Asian Review of Social Sciences
ISSN: 2249-6319 (P) Vol.10 No.2, 2021, pp.1-10

DOI: https://doi.org/10.51983/arss-2021.10.2.2960

Development of an Approach to Assess the Success and Failures Influence in Middle Income Housing Projects: Case Study of Jalthara, Bambalapitiya and Dehiwala

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(Received 20 April 2021; Accepted 28 June 2021; Available online 8 July 2021)

Abstract - **Condominium is a complex of a building containing several individually owned apartments or houses. Condominiums can be identified as a western lifestyle of living in urban areas. Based on high population density, lack of land availability, lack of serviced lands, easy service accessibility is the reason for increasing condominium lives. Consequently, the satisfaction issues in High-rise buildings are considered to enhance the resident's wellbeing among condominiums. All the housing projects are not becoming successful. Successful means that the scope, goals, and objectives were met on time completed and the project came in at or under budget. The incomplete list of requirements, less involved stakeholders, lack usage of resources, high expectations, poor planning, and influence for the failures. There are several factors that have identified performance after the implementation, Aesthetic appearance, Environmental impact, Client satisfaction, Project complexity for measure the project failures. In Sri Lanka is also presently experiencing condominium concept predominantly in Colombo district. Since the middle-income condominium living is new to Sri Lanka, there are no such considerations or research regarding project performances in condominiums. Subsequently, the aim of this study to assess the success and failures influence in middle income housing projects. The study focuses on three of middle-income condominiums in Colombo district. The methodology of this research is comprised of observations and questionnaire surveys. The date was analyzed by using Correlation analysis, Factor analysis and Full permutation Polygon Synthetic Indicator analysis. The findings reveal that success and failures of the housing projects through post performances. Accordingly, the results of this study serve as a basis for planners and developers to design and make polices for the future condominium housing projects.**

Keywords: **Condominiums, Middle Income, Satisfaction, Housing, Impact, Planning**

I. INTRODUCTION

Condominium is a complex of a building containing several individually owned apartments or houses. Condominiums can be identified as a western lifestyle of living in urban areas. Based on high population density, lack of land availability, lack of serviced lands, easy service accessibility is the reason for increasing condominium lives. There are different types of condominiums in Sri Lanka. Based on facilities, building structure, these types are different such as super luxury, luxury, semi luxury, middle income, low income etc. (Senaratne S.2006) Even though the vertical residential schemes concept practice today commonly, the high-rise buildings has started in residential areas with the lack of the space.

Looking for a history of condominium housing projects evolution, after the independence the very first housing sub-committee was appointed in 1952 in housing sector in Sri Lanka. Therefore, on the recommendations, a separate ministry was established in 1953 and the National Housing Department under the National Housing Act No. 37 of 1954. In 1961, the recommendations of committee appointed to inquire housing requirements in rural and urban are in Sri Lanka. In 1973, under the Act No 10 multi-story (flats) housing schemes common amenities were started. And, in very first time, common amenities were established for maintain condominium property. And during this time behalf of people's housing requirements, government was launched housing scheme projects. In 1979, National Housing Development Authority established to implementing housing development as a national program. But at the beginning, they were target low-income community and supply large scale housing schemes with the local and foreign support. With the establishment of the Urban Development Authority 1978, government was focusing new trends in housing sector. They introduced new policies regarding housing, and they launched demonstration projects with the help of Un-Habitat. In early 80s, private sector was encouraging catering to fulfill upper and middle-income housing demand while the government directly intervening alternative housing development programs.

All the housing projects are not becoming success. Successfully means that the scope, goals, and objectives were met on time completed and the project came in at or under budget. The incomplete list of requirements, less involved stakeholders, lack usage of resources, high expectations, poor planning, and influence for the failures. There are several factors that have identified from literature such as Financial, performance after the implementation, Aesthetic appearance, Environmental impact, Client satisfaction, Project complexity for measure the project failures.

