

TOWARDS LOWERING THE COST OF HOUSES IN PALESTINE: NEW PERSPECTIVE

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ABSTRACT: The main aim of this research is to develop an approach to lower the cost of housing while ensuring adequate environment and health conditions. This will ultimately enable more Palestinian people of limited income, especially in Gaza Strip to own their own houses. The specific objectives include investigation of cost influencing factors, determination of cost reduction criteria, proposing an approach to lower the cost of housing, investigating the significance of the developed approach using a real-life case study and developing prototype design example that satisfies the developed approach. The objectives of the research were achieved by reviewing relevant literature research, conducting interviews with Palestinian experts in the housing sector and by utilizing practical experience of the researchers.

The developed approach consists of five phases. These are: Strategy, Planning and Design, Procurement, Execution, and Evaluation. New criteria for planning and design, new procurement procedure, optimal use of building materials, and proposing suitable financial programs were also developed. This approach will lead to create more housing units, introduce suitable area of the housing units, reduce the construction duration and reduce the project overhead. The real life case study showed a lowering of the housing cost to nearly 20% of total cost. The main recommendation for public and private housing sectors is to adopt the proposed approach when introducing new low cost housing projects either in Palestine or in any other country.

KEYWORDS

Housing, Low cost, planning, case study, Gaza.

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نحو تخفيض تكلفة المساكن في فلسطين: رؤية جديدة

حسام عبد الله كراز و دكتور محمد زيارة

الملخص: الهدف الرئيسي لهذه الدراسة تطوير طريقة لتقليل تكلفة المساكن دون الإخلال بالشروط البيئية والصحية. هذا سيؤدي إلى تمكين عدد أكبر من الفلسطينيين ذوي الدخل المحدود وخاصة في قطاع غزة لامتلاك مساكن خاصة بهم. من أجل تحقيق هذا الهدف تم وضع مجموعة من الأهداف التفصيلية يمكن تلخيصها في التالي:

1. البحث والاستقصاء في العوامل المؤثرة في تكلفة مشاريع الإسكان في جميع مراحل تنفيذها.
 2. تحديد معايير للإسكان الاقتصادي.
 3. اقتراح طريقة لتخفيض تكلفة المشاريع الإسكانية.
 4. البحث والاستقصاء عن العوامل المؤثرة في الطريقة المقترحة من خلال استخدام حالة دراسية واقعية وتطوير واقتراح نموذج مشروع إسكان اقتصادي يحقق المعايير السابقة.
- تم تحقيق هذه الأهداف من خلال مراجعة الأدبيات المتعلقة بالإسكان الاقتصادي و دراسة تجربة الإسكان الفلسطينية ومقابلة مجموعة من الخبراء في مجال الإسكان من الضفة الغربية وقطاع غزة بالإضافة إلى الاستفادة من الخبرة العملية للباحثين.

تتكون الطريقة المطورة لتقليل التكلفة من خمس مراحل هي مرحلة الإستراتيجية، التخطيط والتصميم، طرق التعاقدات، مرحلة التنفيذ بالإضافة إلى مرحلة التقييم. تعتمد هذه الطريقة في تقليل التكلفة على تطوير معايير تخطيطية وتصميمية جديدة، تطوير نظام إنشاء جديد (التعاقدات)، الاستخدام الأمثل لمواد البناء و اقتراح برامج تمويل مناسبة لذوي الدخل المحدود.

استخدام هذه الطريقة سيؤدي إلى إيجاد عدد أكبر من الوحدات السكنية وتقديم مساحات وحدات سكنية مناسبة بالإضافة إلى تقليل مدة تنفيذ المشروع وبالتالي تقليل المصاريف الإدارية.

إن الحالة الدراسية التي تم إنجازها أظهرت تخفيض في التكلفة بنسبة 20% تقريباً من إجمالي التكلفة. من أهم التوصيات للقطاع العام والخاص التأكيد على استخدام هذه الطريقة وأخذها بالاعتبار في عملية إنتاج مشاريع الإسكان الاقتصادي الجديدة سواء في فلسطين أو الدول الأخرى.

INTRODUCTION

Housing is one of the basic needs of human. In practical terms "house" can be defined as an "*apartment or living quarter in which the residents live and eat*" [Al-Dosari, 2005]. General characteristics of housing include average monthly housing costs, types, locations, size and conditions of the units influence the housing affordability. This implies that household should be able to support the direct costs of the housing unit without neglecting other essential needs. The vast majority of the world countries face the availability of housing for high-income people and lack of housing units for low and moderate income people. Housing is one of the most pressing problems confronting the world today, especially the third world countries. Creating affordable housing for low-income people revolves around reducing the cost of housing delivery and the factors that affect producing housing units.

