

Journal of Economics and Behavioral Studies

Vol. 5, No. 12, pp. 825-837, Dec 2013 (ISSN: 2220-6140)

Confirmatory Factorial validity of Neighborhood Features amongst South Africa low-income Housing Occupants'

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Abstract: There is a fundamental link between theory and measurement advising that factorial confirmation of measures should be the first stage of theory testing. The aim of this paper was to confirm the factorial validity of the neighborhood features in a residential satisfaction study amongst South Africa low-income housing occupants'. The study was conducted amongst subsidized low-income housing occupants' in South Africa. Data used in the study were obtained from a Delphi and field questionnaire study. Primary data was collected through the use of a structured questionnaire survey conducted among 751 low-income housing residents' in three metropolitan and one district municipality in the Gauteng Province of South Africa. Data gathered via the questionnaire survey were analyzed using structural equation modeling (SEM) which was used to confirm the factorial structure of the constructs. SEM analysis revealed that the Rho coefficient and the Cronbach's alpha coefficient of internal consistency were over 0.70 criteria for acceptability. Further finding was that neighborhood features influence on the residents' satisfaction was not statistically significant and hence was weak in the prediction of the residents' satisfaction with their houses. However, due to the idiosyncratic dataset used in the study, it remains to be seen if the evaluated indicator factors of neighborhood features can replicate to other cross-cultural datasets. If this is the case, the paper makes a significant contribution towards understanding neighborhood features on subsidized low-income housing projects. This study provided significant insight into how residents' satisfaction with their houses could be improved.

Keywords: *Neighborhood features, confirmatory factor analysis, residential satisfaction, structural equation modeling, EQS 6.2, South Africa*

1. Introduction

In the past few decades, measuring the perceived quality of residential environments has been a topic of interest in housing studies. In the person-environment relationship, Francescato (1998) stated that there is often a need to assess how well a residential neighbourhood environment meets the requirements, goals, and expectations of its occupants. That is, how satisfied the occupants are with their environment. In general terms, any such assessment is perceived as a gauge of residential satisfaction. According to Oktay and Marans (2011), residential satisfaction in its simplest sense indicates the occupants' responses to the physical, social, and organizational aspects of the residential environmental neighbourhood in which they live. Overtime, the precise constructs which determines occupants' satisfaction with the various housing domains have been measured and classified differently, making it difficult to specifically ascertain which measures influences residents' satisfaction with their houses.

Most residential satisfaction study models have combined both objective and subjective attributes for the assessment of residential satisfaction. For instance, Francescato et al. (1987) suggest that residence

satisfaction with any residential dwelling depends on three elements, which are: the design of the house, (i.e. the dwelling space organization, layout and facilities provided); the management practices; and the surrounding environmental social aspects. Whilst, Varady and Carrozza (2000), Salleh et al. (2011), acknowledge that residential satisfaction encompasses four distinct types of satisfaction, which include: satisfaction with the dwelling unit; satisfaction with the services provided, including repair services; satisfaction with the whole package received, as in the case of public housing, where no rent is paid (dwelling and service); and satisfaction with the environmental neighbourhood. Moreover, Husna and Nurizan (1987) maintain that outside the facilities in the house, other basic facilities, such as shops, markets, schools, clinics, mailing system, community hall, playgrounds, and others are important to support the daily life of the occupants, and enhance their quality of life. Likewise, Oh (2000) states that there are three main qualities, which bring about residential satisfaction, which are: the quality of the dwelling; the quality of the close environment; and the quality of the urban site, which impacts on the quality of housing. Although, most of the previous studies related to residential satisfaction emerged from within the context of western experiences with limited empirical data as to what pertains in developing countries (Turkolu 1997) like South Africa. Moreover, most of the studies have been undertaken in private residential settings and not on state subsidized housing programmes.