Since Sri Lanka is experiencing the middle to income condominium living in very recently, there are not any considerations or research regarding the post-performance or the post effects, failures of middle-income government housing projects. But such problems may occur in the future with the increased high-rise residential population. And, up to now there is not any specific framework for identify post failures or success factors which help for future housing project programs in Sri Lanka. Therefore, the study that investigates that issue has not been researched yet in Sri Lanka and this research will fill that knowledge gap. The research question is to try to understand the success and failures of middle-income condominium housing projects. The research problem is that government housing projects have more limitations. Residents always having complaints of satisfaction levels, post effects of the housing projects. There is no proper value for the residents according to their payments. Because middle income residents are interesting housing schemes for live long time. The outcome of the study will be significant to identify that what are the considerable planning elements that should be consider in condominium constructions. Middle income community consumes their housing units for living wise purpose comparing high luxury apartment's consumers. Condominium Management Authority does not have any mechanism for identify those factors or criteria. The findings of this study will lead to a direction or a path for planners, project managers, and decision makers to provide better living environment for residents. The study has two objectives. To explore factors that affect condominium projects for their survival and to identify the current trends of housing development impacts.

II. LITERATURE REVIEW

"Condominium can be defined as a multistory building generally constructed using a structural frame, provided with single-speed elevators, and combining extraordinary height with ordinary room spaces." (Engur, 2013) And it can be defined as a "as a building of two or more than two units, the interior space of each unit has individually owned, and the balance of the property is owned commonly by the owners of individual units (Kowshala, 2002)". "However, some researchers have argued that living in condominiums have many negative outcomes such as fear, dissatisfaction, poor social relations and behavioral problems" (Gifford, 2007)

Success criteria mean variables that use for measure project success or fail. (Muller & Turner, 2007). It may be different due to the consideration of stakeholders. (Dvir *et al.,* 1998). Certain criteria might be relevant in measuring the success of most projects and should be adopted to size, complexity, duration, type, and stakeholder's requirements.

Project failures can happen construction stage and implementation stage both. In case of construction case, cost recovering has become a critical issue in projects in developing countries (Cheng, 2014).

Success and failure factors are depending on evaluation of the performance of the project. (Heeks, 2002, 2006). Project failure of success is based on stakeholder satisfaction (Meredith and Mantel (2002) and McManus and wood - Harper (2008).

Success comes from two dimensions project management performance directly connects with budget, schedule and their goals, objectives etc. The benefit accrued from the beneficiaries of the project. It is measuring in long term. (Patanakul and Shenhar 2012).

Success and failures are depending on location factors, strengths of relevant government authorities etc. Join Cordaid (2014) has described cost of living s depend on adequate of housing. He considered that two of main affect to the adequate of housing. These factors are the affordability of housing and the availability of the services essential for health, security, and comfort. And he explained that in a housing project, provided each housing unit must be affordable and maximum services must be available. The affordability means the utilities such as electricity, gas, water, waste disposal etc. According to his idea sometimes a housing project will provide easy and affordable services but the bill for the utilities is too high for the residents. And he explains about location as a factor. An adequate house should be close enough to social infrastructure facilities, schools, health centers, police stations, public transport links etc. He says that housing projects fail because the housing schemes, dwelling units are built miles away from the city without goods, affordable transport links. And the suitability is another selected factor that cause to success and failures of housing projects. Under that housing schemes must be suitable for the surrounding environment such as geographical factors including climate and that it enables the expression of cultural identity and diversity of housing in the area. Further he says that in Haiti, there is a place which hot and it is really essential a cool place in part of the house where people will spend most of their daytime. In Sri Lanka such kinds of weather seasons cannot be seen. But the location suitability is needed such as terrain, natural green environment etc. He says that sometimes people have traditional and cultural wishes should be taken when developing a housing program. And he explains that the role of the government also affects to the success and failures of the housing projects. In here he basically explains about low-income housing projects. The problems that the government think behalf of the low-income dwellings that they come up with all the solutions. Because with the time citizens cannot survive with provided facilities and they become alternative solutions. For an example, people just go there and sell out the windows, doors, toilet fittings and then go back to their slums. The role of the government became failures in such kinds of solutions.

Mohomad Mohit (2014) has studied overview of the theoretical perspective of residential satisfaction. He has discussed socio economic attributes of residential influences and the level of satisfaction / dissatisfaction. Ahamad

Masum has explored the several factors for solving insolvency issues in abandoned housing projects. And through the study, he suggests certain legal approaches to improve the rehabilitation mechanism for abandoned housing projects.

N. Chandrasiri (2016) has studied research the emerging relationship between state, market, and social classes in Colombo. It reveals that the increasing demand among middle and upper-class population for private housing localities and how it affects land prices etc. And he has studied some qualitative requirements regarding housing such as way of life, neighborhood relationships, environment qualities, identity, privacy, security, social status for assessing public housing project access in Nigeria and the results reveal six criteria for computing public housing project management success such as client's satisfaction, project finalized on time, absence of disputes, security, and completion within budget.