Palestine, similar to developed countries, faces housing challenges and limitation especially in dealing with low-cost housing. The population census for the Palestinian areas conducted in 1997 showed that the population in the West Bank and Gaza Strip are 1,600,100 and 1,001,569 anima, respectively [Palestinian Central Bureau of Statistics, Pocket Book, 2000]. Based on available information the annual needs for housing units in Palestine range from 20,000 to 34,000 [Ziara, 1997].

Reviewed literature dealing with low-cost housing projects have focused on one or two cost influencing factors. Previous approaches used conventional planning method "network planning". This method can provide high-density but in the same time it may not satisfy the health and environmental conditions. Moreover, it increases the cost of infrastructure. The reduction in housing units in reviewed approaches is mainly due to the reduction in the dwelling area 40-75 m². This area is too small, especially for large size family. Other approaches used bearing wall structure systems with some prefabricated elements. These techniques are not familiar to Palestinians and have special construction and implementation requirements [Aref, 2005, Al-Absi, 2004 , Islamic Group, 1976, Usrry et al, 1970, Aid and Marghani, 2004 , Haider, 1994, Al-ahwal, 1979, Behloul, 1991, Nilson et al, 2004, Ibraheem, 2004, Oladapo, 2001, Schill, 2004, and Lea and Wallace, 1996].

On the other hand the proposed structure is similar to the traditional method used in Gaza Strip. It also focuses on using new contractual method to benefit from contractor experience in the field of design and project implementation. The proposed approach has used planning concepts, which

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are more economical. This approach achieves optimal land use and suitable land intensity. In addition, it satisfies environmental and health conditions.

RESEARCH IMPORTANCE

Providing low-income people with adequate housing is a formidable task, especially in developed countries such as Palestine. The main aim of this study is to develop an approach to lower the cost of housing while ensuring adequate environment and health conditions. This will ultimately enable more people of limited income to own their own houses.

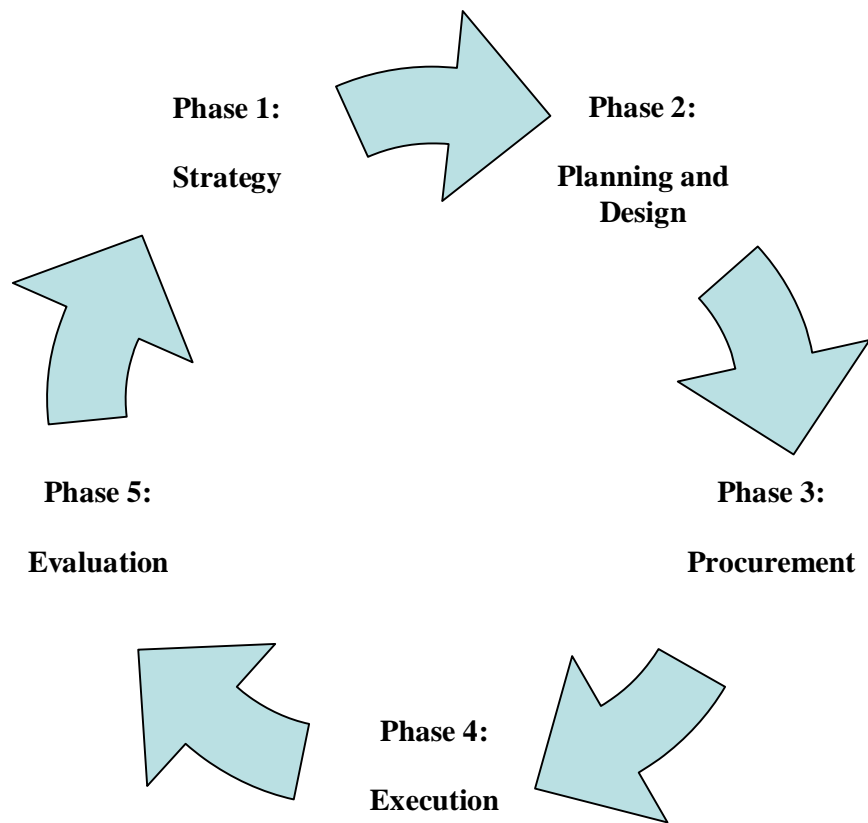


Figure 1: Five Phase approach

PROPOSED APPROACH FOR LOWERING HOUSING COST

The developed approach includes lowering housing cost criteria for Palestine that have been identified utilizing international experience and local expertise. The approach consists of five Phases relevant to real life procedures applied in the housing constructing industry and main cost influencing factors that affect the total cost of the housing project. The five Phases shown in Figure 1 are: (1) Strategy, (2) Planning and design, (3) Procurement, (4) Execution and (5) Evaluation.