Parkes et al. (2002) stated that there are constraints associated with adopting the results of research undertaken in one cultural context to another. This practice has created a gap in the field of housing satisfaction studies in the developing countries. A reason accounted for this gap might probably be the emphasis placed by previous studies on issues relating to housing provision in quantitative terms. This apparently had direct links with the direction of previous housing policies in the developing countries. Issues relating to the quality of residential settings, and residents' opinions with respect to levels of satisfaction with regards to the various aspects such as the neighbourhood environment, were observed to have been relegated to the background. Hence, it is evidence that there is a fundamental link between theory and measurement advising that confirmation of measures should be the first stage of theory testing.

Therefore, the objective of this paper is to confirm the factorial validity of the neighbourhood features for use in a residential satisfaction study amongst South Africa low-income housing occupants' because it is presumed that not all identified neighbourhood construct's in literature will be effective in measuring neighbourhood satisfaction in a cultural context like South Africa. The paper starts with an overview of the literature on this topic. Then, the methodology adopted for the study is presented followed by the results of the questionnaire survey analysis and findings of the research. Finally, the paper draws some conclusions and recommendation. The paper makes a significant contribution towards understanding neighbourhood features on subsidized low-income housing projects. This study provided significant insight into how residents' satisfaction with their houses could be improved.

2. Understanding Neighbourhood Features

The literature on neighbourhood defines this concept in many ways. Brower (1996) informs that its form is derived from a particular pattern of activities, the existence of a common visual motif, an area with continuous boundaries or a network of often-travelled streets. Likewise, Kallus (2000) and Kallus and Law-Yone (2000) defined it as a place with physical and symbolic boundaries while Morris and Hess

(1975) considered it as 'a place and people with common sense limit as the area one can easily walk over'. Similarly, Golag (1982) perceives it as 'a physical or geographical entity with specific boundaries'. Whilst others have tried to integrate it with social and ecological perspectives by defining the neighbourhood as a limited territory within a large urban area, where people inhabit dwellings and interact socially (Hallman 1984). In addition, Warren (1981) defines it as a social organization of a population residing in a geographically proximate locale where there exists a common named boundary, more than one institution identified with area, and more than one tie of shared public space or social network.

Diverse definitions serve different interests, so that the neighbourhood may be seen as a source of place-identity, an element of urban form, or a unit of decision making. It is presumed that different research uses multiple definitions of a neighbourhood simultaneously to reflect the fact that neighbourhood is not a static concept but rather a dynamic one (Talen and Shah 2007). Likewise, planners and designers have also thought of the neighbourhood setting as a fixed, controllable, and imaginable physical area. Generally, researchers agree that a neighbourhood should comprise a walkable distance (the distance that a person could pleasantly walk, a 3MPH pace in 5 minutes). However, the actual walkable distance considered has varied from a quarter-mile to one mile from centre to edge (Colabianchi et al. 2007; Talen and Shah 2007).

The above listed definitions postulate either a certain degree of spatial extent and or social interrelationship within that space. However, it must be realized that there exists other features of the neighbourhood that clearly affect its quality from the perspective of the residents, property owners and other observers (Hallman 1984; Temkin and Rohe (1996). The definition of neighbourhood as assume by the present study is positioned toward the work of Pitkin (2001) which defined the neighbourhood as a multidimensional bundle comprised of spatially based attributes associated with clusters of residences, sometimes in conjunction with other land uses. The theory of neighbourhood as postulated by Pitkin (2001) is associated with spatially based attributes such as:

- Structural characteristics of residential and non-residential buildings: type, scale, materials, design, state of repair, density, landscaping;
- Infrastructural characteristics: roads, sidewalks, streetscaping, utility services, etc.; and
- Demographic characteristics of the resident population: age distribution, family composition, racial, ethnic, and religious types, etc.;
- Class status characteristics of resident population: income, occupation and educational composition;
- Environmental characteristics: degree of land, air, water and noise, population topographical features, views, etc.
- Political characteristics: the degree to which local political networks are mobilized, residents exert influence in local affairs through spatially rooted channels or elected representatives;
- Social interactive characteristics: local friend and kin networks, degree of inter-household familiarity, type and quality of interpersonal associations, residents' perceived commonality, and participation in locally based voluntary associations, strength of socialization and social control forces.