Ana Marra Gromescu have studied that how to use modern technology to develop investment housing projects in Iraq. Surangkana Trangkanont (2014) was found critical failure factors of low-income housing project life cycle programs. Mohommed Muthtar Musa (2015) reveals that the economic factor significantly disturbs for the success of community housing projects. And political factor significantly affects public housing projects success. They have established a comprehensive model that use to measure housing policy makers, consultancies, designers, contractors and other stakeholders in the planning and development of public housing programs. Many scholars have discussed about the satisfaction levels of condominiums. There is not any study in Sri Lanka, middle income condominium post effects through these criteria.

III. INFLUENCE OF INFRASTRUCTURE FACILITIES

Infrastructure is an important component for a residential housing development, and it includes facilities, structures, equipment, and similar physical assists. (Beeferman & wain, 2016). Housing demand can be seen in urban areas as well as rural areas now. The decentralization of job centers to the suburbs, availability of automobiles with well-developed roads have attracted for housing development and there is a need for more infrastructure to support the residential housing developments in suburbs areas more and more (Suen 2005)

Infrastructure can influence for human lives tremendously. Social infrastructure can influence for growth of community health, safety, and quality of life. (Humbolt country General Plan, 2007). Available infrastructure facilities within the neighborhood enable dwellings have a better participate in the society (Yigitcanlar, Kamruzzman and Teriman, 2015). According to these scholars, infrastructure can be upgraded, quality of the life of people, improved safety of residents, improve health and aesthetics, create new job opportunities, reduced household expenditures, upgrade neighborhood viality etc.

IV. INFLUENCE OF MAINTENANCE

Generally, maintenance means kind of work needed to advance or enhance the quality a building for functioning well. (Mosel &Janssen, 2010) Maintenance services are a housing service factor provide by the management to dwellings such as community facilities, surrounding infrastructure and fostering positive emotional state on their housing (Mossel & Sttrub, 2009). Maintenance services involve activities that can prevent building decay, moderate breakdowns, and eliminate safety hazards (Lai & Pan 2010). Majority of maintenance services aims to achieve operational efficiency and customer satisfaction. (Siue al, 2001)

V. INFLUENCE OF SURROUNDING NEIGHBORHOOD

Consider about middle-income housing projects, they located close to Colombo mostly. In lots of middle-class housing schemes have not compatible with their surrounding neighborhoods. There are some issues regarding the applicability of neighborhoods. Rohe and Freeman 2001; Rosenthal, 2007) says neighborhood racial transitions as well as neighborhood economic status influence for success and failures of housing projects. There are studies that present positive, negative, or minimal neighborhood effects from nearby affordable housing projects. (Galster 2004). According to the Freeman and Botein (2002) says one critical factor that might be influence for variations of neighborhood environment within which the assisted housing is built.

VI. INFLUENCE OF ARCHITECTURAL DESIGN

Design aspect addressing the behavioral aspect of built environment basically. It is kind of new investigation. Environmental design research association have committed to present relationship between a designed environment and the human response to that environment. (Victor Regnier - design problems in enhancing productivity and independence in housing for the elder.) Designers have investigated evaluation of the environment and the successful and resident satisfying design products. Steinfeld have identified three main areas of residential unit that have significant effect on the adoptability of the unit and their living environment such as kitchen design, bathroom

VII. METHODOLOGY

This chapter consists of the conceptual study to the research, the selection of the case study, data collection methods, method of sampling selection, factor analysis methods, methods of data analysis and the detail methodology of the research. Basically, there are two data collection methods were used in this study. The mixed

methods research is referring to research that consolidate qualitative and quantitative data within a single study. (Wisdom *et al.*,& Creswell and Plano Clark, 2012). Both qualitative and quantitative components are mixing within the study. When using mixed method approach in a single study, data collection using as two methods. For example, interviews and group discussions, surveys and project reports(Andrew and Halcomb). There is a reason for selecting mixed method approach. The descriptions, illustrations can be used to complement the meaning of strong arguments can be provided by strong findings and perspectives relevant to research study. Data collection methods consist of two ways in the research. They are primary data and secondary data. Primary data collected by the investigator and secondary data collected by someone else for some relevant purpose. Primary data and secondary data use for the study and the primary data is collected through questionnaire survey and semi structured interviews. The respondents of the questionnaires and the semi structured interviews are the people who are the involved people in housing projects and the residents. The secondary data is collected through project reports, project agreements, and other data collected from statistics reports. Semi structured interviews are usually happening between interviewer and the individual to an information on a specific topic. Interviews can be conducted from surveys by the structure placed on the interaction. The semi structured interviews were conducted to collect data from key stakeholders involved in the condominium housing projects. A questions ware prepared as a guideline to conduct the interview process related to the housing project and beneficiaries. Specifically, the socio – economic, environmental, financial aspects were well covered.