Phase 1: Strategy

The strategy for lowering the housing cost includes the following considerations:

Location

1. Peripheral for small to medium projects implemented by private sector
2. New towns for large scale projects, especially if implemented by government.

Finance

Long-term policy includes:

1. Creating national housing fund to be the insurance for depository institutions (local banks) in order to encourage these institutions to give long term loans (20-30 years).
2. Create national housing fund to finance low cost housing projects as a revolving fund program. This program can work through non-governmental institutions.

Short-term policy programs (less than five years) are to be created for improving living conditions. These programs can be implemented by non-governmental institutions.

Governmental Role

The Government may intervene through the following provisions:

1. Develop standards and building regulations geared only for affordable housing.
2. Provide the infrastructure and the economic environment conducive to the creation of long term savings and lending through polices that foster a well functioning legal system and confidence in the future.
3. Establish research centers.
4. Creation of government-private sector partnership entities.

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5. Incentives given to the low cost housing developers.

Phase 2: Planning and Design

Elements of Planning and Design

These include the site layout elements, e.g. land subdivision and density, housing estate patterns, open spaces and road, land topography and parking system. Also they include building design elements, e.g. building type, unit design and finishing material.

Project Element Ratio

Residential project elements ratio are summarized in Table 1.

Table 1: Residential project element ratio.

No.	Item	Approved /suggested ranges
1-	Net density	15-18 dwelling unit/dunum
2-	Road, sidewalks and parking	25- 30% total area
3-	Services and utilities area	8-10% total area
4-	Number of parking lots	25% total apartment number
5-	Open spaces	15-18% total land area
6-	Build up ratio	40-45% total land area
7-	Land subdivision	Cluster concept
8-	Housing estate patterns	Nodal with combined building
9-	Building type	Five storey walk-up apartment
10-	Number of unit per floor	3-4 apartment per floor
11-	Construction method	-Cast-in-place reinforcement concrete method. -One way ribbed slab for slabs and roof system. -Fair face hollow cement block for walls system.
12-	Dwelling unit design	-15-20% total number of apartment is two bedrooms with 80m ² area. (suggested) -45-50% total number of apartment is three bedrooms with 116m ² area. (suggested) -30-35% total number of apartment is three bedrooms with 128 m ² area.

		(suggested)
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Residential Unit Design

Residential unit design space sizes is summarized in Table 2. It should be emphasized that the main stairway must not reach the roof in order to restrict vertical expansion and eliminate the need to build boundary for safety.

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Table 2: Space size.

Item*	Final Size
Kitchen	9-11 m ²
Guest and living room	14,16 m ²
Main bedroom	14-16 m ²
Other bedrooms	12.5 m ²
Toilet	1.6 m ²
Bath	4 m ²
Store	1.6 m ²
Windows area	8-12% of space area.

* The suitable height for all spaces is 2.6 m.

Finishing Material

Proposed finishing materials are shown in Table 3.

Table 3: Finishing materials.

Item	Finish Materials
Water proof	Local made
Internal wall finishing	interior plaster
Tilling	Terrazzo tiles (local) + ceramic for baths only
External wall finishing	External plaster with Tyrolean
Internal paint	Polyseed paint
External paint	without
Doors	Flush and solid Wooden doors with primary paint.
kitchen	Local marble for the table face
Electrical works	Local made
Sanitary works	Local made

Phase 3: Procurement

Modified Design/Build method is selected in order to decrease the cost of houses due to the following reasons:

1. Single point responsibility leads to decrease variation orders related to design mistakes, bad coordination and adversary relationship between contractor and consultant.
2. Fixed price for design and construction reduces the potential for cost overruns.
3. Applying team work concept in design and construction leads to decrease the cost because of the advantage of involving the contractor in

the design and minimizing mistakes in design which normally increases the cost.

4. Faster schedule leads to decrease administration cost in addition to overhead cost for the Design/Build firm.

Phase 4: Execution

Considerations are taken in order to prevent any increase in the project cost during execution phase. The Execution Phase is thus subdivided into two main categories as follows:

1. Allow for contractor and subcontractor procedures to prevent any increase in the cost such as " storage material, create good schedule, etc."
2. Owner procedures to prevent any increasing in the cost such as "prevent variation orders, facilitates payments, etc."