The notion on neighbourhood as advanced by Pitkin (2001) concurs with the work of Minkler and Wallerstein (1997), which states that a given neighbourhood have four basic components, which are: physical and human built environment that supports the housing occupants needs; social dynamics and interactions; group identity and cohesion; and collectives who act together for political change.

Furthermore, Galster (2001) informs that a neighbourhood can be projected as a consumable commodity from which four different types of users potentially reap benefits. The users include:

- Households: Households use the neighbourhood through the act of occupying a residential unit and using the surrounding private and public spaces. Thus gaining some degree of satisfaction or quality of residential life;
- Businesses: Businesses use the neighbourhood through the act of occupying a non-residential structure (store, office, factory etc.), thereby gaining a certain flow of net revenues or profit associated with that venue;
- Property owners: Property owners consume the neighbourhood by extracting rents and/or capital gains from the land and buildings owned in that location;
- Local authorities: The local authority consumes the neighbourhood by extracting tax revenues, typically from owners and tenants based on assessed values of residential and non-residential properties.

Through the consumption of the neighbourhood, changes occur; this can occur directly or indirectly (Galster 2001; Pitkin 2001). When these changes are not well managed they bring about a sense of dissatisfaction which affects the residents' satisfaction with the entire housing component. Satisfaction with neighbourhood features have been observed as a vital determinant of residential satisfaction (Vrbka and Combs 1991) to the extent that residents are willing to compromise the inefficiencies within the dwelling unit because of the satisfaction that is provided by the neighbourhood facilities and features (Ukoha and Beamish 1997). Neighbourhood features refer to the location of the dwelling unit, neighbourhood relations, distance to the shopping areas, distance to the workplace or school, distance to the police services, distance to recreational facilities, secure and clean environment, the building image and parking facilities amongst others (Aigbavboa and Thwala 2011; Awotona 1991). Hence residents of a given housing scheme are most likely to be dissatisfied with housing facilities that require residents to travel or walk long distances to school; to workplaces, shopping areas, medical centres and the geographical areas around their dwelling units. Easy access to good public transportation, community and shopping facilities and physical environment variables will provide residents' satisfaction with their housing units.

For instance, research conducted by Bjorklund and Klingborg (2005) in eight Swedish municipalities found the following top neighbourhood factors amongst others to be related to residential satisfaction, these include proximity to commercial areas, building exteriors with high aesthetic values, proximity to open spaces, less noisy environments with no traffic congestion, good reputation, good quality along the housing surroundings, proximity to town centres and a conducive environment. On the other hand, findings of a study conducted by Abdul and Yusof (2008) on residential satisfaction shows that neighbourhood facility factors are the most dominant factors in determining the level of satisfaction towards housing. The study further revealed that factors of neighbourhood facilities that caused a low level of satisfaction were poor public transport, lack of sport fields, lack of multi-purpose halls, lack of parking areas and lack of safety facilities for the disabled. Also, Ramdane and Abdul's (2000) study on the factors of neighbourhood facilities to evaluate the level of residential satisfaction, found that neighbourhood factors have a huge impact on the overall satisfaction with the housing facilities. Research has pointed out the complex characteristics of neighbourhood satisfaction (Amerigo and Aragonés 1997; Francescato 2002; Marans and Rodgers 1975; Marans and Spreckelmeyer 1981). It has also been

identified that aesthetics, or pleasantness to the eye, is one of the most important factors in neighbourhood satisfaction (Sirgy and Cornwell 2002). Whilst, social and personal characteristics, such as neighbourhood cohesion, or networks, were other factors associated with neighbourhood satisfaction (Chapman and Lombard 2006; Morrow-Jones et al. 2005). The neighbourhood features which were considered in the present study are presented in Table 1 below. The features were generated from the extensive review of literature which align with the definitions of Pitkin (2001) and Minkler and Wallerstein (1997).