The research is carrying out due to the mixed method approach with probability and non-probability sampling. Random sampling method is the method that I use for my survey. Random sampling method is the normally used method in surveys when doing a questionnaire survey. (Farida, 2013). Random sampling method is use for the questionnaire survey of this research for getting lower variation of population. Taro Yamane's has introduced a formula which represent sample size n. N is for population size. 'e' is the sampling error.

This sample size was selected by using systematic sampling method. It was done building maps of the three housing schemes andrandom sampling table is used for selecting the housing units.

$$N= N/1+N(e)^2$$

n is sample size
N is population size
e is the error

Jalthara Housing Scheme (470 of housing units)
$n = N/1+N(e)^2$
$n = 470/ 1+ 470 (o.1)^2$
$= 82$

Dehiwala Housing Scheme (48 of housing units)
$n = N/1+N(e)^2$
$n = 48/1+48(o.1)$
$= 32$
Bambalapitiya Housing Scheme (298 of housing units)
$n = N/1+N(e)^2$
$n = 298/1+298(o.1)^2$
$= 74$

Factor Analysis and binary are data reduction techniques that used for identifying the dimensions in multivariate data analysis. It uses the correlations structure in large number of variables. Anyway, it is kind of statistical way of condensing a large number of original variables into smaller number of dimensions often called factors.There is another analysis include in the research. It is FPPSI method. Full Permutation Polygon Synthetic Indicator method that suitable for apply in planning industry for effective management of plan implementation, evaluation of outcomes of planning action projects.

VIII. ANALYSIS AND FINDINGS

Initially, in here it can be identified that what are the highly sensitive factors that should consider in housing projects. Through factor analysis method, analyze was done in each case studies. In below table I show that included factors and extracted factors in Bambalapitiya housing scheme. The factors are given by the survey of Bambalapitiya case study. Among the values, it is needed to extract values below 0.3 and above 0.9. After the extraction, the values show in rotated component matrix. According to the highest order, it can be identified the residential sensitive factors in this case study. Due to the received results, the residents who live in Bambalapitiya housing scheme, highly sensitive for these factors like cleaning of their common amenities, repairing their housing units, ownership, satisfaction of management cooperation, waste management systems etc. Bambalapitiya middle income housing scheme is in a Colombo 06. It is in highly urban location. Therefore, according to all the factors that included to the analysis, the model rejects the factors such as satisfaction of electricity facilities, green spaces, usage of thermal materials, parking facilities etc. But according to the observations, though people are satisfied of these factors there are some issues available within the scheme regarding those factors. The parking is not highly unsatisfied issue according to their responses. But because of the effects of government decisions parking lots was sold out for different purposes. There is enough space within the scheme. Therefore, people have not huge trouble regarding parking need. As well as disabled facilities also have a trouble. There are not any special facilities foe disable people. Normally, in a housing scheme, disable people are getting ground floor. The management cooperation considers those issues. But in here they have less participation for these kinds of issues. Those kinds of failures can be seen in Sri Lankan middle income government housing projects.

TABLE I IDENTIFIED FACTORS OF CASE STUDY 01- BAMBALAPITIYA

Particulars	Component			
	1	2	3	4
How often that CommonAmenities become clean	.899			
How often your HousingUnits become repair	.864			
Satisfaction level of the management cooperation	.770			
Ownership			.865	
Waste collection methods				.785

Residents who are living in Dehiwala housing scheme, highly sensitive for factors of ventilation, parking, fire safety and surrounding view. (Table II). Dehiwala government housing scheme is located close to the Galle Road. And it has not enough space for landscape arrangement. And there is no better view and ventilation in here. Results of the analysis clearly show the importance of the environmental sensitivity of residents. Residents have high satisfaction about location of the scheme. But they haven't proper ventilation and better environmental view. However, it is high consider about these two factors when planning housing projects because residents have high sensitivity about these factors when in living high rise buildings in urban areas. That housing scheme is 38 years old. But up to now there are not any parking lots or separate parking space for residents. And according to the ideas of the residents, there was an open space with Children Park. (Images was analyzed in annexures) But now those facilities are not available because of the illegal land encroaching activities. Management cooperation is not working strongly. And the relevant housing authorities or organizations have not any consideration regarding those issues. Though those factors are not highlighted in analysis, residents have negative responses regarding those facilities. Therefore, government housing authorities have to consider about these factors by providing regulations or protections for residential living conditions.