Phase 5: Evaluation

An evaluation should be done for each phase before starting the next step in order to correct any adverse matters. Planned cost and actual cost shall be reviewed in depth. Post occupancy evaluation should be conducted after 2 to 4 years after implementing the project. Then overall evaluation should be made to the benefit of other projects.

CASE STUDY

The practicality of the developed approach has been verified using a real life case study utilizing an existing housing project.

Background

To cope with pressing housing problem in Gaza, several housing programs have been launched since the establishment of the Palestinian National Authority in 1994. Housing projects have been constructed outside and inside the existing urban perimeters. The acute housing shortage has been caused by the high birth rate and the returnees of Palestinians. Before 1994, there were no national housing institutions except the Palestinian Housing Council (PHC) which was established in 1991 to help in solving the housing problem in Gaza Strip and West Bank. In 1994, the newly established Ministry of Housing (MoH) assigned the responsibility for planning and implementing a Palestinian housing strategy and programs. Ministry of public Work and Housing (MPWH) "previously called MoH", PHC and private sector are now the main players working in the housing sector in Palestine.

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The Case Study Housing Project

Eleven projects implemented by PHC and MPWH clarify the Palestinian housing experience during the last thirteen years. Table 4 illustrates the characteristics of these housing projects.

A short list of housing projects that were considered for the case study was based on the following requirements:

1. The project must be directed to limited income people.
2. The project must contain at least 300 dwelling units.
3. The project can be classified as urban housing project, i.e. not site and services project.

Table 4: Housing project characteristics (MPWH and PHC files).

Project	Project area (m ²)	No. of apart.	House holder	Owner	Designer	Project classification
Zahra	173847	2580	L.I.*	MPWH	MPWH	Site and services
Austrian	22100	206	L.I.	MPWH	MPWH	Urban
Nada	153118	1458	L.I.	MPWH/P S**	C.O.***	Urban
Sheikh Zayed	428872	3652	Not defined	MPWH	C.O.	Urban
EL-Fara	9263	140	L.I.	MPWH	MPWH	Urban
Dair-El-Balah	3900	80	L.I.	MPWH	MPWH	Urban
Ain-Jalout	22436	320	L.I.	PHC	C.O.	Urban
Karama	22127	416	L.I.	PHC	C.O.	Urban
Police	18000	256	Police	MPWH	PHC	Urban
El-Qalaa	6127	96	Police	PHC	C.O.	Urban
Tal-El-Soltan	9938	110	L.I.	PHC	PHC	Urban

* Limited Income - ** Private Sector – *** Consultant Office

Table 5 includes the short list of projects which satisfy these requirements.

Table 5: Short list of projects.

Project	Number of apartments	Householder	Project classification
El-Nada	1458	L.I. *	Urban
Ain-Jalout	320	L.I.	Urban
El-Karama	416	L.I.	Urban

(* Limited Income)

The following criteria have then been used to select the case study project:

1. Project location and project land price.
2. The project size of at least 300 dwelling unit.
3. The project satisfies neighborhood elements.
4. Availability of information about the project.
5. The completion of all phases of the project.

A weighted scale decision method technique was used in order to prioritize these projects. Accordingly, cardinal ranking is shown in Table 6. Thus, El-Nada housing project was considered in the case study.

Table 6: Scale decision making technique for the case study project.

Criteria	Number of Degree			Weight factors
	El-Nada	Ain-Jalout	El-Karama	
1- Project location and land price	5	3	1	0.3
2- Project size	5	2	3	0.2
3- Neighborhood elements	5	4	4	0.1
4- Information availability	2	5	3	0.25
5- Completion of all phases	1	4	5	0.15
Total	3.65	3.55	2.8	1

Alternative Planning and Design Based on Developed Approach

For comparison purposes El-Nada housing project that was identified for the case study was re-planned and re-designed based on the developed approach. This will allow the determination of percentage of saving in the cost when developed approach is used. Drawing in Figure 2 illustrates the conceptual planning and design considering four residential zones, cluster concept for roads and parking, and nodal concept for housing estate patterns. Figure 3 illustrates the site layout. Three types of apartments of different areas were used (80, 116 and 128 m²). Buildings type-A and type-B consist of three and four apartments per floor, respectively. Figures 4 to 7 illustrate the types of buildings which were used in the proposed design. Table 7 illustrates the characteristic of the original design in comparison with the proposed design.