Table 1: Neighborhood Features Conceptual Variables

Neighborhood Features (NDF)	Location of the dwelling unit in the neighborhood
	Quality of relationship with neighbors
	Quality of landscape in the neighborhood
	Quality of walkways
	Ease of access to main roads
	Amount of privacy from other neighbors
	Quality of street lighting at night
	Amount of security in the neighborhood
	Physical condition and appearance of the neighborhood
	Cleanliness of the neighborhood
	Proximity of house to workplace
	Proximity of house to shopping areas
	Proximity of house to the nursery school
	Proximity of house to the high school
	Proximity of house to hospitals/clinics
	proximity of house to place of worship
	Proximity of house to police services
	Proximity of house to parking facilities
	Proximity of house to disabled facilities
	Proximity of house to the community hall
	Proximity of house to playground / recreational facility
	Proximity of house to public transportation and services

3. Methodology

The study was conducted using both qualitative and quantitative data collection methods. For the qualitative aspect, a Delphi technique was used and field questionnaire survey was used for the quantitative aspect. The Delphi survey was conducted with 15 sustainable human settlement experts drawn from the nine province of South Africa. The output from the Delphi techniques was a refinement of conceptual variables for neighbourhood features. With regards to the quantitative aspect of the study, a face-to-face administered questionnaire survey was conducted among 751 low-income housing residents' in three metropolitan and one district municipality in the Gauteng Province of South. Data gathered via the questionnaire survey were analyzed using structural equation modelling (SEM) software Version 6.2, which was used to assess the factor structure of the constructs. The conceptual variables were thereafter tested as a priori using SEM of the questionnaire survey results. The SEM process was therefore undertaken as confirmatory factor analysis (CFA) of the priori model. Due to the limited space in current paper, the Delphi process is not discussed.

Model testing: Confirmatory factor analysis (CFA) using EQS Version 6.2 (Bentler and Wu 1995) was used to test the neighbourhood features priori. The construct parameters were estimated using the Maximum Likelihood method. Since psychometric data have a tendency to be not normally distributed,

consideration was given to the Mardia coefficient. Meaning, if the Mardia values showed significant deviation from normality, the Satorra-Bentler Scaled statistics (Robust) would be used as these have been found to perform adequately under such conditions (Bentler 1988). In establishing the score reliability, the construct validity for the variables was conducted to demonstrate the extent to which the constructs hypothetically relate to one another. This is also referred to as the test of measurement invariance (MI), factorial invariance or measurement equivalence between indicator variables. Measurement invariance is a very important requisite in Structural Equation Modeling. It attempts to verify that the factors are measuring the same underlying latent construct within the same condition. MI ensures that the attributes must relate to the same set of observations in the same way. The MI for the neighbourhood features was determined based on examination of the residual covariance matrix from the CFA output result as opposed to the correlation matrix. Covariance matrix establishes the variables that adequately measure the neighbourhood construct.

Hence, preliminary Confirmatory Factor Analysis (CFA) was performed to measure the neighbourhood variable indicators to identify which items appropriately measures the neighbourhood features. Indicators variables with an unacceptably high residual covariance matrix (>2.58) were dropped, meaning that they do not sufficiently measure the neighbourhood features regardless of their importance in other cultural context and past research studies. Residual covariance matrix values greater than 2.58 are considered large (Byrne 2006; Joreskog and Sorbom 1988). Therefore, in order for a variable to be described as well-fitting in measuring a construct like neighbourhood satisfaction, the distribution of residuals covariance matrix should be symmetrical and centered around zero (Byrne 2006; Joreskog and Sorbom 1988). This procedure was adopted as a means to ensure that the indicator variables were measuring the same latent construct. The assumption of measurement invariance is most times tested in CFA (Meredith 1993), so as to allow for comparison of indicator variables under the same condition. The assessment of measurement invariance across latent variables involves the use of multi-sample CFA as used in this study. This procedure has been described and used by Widaman and Reise (1997) and Reise et al. (1993). Also, Little (1997) investigated invariance of factors of control expectancy across gender and four cultural groups. Kim et al. (1996) studied invariance of world views and religious beliefs of older adults over time.