TABLE II IDENTIFIED FACTORS OF CASE STUDY 02 - DEHIWALA

Particulars	Component			
	1	2	3	4
Ventilation	.892			
Parking	.845			
Interest of surrounding view		.781		
Fire safety				.853

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization[a].
a. Rotation converged in 6 iterations.

Jalthara housing scheme is in a Homagama Divisional Secretary area, and it can be identified as a government employee housing scheme. It is in suburbs area and residents who are living in the Jalthara housing scheme also having troubles. As a result of factor analysis, in here highly sensitive factors are total floor area of the house, ownership issue, disable facilities and children's safety. (Table III) They have not enough space in their housing units. Especially in this housing scheme families are living with more than 4 or 5 members. But they are not satisfying about their area of housing units. However, the appropriateness with the recommended standards will explain in this research further. The ownership issue was born in initial stage of the project. As mentioned above, Jalthara housing scheme was construct behalf the government employees. But the ownership procedure had several issues. They were going to another people also. Residents are dissatisfying about the negative outputs of government procedures.

TABLE III IDENTIFIED FACTORS OF CASE STUDY 03 – JALTHARA

Particulars	Component			
	1	2	3	4
Total floor area	.961			
Ownership	.929			
Facilities for children		.758		
Disable facilities			.809	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Apart from these factors, dwellers have issues about their safety. Regarding safety, most effected factors were analyzed through bivariate correlation analysis.

In Bambalapitiya housing scheme people have highlighted factors that they considering related their surrounding environment and their safety. The results examined there is very poor relationship between variables that related to safety in Bambalapitiya housing scheme. Schemethere is 0.002 coefficient value between these two variables. Therefore, it is less than 0.5. It is very poor relationship. When considering significance values between these two variables it is 0.987. It is greater than 0.05. It is not significance. It should less than 0.05 for become significance value. As a result of the analysis there is not any huge effect for safety in Bambalapitiya housing scheme. (Table IV).

TABLE IV RELATIONSHIP BETWEEN UNDESIRABLE ACTIVITIES AND AVAILABILITY OF VACANT BUILDINGS IN NEIGHBORHOOD

Correlations		
Any undesirable activities of land uses? (Illegal selling places, burial- ground) around the neighborhood	**Value**	**Availability of vacant or abundant buildings within the neighborhood**
	Sig.(2-tailed)	.987
	Pearson Correlation	.002
	N	74

The results of Dehiwala housing scheme, when interpreting the P value, it is less than 0.5. It is not even under the moderate level (0.3 – 0.49). The values between variables are less than 0.5. In here, there is not any strong or moderate relationship between variables. The significance level also greater than 0.05. It is not significance. For an example, when considering vacant buildings via number of streetlights there is a 0.121 of coefficient value and 0.509 of significance level. There is no even moderate relationship between these two variables. The rest of the variables also have poor relationship. That means there is not any huge effect for safety of residents in this housing scheme. (Table V).

TABLE V RELATIONSHIP BETWEEN AVAILABILITY OF VACANT BUILDINGS AND USAGE OF STREET LIGHTS IN NEIGHBORHOOD

Correlations		
Availability of vacant or abundant buildings within the neighborhood	**Value**	**Number of streetlights**
	Sig.(2-tailed)	.509
	Pearson Correlation	.121
	N	32

In Jalthara housing scheme, when considering to variables such as vacant buildings via unsafe back lanes, there is a 0.000 of significance value. That means the relationship between these two variables is significant. The P of two variables is 0.599. It is in 0.5 - 1 range. Therefore, it has strong relationship. That means there is a safety issue in the housing scheme. (Table VI).

However, based on the site visits and observations, there is a safety issue within the scheme. Because as mentioned initial stages of the research, the housing scheme is in a Jalthara which far away from the Homagama. It is rural area and the surrounding land uses are not compatible. There is an effect to the housing scheme from the surrounding neighborhood. Illegal activities such as corruptions, illegal drug selling shops are happening around the housing scheme. Although it has unsafe environment there is not any safety facility to the housing scheme.