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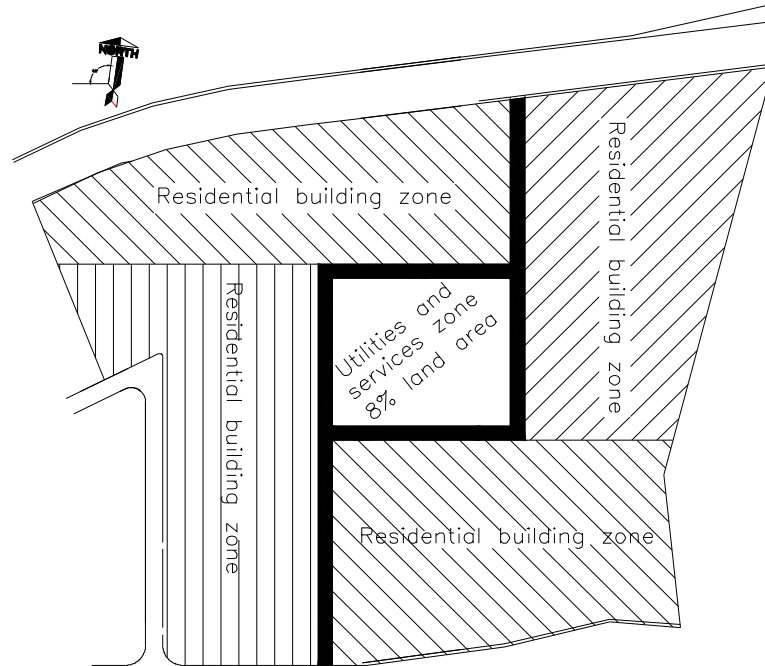


Figure 2: Conceptual planning and design.

Cost Reduction

The main concept for cost evaluation used in this case study has been based on percentages not absolute cost. This is to introduce an applicable method for cost reduction which can be used in other countries in which absolute cost of housing elements varies. Table 8 includes the saving percentages in main factors that affect the houses cost based on the developed approach.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The main influencing factors that affect the cost of housing projects for low-income people in Palestine are planning and design, construction industry, utilizing of local building materials, building codes and regulations, land use and tenure, and the use of suitable financing programs.
2. The main deliverable of this study is the developed approach that resulted in lowering the cost in this case study by approximately 20% of total cost.

3. The main influencing factor that affects the reduction cost in the developed approach was “planning and design” which represent 62% of total reduction cost. The second factor is "utilizing local building materials" which represent 30% of total reduction cost.
4. The developed approach can be applied in other countries since it considers relative savings not absolute values. However, this needs further verification.



Figure 3: Site layout.

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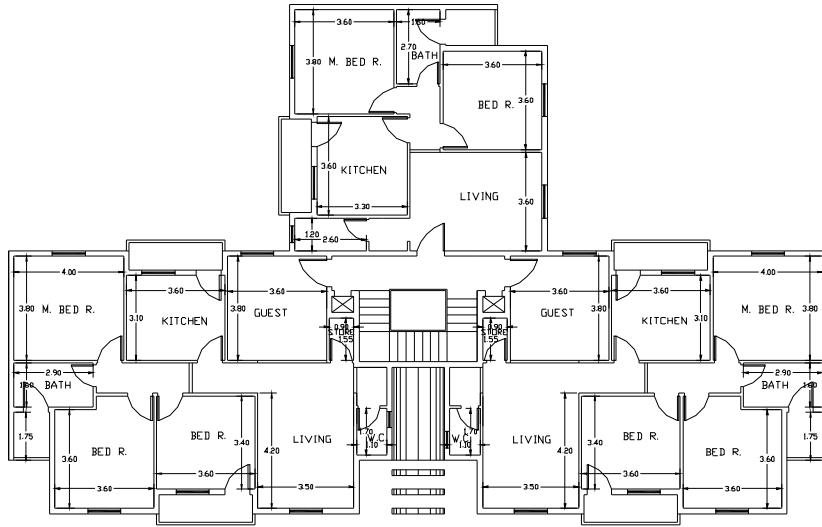


Figure 4: Typical floor plan – type-A.



Figure 5: Main elevation – type-A.