4. Results

Descriptive statistics: The assessment of the available private and public neighbourhood features revealed 61.9% have a shopping mall within their neighbourhood, while 38.1% informed there is no shopping mall in their neighbourhood. The majority (83.8%) have a place of worship in their vicinity, while 16.2% do not. Likewise, 44.8% informed they have a playground / recreational facility in their neighbourhood, while a majority (55.2%) said they do not have such a place in their neighbourhood. Also, majority (94.4%) informed they do not have facilities for the disabled in their neighbourhood, while only 5.6% said they have in their neighbourhood, as shown in Table 2.

Table 2: Available Private / Public Neighborhood Features

Facility	Present	Not present
Shopping area	61.9%	38.1%
Place of worship	83.8%	16.2%
Parking facilities	6.0%	94.0%
Playground/recreational facilities	44.8%	55.2%
Community hall	38.7%	61.3%
Disabled facilities	5.6%	94.4%

Furthermore, when the presence or absence of some listed government services was assessed, findings emanating from the survey revealed that a majority (94.9%) have access to public transport, followed by 92.5% who informed they have access to garbage and waste collection, 84.0% have a drainage system (within neighbourhood or outside). However, the respondents (86.5%) further indicated that they do not have fire protection services in their neighbourhood, followed by 66.8% who do not have police services, 63.2% do not have access to hospital/clinic in their neighbour, 48.7% do not have high school either private or public in their neighbourhood and a combined response of 55.8% do not have primary / nursery schools (either private or public) in their area, as shown in Table 3.

Table 3: Available Government / Private Neighborhood Features

Service	Present	Not present
Nursery school	76.2%	23.8%
Primary school	68.0%	32.0%
High school	51.3%	48.7%
Hospital/clinic	36.8%	63.2%
Police services	33.2%	66.8%
Fire protection services	13.5%	86.5%
Public transport	94.9%	5.1%
Drainage system (within neighborhood or outside)	84.0%	16.0%
Garbage and waste collection	92.5%	7.5%

Measurement model for neighbourhood features (NDF): From a total sample of 751 responses, the number of cases that were analyzed was 749. Two cases were skipped because of missing variables. Preliminary observation of the data revealed that the residual covariance matrix scores for seventeen indicator variables (NDF2, NDF4, NDF6, NDF8-NDF9, and NDF11-NDF22) had unacceptably high scores (values ranged from 2.95 - 4.71). Hence, they were dropped from further CFA analysis. Therefore only five indicator variables passed the test and were used for the assessment of the neighbourhood satisfaction measurement model goodness-of-fit. The question of how many factors a construct should have is also debatable (Bollen 1989; Hayduk and Glaser 2000). However, some scholars have informed that a minimum of four indicator variables should be used whilst others have recommended five (Bollen 1989; Byrne 2006; MacCallum et al. 1996). Analysis of the Mardia values showed that the data deviated significantly from normality (Mardia = 19.78), hence the decision was to use the robust maximum likelihood method.

Examination of the Bentler-Weeks structure representation for the approved construct revealed that the NDF construct has 5 dependent variables, 6 independent variables and 10 free parameters. The number of fixed non-zero parameter was 6. As shown in Table 4, the sample data on NDF measurement model yield an $S - B\chi^2$ of 53.024 with 5 degrees of freedom. The associated p-value was determined to be 0.0000. The chi-square value advocated that the difference between the sample data and the postulated neighbourhood features measurement model was insignificant. From these values, the normed chi-square value was determined to be 10.60. The normed chi-square is the procedure of dividing the chi-square by the degrees of freedom. The normed values of up to 3.0 or 5.0 are recommended (Kline 2005). The ratio of $S - B\chi^2$ to the degrees of freedom was higher than the upper limit value of 5.0 suggesting a mediocre fit of the data to the construct. However, the chi-square statistics is only indicative of fit and therefore, other goodness-of-fit indexes were reviewed.