TABLE VI RELATIONSHIP BETWEEN AVAILABILITY OF VACANT BUILDINGS AND UNSAFE BACK LANES IN NEIGHBORHOOD

Correlations		
Availability of vacant or abundant buildings within the neighborhood	**Value**	**Unsafe back lanes**
	Sig.(2-tailed)	.000
	Pearson Correlation	.599
	N	84

According to the questionnaire survey, residents have different reasons for selection the housing scheme and the location. Majority of residents who are living in the Bambalapitiya (41%) selected the housing scheme because of the job. Same as the Jalthara housing scheme, this was constructed behalf government employees.

46% of residents are doctors, teachers, architects, engineers etc. Next to the job purpose 35% of people have selected the resident because of the war effect. As analysis result of user profile, majority of people (47.3%) are Tamil population. They were selected the resident because of the war effect. Apart from that 22% people were came for the residents for education purpose and rest of the 3% of sample have selected the location for private reasons.

However, the selection has depended on the location and the availability of the infrastructure facilities because the housing scheme is located very close to the Colombo. It can be identified as a success factor of the housing project because people have high satisfaction about the location and the surrounding facilities. In Dehiwala housing scheme, half of the residential population from the selected sample have selected the Dehiwala housing scheme for job purpose. Like the previous housing scheme, this also located very close to the Colombo. However, majority of people (34%) are government employees. And 22% of residents ware came because of the war effect. In here also 68.75% of highest population is Tamil people. However, same as the previous housing scheme, this one also has pull factors such as location advantage and infrastructure facilities.

The Jalthara housing scheme also allocated for the government employees. But now different categories of people are living in the scheme. However, the 44% of population was selected this housing scheme for job purpose. Next, 18% of people came for education purpose. However, there is a difference in this housing scheme comparatively previous two housing schemes. Apart from the previous factors there are special two factors have affected for the selection of this housing scheme. Easy affordability and quiet environment become sensitive factors for selection of people because it is in a suburb area. The environment looks like very quiet and calm rural environment. Comparatively Bambalapitiya and Dehiwala housing schemes, the price also has difference. However, residents have more sensitivity for these two factors.

Community spaces are one of the important elements in a condominium housing scheme.Common spaces mean that the spaces can be used for all the residents in the housing scheme. Bambalapitiya housing scheme is located close to the marine drive. 73% of people sensitive for beach side for spend their leisure time. Next to that 15 of people are using children park and 9% people are willing to use playground for relaxation. The residents of Dehiwala scheme don't have much common facilities comparatively another two residents. There is not any open space within the scheme. Therefore, they are using their own balcony for relaxation. 44% of people do not use even balcony for their relaxation.

Jalthara scheme also doesn't having much of community amenities. But because of the location and the enough space, they are using road within the scheme and the small compound area of each housing unit. Though they have more space government didn't construct any open space or children park or relaxation area for them presents the utilization of the available space for their relaxation. Based on that, majority of people from the sample population (51%) doesn't have any open space for the relaxation purpose. 35% of people are using road for walking and relaxation. These facilities mustbe provided for the housing scheme because relaxation is the most important component in life of community.

When looking at most people who are living in Jalthara housing scheme, use their community amenities in special events only. Similarly, in Dehiwala housing scheme, more than 80% people are using their community amenities for special events only. But the residents in Bambalapitiya use their community amenities in weekends also. Comparatively, in Bambalapitiya housing scheme people more like to use their community amenities and spend the time there. And when analyzing the time of their usage, when considering the time usage of community amenities, residents of Bambalapitiya are more willing to spend time in common areas. About 80% residents like to spend time more than an hour.

TABLE VII EXTRACTED FACTORS OF ALL SELECTED HOUSING SCHEMES

Bambalapitiya	**Dehiwala**	**Jalthara**
Poor cleaning of common amenities	Ventilation issue	Week management of ownership procedure
Poor repairing housing units	Lack of parking	Unavailable of disabled facilities
Week management of ownership procedure	Issues of surrounding view	Children safety
Waste collection procedure	Safety	
	Poor maintenances of sanitary facilities	
	Unavailable od disable facilities	

In Dehiwala, residents have not much interest to spend time in their public spaces. 80% people use public spaces less than 10 minutes. In Jalthara housing scheme more than 75% people use their community amenities 10- 30 minutes. There are different reasons for this difference among three housing units shows the reasons for that. Overall, three of the housing units have maintenance issue mostly. Next, number of facilities affects the usage of the community amenities. For an example, in community halls in Jalthara and Bambalapitiya facilities are not enough. Based on the observations, there is only one functional hall in Jalthara, if there is a funeral and wedding ceremony there are not enough space to carry on both. Therefore, people are not waiting in a particular function in more time. These reasons are effect for the frequency of the public uses in three of the housing units. In here, that can be identified as a failure in three of the housing projects.