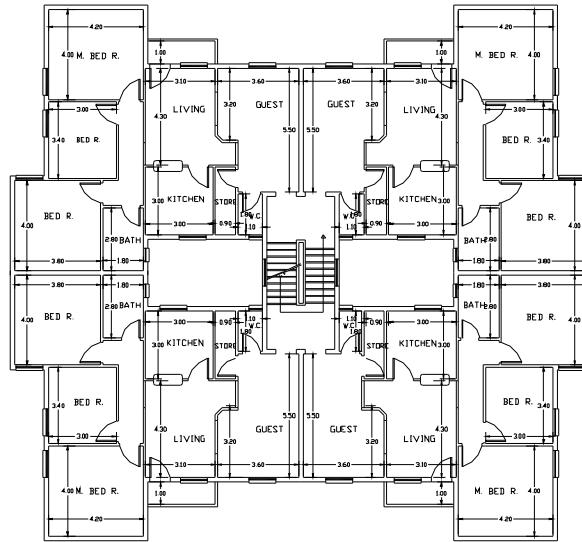


Figure 6: Typical floor plan – type-B

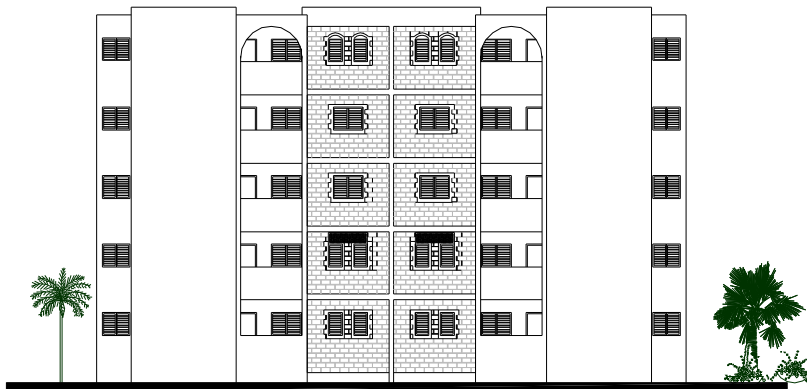


Figure 7: Main elevation – type-B

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Table 7: Comparison of characteristics.

Item	Original Design	Percentage	Proposed Design	Percentage
1- Land area	153118 m ²	100%	153118 m ²	100%
2- Roads and parking	28811.27 m ²	18.82%	22093.56 m ²	14.4%
3- Roads length	1274.25 m	-----	1100 m	-----
4- Paved paths	44738.72 m ²	29.2%	31534.18 m ²	20.59%
5- Services/utilities	24703.99 m ²	16.13%	12724 m ²	8.3%
6- Residential building	29321.45 m ²	19.15%	61246 m ²	40%
7- number of units	1458	-----	2410	-----
8- Open spaces system	25543.16 m ²	16.7%	25598 m ²	16.71%
9- Number of parking lots	487	29.3% apartment number	585	24.3% apartment number

Table 8: Percentages of cost reduction.

Reduction Item	Percentage (% of total cost)
1- Land	4.11
2- Roads and parking paving	0.046
3- Sewage and water network	0.336
4- Lighting network	0.352
5- Sidewalks paving	0.24
6- Plants and furniture of site work	0.367
7- Storey height	2.865
8- Windows area	0.626
9- Stair and roof boundary walls	0.784
10- Module	2.40
11- Finishing material (paint-insulation-tilling)	5.973
12- Procurement method	0.42
13- License fees	1.3
Total cost saving	19.82

Recommendations

General Recommendation

1. The developed approach can be used by private and public housing sectors.
2. Same housing patterns can be repeated.

Recommendation for the Government

1. The government, municipalities and engineering societies need to develop separate standards and building regulations geared only for low cost housing.
2. The government needs to encourage the investors to construct new low-cost housing project by the facilitation of the procedures, creation of laws and the creation of government-private sector partnership unit.
3. The governmental institutions need to approve the design/build procurement method in order to create relevant legal framework.
4. The government needs to create National Housing Funds.
5. The government needs to encourage the local factories to produce locally made construction and finishing materials.

Recommendation for Private and Non-Governmental Sector

1. Non-governmental housing institutions need to create short-term finance programs.
2. The private and public institutions need to develop training courses on design/build method.

Recommendation for Local Banks

1. The local banks need to create long-term finance programs.
2. The local banks need to facilitate the contractor's bank guarantees.

Recommendation for the Contractors and Consultants

The contractors and consultants' needs to create one firm as joint venture relationship.

Recommendation for the Owners

1. The owners need to facilitate the contractor payments. Down payment is recommended.
2. The owners need to facilitate the approval of locally made equivalent material.

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