Table 4: Robust Fit Indexes for Neighborhood Feature Construct

Fit Index	Cut-off value	Estimate	Comment
$S - B\chi^2$		53.024	
df	0≥	5	Acceptable
CFI	0.90≥ acceptable 0.95≥ good fit	0.931	Good fit
GFI	0.90≥ acceptable 0.95≥ good fit	0.958	Good fit
SRMR	0.08≥ acceptable 0.05≥ good fit	0.050	Good fit
RMSEA	0.08≥ acceptable 0.05≥ good fit	0.113	Acceptable fit
RMSEA 90% CI		0.087:0.141	Barely out of range

The goodness-of-fit indexes are presented in Table 4. The robust Goodness-of-fit (GFI) index of 0.958 was found to be higher than the cut-off value for a good fitting model. Whilst the Comparative fit index (CFI) of 0.931 was slightly lower than the cut-off value for a good fitting model. A model is said to be a good fit if the CFI and GFI are above the cut-off value of 0.95 (Hu and Bentler 1999; Joreskog and Sorbom 1988). With the drop (difference of 0.019) in the CFI value, the model can be described to have an acceptable fit, albeit, not well fitting. The robust root mean square error of approximation (RMSEA) with 90% confidence interval was found to be 0.113 (lower bound value = 0.087 and the upper bound value = 0.141). This value was above the maximum value of 0.08 for a good fit model. However, this is considered an acceptable mediocre model fit (MacCallum et al. 1996). In addition, the absolute fit index, Standardized root mean square residual (SRMR) was found to be 0.05. This value indicated a very good fit because a good fitting model is expected to have an SRMR index lower or equal to 0.05, whilst an index of 0.08 is sufficient to accept the postulated model. The absolute fit index SRMR accounts for the average discrepancy between the sample and the postulated correlation matrices and therefore, it represents the average value across all standardized residuals and ranges between zero and 1.00 (Byrne 2006). Evaluation of the SRMR, RMSEA (90% CI), GFI and the CFI fit indexes indicated an acceptable mediocre fit of the measurement model for the neighbourhood features factor.

Testing the influence of neighbourhood features (ndf) on overall residential satisfaction: In determining the internal consistency for the NDF measurement composition model, the Rho Coefficient and the Cronbach's Alpha Coefficient were examined to establish reliability. According to Kline (2005), multivariate reliability coefficient should fall between zero and 1.00. While values close to 1.00 are desired. The Rho Coefficient of internal consistency was found to be 0.772. This was above the minimum value of 0.70. Equally, the Cronbach's Alpha was also found to be above the minimum value of 0.70 at 0.764. Both values showed a high level of internal consistency and therefore reliability (Table 4).

The construct validity was determined by examining the magnitude of the parameter coefficients. High parameter coefficients greater than 0.50, indicate a close relation between the factor and the indicator variable. A parameter coefficient of 0.50 is interpreted as 25% of the total variance in the indicator variable being explained by the latent variable (factor). Therefore, a parameter coefficient has to be between 0.50 - 0.70 or greater to explain about 50% of the variance in an indicator variable (Hair et al. 1998). Hence, the inspection of the standardized parameter coefficient presented in Table 4, shows that they were significantly high (values ranged from 0.761 to 0.380). The estimate of 0.380 being the minimum suggested that the measured factor accounts for 43.88% of the variance in predicting the occupants' overall residential satisfaction. The total variances accounted for in each indicator variables by the endogenous variable revealed that the scores were significance at 5% level.