The highlighted factors are including under the poor management of the management cooperation of each housing units. However, the extracted factors are not becoming on considerable factors of Condominium management authority or National housing development authority. They only consider about the basic facilities such as number of bedrooms and rest of the housing elements. But after opening up the housing project they establish the condominium management cooperation within the participation of residents. Each housing scheme hasdifferent types of management cooperation. The success and failures are happening based on the effectiveness of the management cooperation. Therefore, the management level of the cooperation is considered as a one indicator that should consider for future housing projects.

The overall list of criteria and related factors that were identified from literature review has been extracted through questionnaire survey considering their applicability in the context of three housing units of Colombo. Six of the extracted factors which more suitable for evaluate the performance level and the satisfaction level of each housing project also identified through the perception survey. Full permutation Polygon Synthetic Indicator (FPPSI) method has been used to analyze the performance level or the success level of each housing level under each criterion. In here, each indicator has target value and the present value. Present value means the present performance level of each indicator. The following equation was used for analyzing results.

$$Si = (Ui- Li)(Xi-Ti)/(Ui+Li-2Ti)Xi+UiTi+LiTi-2LiUi$$

Si = Standard indicator value
Ui = Upper value of the existing value
Li = Lower value of the existing value
Xi = Present value of the indicator
Ti = Target value of the indicator

TABLE VIII FULL PERMUTATION POLYGON SYNTHETIC INDICATOR ANALYSIS

Particulars	**Bambalapitiya**	**Dehiwala**	**Jalthara**	**T**
Maintaining common amenities and housing schemes	68	60	56	100
Ownership distribution procedure	35	90	34	100
Disable,parking & safety facilities	70	47	37	100
Active participation of management cooperation	60.00	96.52	45.00	100
Ventilation and landscape arrangement	67.00	15.00	93.00	100
Open spaces and children'sfacilities	75.00	32.00	42.00	100
Upper Limit (U)	85	96	93	
Lower Limit (L)	33	15	21	
	Bambalapitiya	**Dehiwala**	**Jalthara**	
Maintaining common amenities and housing schemes	-2.71	-1.13	-1.18	
Ownership distribution procedure	-1.02	-3.86	-1.04	
Disable,parking & safety facilities	-3.47	1.00	1,00	
Active participation of management cooperation	-1.64	0.76	-1.09	
Ventilation and landscape arrangement	-2.47	-1.00	1.00	
Open spaces and children'sfacilities	-3.10	-1.03	-1.08	

However, the full permutation polygon synthetic indicator analysis was used for the study for visually interpret the factors that should consider for a housing project in Sri Lankan context.

