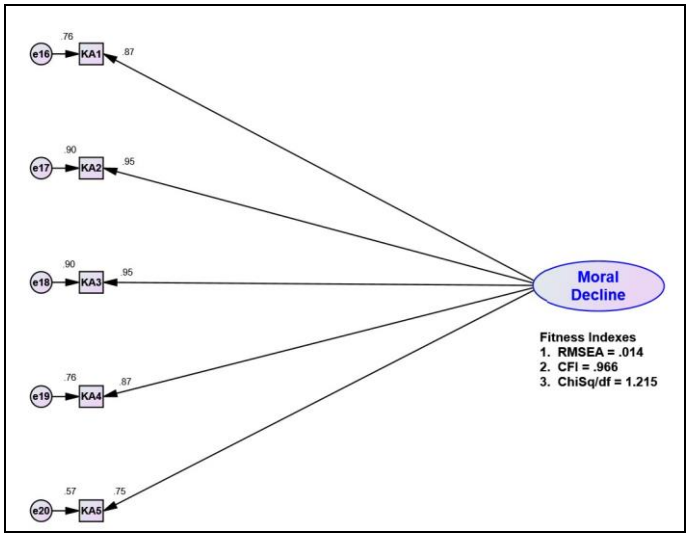

Figure 4. The Measurement Model of Moral Decline

CFA Analysis for the Living Assistance Measurement Model

The analysis of Fitness Indexes in Table 6 below shows that the Living Assistance Measurement Model has reached the level of the Fitness Index level as stated in Table 1 above. This means that Construct Validity has been achieved (Chik et al., 2024; Hoque et al., 2017).

Table 6 *Analysis To Determine Validity for Living Assistance*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.058	Reach the set level
2. Incremental fit	CFI	0.995	Reach the set level
3. Parsimonious fit	ChiSq/df	1.828	Reach the set level

The Measurement Model for the Living Assistance as reached the value of the Conformity Index level. This means that Construct Validity for this construct, has been achieved (Chik et al., 2024; Kashif et al., 2016).

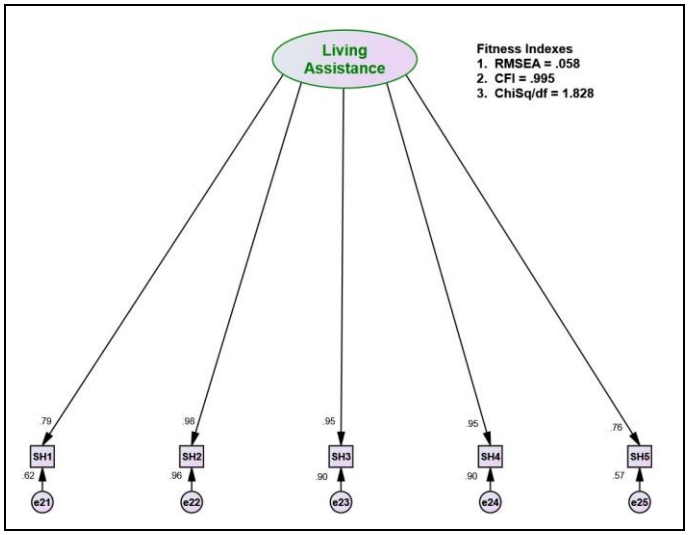

Figure 5. The Measurement Model of Living Assistance

CFA Analysis for the Explanation of Rent Arrears Measurement Model

The analysis of Fitness Indexes in Table 7 below shows that the Explanation of Rent Arrears Measurement Model has reached the level of the Fitness Index level as stated in Table 1 above. This means that Construct Validity has been achieved (Chik et al., 2024; Hoque et al., 2017).

Table 7 *Analysis To Determine Validity for Explanation of Rent Arrears*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.000	Reach the set level
2. Incremental fit	CFI	1.000	Reach the set level
3. Parsimonious fit	ChiSq/df	0.331	Reach the set level

The Measurement Model for the Explanation of Rent Arrears has reached the value of the Conformity Index level. This means that Construct Validity for this construct, has been achieved (Chik et al., 2024; Kashif et al., 2016).