Table 5: Reliability and Construct Validity of NDF Model

Indicator Variable	Stand. Coeff. (λ)	Z-Stats	R²	Total Variance	Factor Loading	Sign. @5% level
NDF1	0.723	**	0.523	59.12%	0.719	Yes
NDF3	0.671	22.368	0.450	57.30%	0.662	Yes
NDF5	0.647	16.957	0.419	56.41%	0.684	Yes
NDF7	0.761	20.580	0.579	60.35%	0.722	Yes
NDF10	0.380	11.849	0.145	43.18%	0.401	Yes
RS1	0.797	**	0.635	61.45%	0.718	Yes
RS3	0.510	13.527	0.260	50.50%	0.551	Yes
RS5	0.391	9.122	0.153	43.88%	0.479	Yes
RS7	0.617	14.956	0.381	55.24%	0.644	Yes

Cronbach's Alpha = 0.764; Rho Coefficient = 0.772

(Robust Statistical Significance at 5% level)

*** SEM Analysis Norm (Kline 2005) - One variable loading per latent factor is set equal to 1.0 in order to set the metric for that factor. *Parameter estimates are based on standardized solutions*

In addition, the assessment of the interfactor correlation (R²) values for the neighbourhood feature indicator measures revealed that only two indicator values were close to the desired value of 1.00, hence, they were not significant in predicting the residents' overall residential satisfaction (RS). The other indicator variables were weak in predicting RS variable. The interfactor correlation test statistics (Z-stats) which functions as a Z-statistics test that the estimate is statistically different from zero. Findings on this aspect revealed that the estimate is statistically different from zero, however, the R² did not sufficiently measure the RS variable. Therefore, from the statistical assessment, the score results suggested that the influence of this factor on the RS variable was weak (indirect). Nevertheless, the total variance accounted for revealed that it has a good indirect association in the prediction of overall residential satisfaction.

Discussion: The finding was that neighbourhood satisfaction indicator variables satisfied both internal reliability and the construct validity criteria. The Rho value was above the minimum value of 0.70 (Table 4) and the construct validity criteria was justified by the magnitude, and statistical significance of all parameter coefficients. The CFA analysis for the neighbourhood feature indicator revealed that only five indicator variables passed the test and were used for the assessment of the neighbourhood satisfaction measurement model goodness-of-fit. In essence, they were closely associated with the dependent variable. The other variables were weak in predicting the neighbourhood feature variable which was further evident in the assessment of residents' overall housing satisfaction. However, a further assessment of the variance accounted for in each measure by the indicator variables revealed that the scores were significant, as the values were above the minimum required value. The statistical assessment suggests that the direct influence of these variables on the resident's satisfaction was weak (indirect). However, the total variance accounted for revealed that there was an indirect association in the prediction of the residents' satisfaction with the neighbourhood features.

Satisfaction with neighbourhood features have been observed as a vital determinant of residential satisfaction (Vrbka and Combs 1991) to the extent that residents are willing to compromise the inefficiencies within the dwelling unit because of the satisfaction that is provided by the neighbourhood facilities and features (Aigbavboa and Thwala 2011; Onibokun 1974; Ukoha and Beamish 1997). Similarly, descriptive assessment of neighbourhood features revealed that the findings agrees with the work of Mohit et al. (2010), Parkes et al. (2002) and Chapman and Lombard (2006) which indicated that most respondents in their study were not satisfied with the security and crime prevention features in a low-income residence because of the lack of a permanent policing facility in their neighbourhood. Also, Zack and Charlton's (2003) work, which was a South African based study, found that crime and safety concerns, and the lack of adequate public transport feature strongly in beneficiary complaints about their neighbourhoods, which ultimately lead to their dissatisfaction with the neighbourhood and the housing unit.