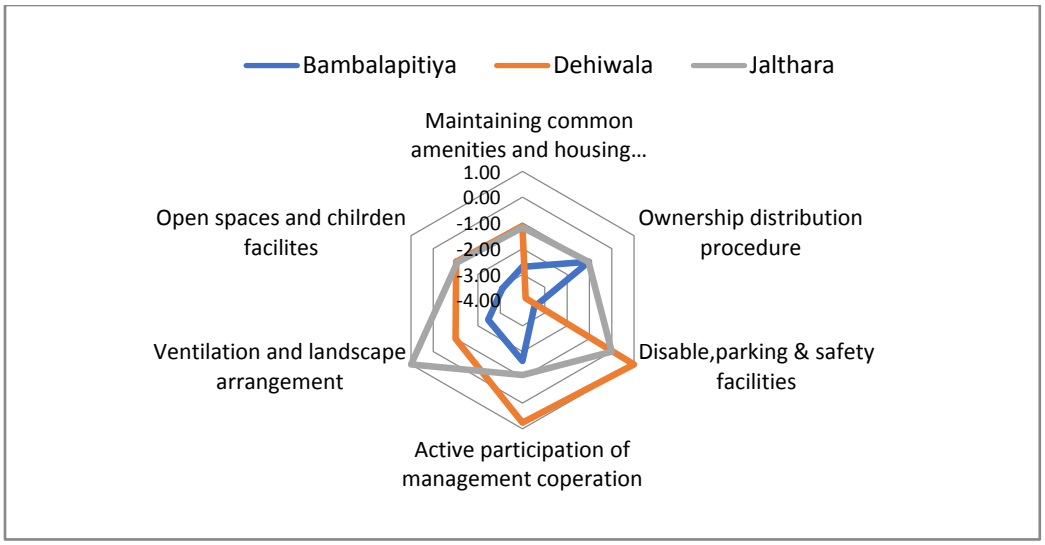

Fig. 1 Visually interpretation of identified success and failures

This is the visual interpretation of final extracted factors of the study. These factors are the most influenced factors in three of case study. Residents are more sensitive for these indicators. The analysis interprets the performance level of these indicators. The indicator values which are close to 1 are achievable factors in future. They have very high level of performance level. And they have ability to achieve success level. Comparing three of h housing schemes high performance level can be identified in a Jalthara housing scheme. The discussion and recommendation chapter will discuss that further.

IX. CONCLUSION

In residential construction, vertical residents have a high opportunity in developed countries and developing countries. In Sri Lanka, middle income condominiums are rapidly increasing same as the luxury high-rise apartments. This vertical residential development creates numerous social issues because of the isolations in upper floors. Consequently, vertical residential lives play a major role in living pattern. Comparatively, single housing livings, people who are in the condominiums must adopt condominium law. They must use common elements and they must carry out their daily works within a limit. This study can be regarded as preliminary research into identify the influence or the effect of social issues of residents and the success and failure achievements of the Sri Lankan housing projects. For achieving the objectives of the study, three selected neighborhoods are observed, surveyed, and analyzed.

The findings explored the success and failures of middle-income housing projects. Basically, the study identified that dwellers are sensitive not for the available floor area and infrastructure facilities. They have sensitivity for surrounding view, landscape arrangement, housing design etc. Housing design has important place among them because with the western lifestyle vertical housing schemes have modern designs. For example, the design innovations, such as half wall. The lifestyle of the middle-income residents is different from apartments. Based on the observations and surveys their choice or their selection is totally different. But before selling the housing units, residents have no choice to study a model house or similar thing. Because of their dissatisfaction, they become lots of issues in now. That is project failure, and those kinds of criteria should be considered about the project related authorities. Additionally, the study reveals the physical attributes that are value for the user satisfaction due to the provided facilities.

Anyway, as mentioned in initially, the success and failure factors are different with the location of the housing scheme. The housing schemes which located in a suburb's areas, satisfaction level is not similar due to the urban housing scheme. Accordingly, these findings prove that the residents who live in Jalthara suburbs housing scheme have high satisfaction about their landscape arrangement. Comparatively rest of the two housing schemes, they have strong relationship between their connection of neighbors of housing scheme and the landscape arrangement. That means, the available space arranges properly with greeneries and proper access points. There are no hidden places within the scheme. The people are living in freely comparatively another two condominiums.

Because of that, they have external issues from surrounding neighborhood. That becomes influence for the consumption of the facilities. They have transport facility which was given from SLTB. But because of the influence of surrounding people residents cannot use the facility. Government already provided the facility. But there is no any investigation or action after the project implementation. The project post performances depend on the effectiveness of the management cooperation. But based on the satisfaction issues housing owners leave their housing units and therefore renters become increased. Renters are not the members of management cooperation. As a result of that,

the management cooperation became poor management. When considering urban housing schemes, residents are more satisfied about their accessibility, infrastructure facilities etc. But the lack of the space and the poor landscape arrangement are the drawbacks of the project. And the housing schemes which are locate in front of the road not having any heat transferring materials and noise sensitive materials. Property developers must consider those policies. And another thing is based on different reasons, the provided facilities become lost with the time, in Bambalapitiya condominium, long time ago they had parking lots. But now government was sold-out those parking lots for different purposes. There is not any regulation or the policy framework regarding resident's facility management. According to the study, it recommends that there should be proper consideration on the post performances (Effectiveness of management cooperation) of housing schemes because the success and failures highly depend on that, not only the provided facilities or the location. Finally, this study serves considerable factors that should be concern when planning and manage middle income housing projects. That means the factors or criteria that residents have more sensitivity.

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