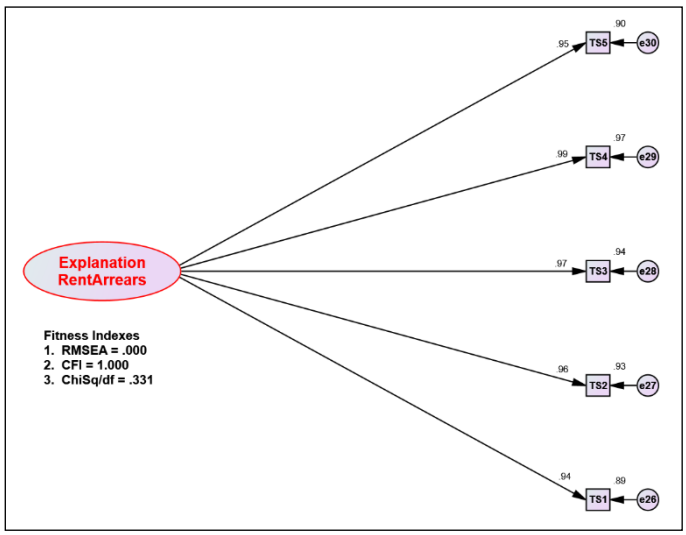

Figure 6. The Measurement Model of Explanation of Rent Arrears

Combined Confirmatory Factor Analysis of All Measurement Models (Pooled CFA)

This Pooled CFA analysis is necessary to evaluate the correlation value between the constructs in the Discriminant Validity procedure. If the correlation value between two constructs exceeds 0.85, then there is redundancy between the two constructs (Chik et al., 2024; Hoque et al., 2017). A model involving a second order construct is a construct that has dimensions or sub-constructs where each dimension or sub-construct has a certain number of items. Researchers will have difficulty combining all the second-level constructs in one model to conduct Pooled Confirmatory Factor Analysis (Pooled CFA). The solution, all second order constructs need to be summarized into a first order construct model by taking the mean item of each sub-construct or dimension (Chik et al., 2024; Hoque et al., 2017). The results of the Pooled CFA procedure are shown in Figure 7 below. The single headed arrow value is the factor loading values of each item and the double headed arrow value is the correlation between constructs. Through the Pooled CFA method, only one model fit index that represents all the constructs is released. Table 8 below shows that all three categories of model fit index for the construct measurement model have been achieved.

Table 8 *Analysis To Determine Validity for All Constructs*

Category Name	Index Name	Index Value	Findings
1. Absolute fit	RMSEA	0.021	Reach the set level
2. Incremental fit	CFI	0.982	Reach the set level
3. Parsimonious fit	ChiSq/df	1.466	Reach the set level