There is broad consensus in the South African subsidized low-income housing landscape that many of the neighbourhoods in which subsidized low-income housing are located, are not adequate and do not offer a full range of amenities (Charlton 2004). This is despite an obvious recognition that the environment within which a house is situated is recognized as being equally as important as the house itself in satisfying the needs and requirements of the occupants (Charlton et al. 2003; National Department of Housing 2000). Over and over again in South African low-income housing development, provisions are made in most township layout for essential facilities, and the land set aside, but for several years or long after the housing has been developed in those areas, the amenities remain as undeveloped. For instance, the PSC (2003) during the Housing Subsidy Scheme Review in 2004 noted that access to schools was generally reasonable in new housing projects but that a range of other facilities were often lacking, which supports this study's assessment. However, the South African Department of Human Settlement has acknowledged that most low-income residential areas have been developed without the necessary social and other amenities and this "detracts from the ideal to establish habitable, viable and sustainable human settlements" (Department of Housing 2003:28). Also, Charlton (2004) posits that many housing projects have manifested as low density and mono-functional neighbourhoods, lacking in integrated, holistic development. This circumstance does not facilitate the economic growth or socio-economic development of low-income communities so necessary to metropolise development. Likewise, it runs counter to the

intention that ultimately, the housing process must make a positive contribution to a non-racial, non-sexist, democratic and integrated society (Charlton 2004).

The importance of having conducted a confirmatory factor analysis to confirm the factorial validity of the neighbourhood features for use in a residential satisfaction study amongst South Africa low-income housing occupants' was that it is more useful to specifically identify the factors of a subsidized housing neighbourhood with a statistically significant causal effect on the overall residents' satisfaction. With this analysis, it was possible to characterize and identify specifically the factors of neighbourhood satisfaction which has a statistically significant influence on the residents, albeit, the factors were weak in predicting the residents' overall satisfaction with their housing units. Therefore, with such knowledge, it is possible to efficiently allocate the required resources to various aspects of neighbourhood features in order to assure neighbourhood satisfaction. Hence, the confirmation of measures should be the first stage of theory testing.

5. Conclusion

A priori neighbourhood feature indicator variables were tested based on the findings from literature and the Delphi study. The priori postulated that neighbourhood satisfaction is based on a set of variables. The postulated priori was analyzed using EQS version 6.2 SEM software package. The SEM process was therefore undertaken as confirmatory factor analysis (CFA) of the priori variables. The CFA analysis revealed that only five indicator variables passed the test of factorial validity which was used for the assessment of the neighbourhood satisfaction measurement model goodness-of-fit. Further findings shown that the residual covariance estimates for the five variables fell within the acceptable range; the robust fit indexes had an acceptable fit, while the RMSEA value and the RMSEA with 90% confidence interval produced an average fit. Likewise, the parameter estimates were statistically significant and feasible. Hence, it was therefore concluded that the measurement model for the neighbourhood feature, had an adequate fit to the sample data. Despite these findings, the CFA result shows that not all variables as classified as predictors of neighbourhood satisfaction in other cultural contexts in literature and further verified through conducted Delphi study determines neighbourhood satisfaction in subsidized housing in South Africa. This view was also supported by other studies that have used other research methods on the determinants of neighbourhood and residential satisfaction.

Another reason why most of the variables that determines neighbourhood satisfaction in other cultural contexts were not considered so in South Africa low-income housing can be attributed to the fact that since 2004; subsidized housing development in South Africa has been developed as an all-inclusive project. This entails comprehensive development of housing neighborhood's, with the presence of all amenities and infrastructures. This research supports the theory confirmation of measures should be the first stage of theory testing. The authors believe that the SEM technique could be used to further refine variables that should be given considerable attention in the development of new housing projects. Hence, the findings offer a minimum requirement that could be used by the Department of Human Settlement to influence residential satisfaction in subsidized low-income houses. It is therefore recommended that a checklist of items defining the factors of neighbourhood features could ensure that stakeholders meet the basic required criteria to influence residential satisfaction through the development neighbourhood that meets the expectation of the occupants'.

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