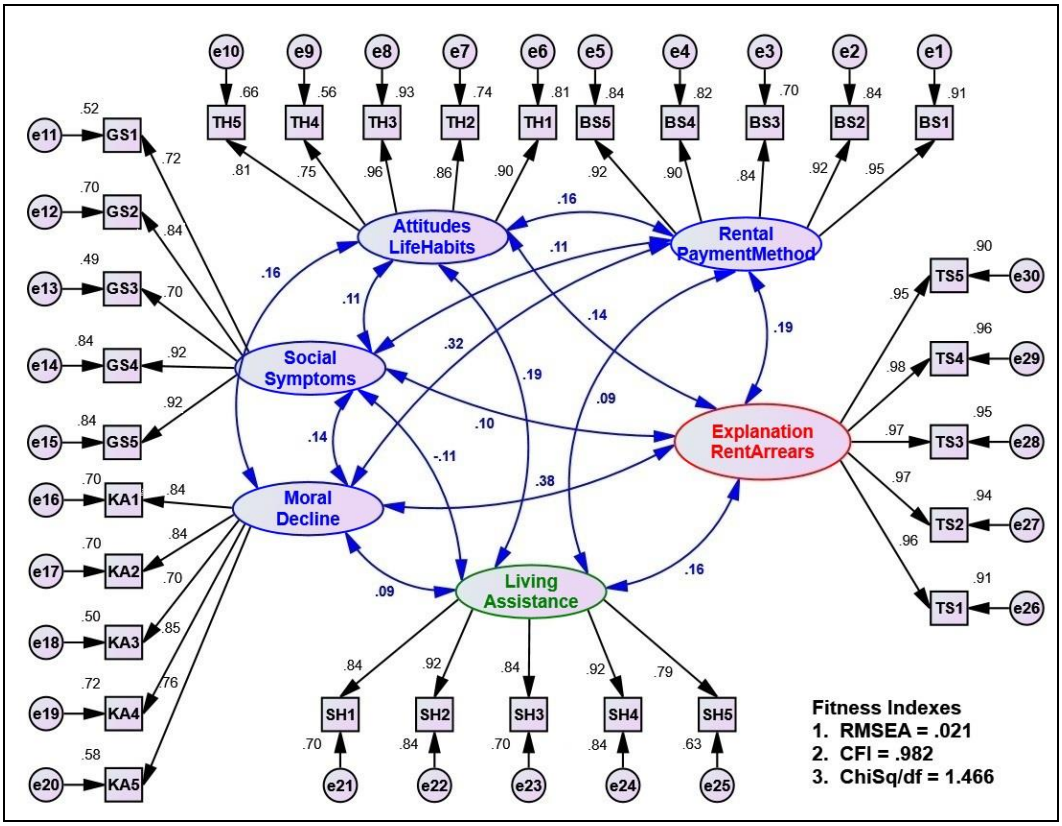

Figure 7. Pooled CFA Analysis Findings

Discriminant Validity is necessary to prove that all the constructs in the model do not have a strong relationship with each other leading to the problem of multicollinearity (Chik et al., 2024). Table 9 below shows the Discriminant Validity Index Summary between all the constructs in the model.

Table 9 *Discriminant Validity Index Summary*

Constructs	(a)	(b)	(c)	(d)	(e)	(f)
Rent Payment Methods (a)	**0.907**					
Attitudes and Lifestyle Habits (b)	0.160	**0.859**				
Social Symptoms (c)	0.110	0.110	**0.884**			
Moral Decline (d)	0.320	0.160	0.140	**0.860**		
Living Support (e)	0.090	0.190	-0.110	0.090	**0.864**	
Explanation of Rent Arrears (f)	0.190	0.140	0.100	0.380	0.160	**0.966**

Table 9 above presents the square root value of AVE for each construct on the diagonal matrix. The other values in the table are correlations between the two constructs. According to Chik et al. (2024), Discriminant Validity will be achieved if all the values of the square root of AVE (Diagonal) are greater

than other values whether the values are in rows or columns. Findings from Table 9 show that Discriminant Validity for all constructs in the model has been achieved.

Conclusion

Overall, the CFA analysis conducted on the Rent Payment Methods, Attitudes and Lifestyle Habits, Social Symptoms, Moral Decline, Living Assistance and Explanation of Rent Arrears among residents in the Terengganu Family Development Foundation (TFDF) Family Village Flats, has reached the fitness index level. The combined results of the confirmatory factor analysis of all measurement models (Pooled CFA) prove that all constructs do not have a strong relationship with each other to avoid the existence of multicollinearity problems. Therefore, before real data is analyzed to identify the effects between constructs, the validation of each construct must be carried out first in this study. The CFA analysis has confirmed that each construct used in this study does not overlap (i.e. each questionnaire item used in this study does not show the same meaning in each construct used).

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Data Availability: The author has all the data employed in this research and is open to sharing it upon reasonable request.

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