THE ESTABLISHMENT OF PERFORMANCE CRITERIA FOR THE EVALUATION OF PROCUREMENT OF SENIOR STAFF AND PRIVATE HOUSING PROJECTS IN THE STATE OF QATAR

by
HASSAN RASHID H. AL-DERHAM

A submission presented in partial fulfilment of the requirements of the University of Glamorgan/Prifysgol Morgannwg for the degree of Doctor of Philosophy

February, 1999

بسم الله الرحمن الرحيم

THE ESTABLISHMENT OF PERFORMANCE CRITERIA FOR THE EVALUATION OF PROCUREMENT OF SENIOR STAFF AND PRIVATE HOUSING PROJECTS IN THE STATE OF QATAR

Hassan R. H. Al-Derham, BSc, MSc, PG Dip

ABSTRACT

A study by the Supreme Planning Council called the attention of problems during the procurement of Senior Staff Housing projects leading to less effective project outcomes. The SPC report put the blame on the current regulations of the scheme.

This research evaluated SSH projects in comparison with Private Housing (PH) projects, which were not affected by SSH regulations. A model was developed as part of this research study. The model sets out to embrace the relationships between the variables in the building process. The model takes six main groups of independent variables, namely those that affect the client, the land acquisition, the design phase, the construction phase, disputes and SSH regulations. The effectiveness of the housing projects was measured against quantitative and qualitative performance indicators. The performance variables tested were unit cost; percentage of cost overrun; speed of construction; percentage of time overrun; client's satisfaction with cost and time; client's overall satisfaction; client's rating on quality; aesthetic quality and technical quality.

As this study is the first of its kind, exploratory interviews with industry participants were conducted to gain a better understanding of construction practice in Qatar as well as to firm up the design of the client's questionnaire, aesthetic and technical quality evaluation techniques. The main field study resulted in 61 SSH projects and 34 PH projects.

The research revealed that PH projects are more effective than SSH projects. It was found that SSH regulations are not the main reason for a less effective outcome. The main reasons were the unclear objectives and bad decisions made by the SSH clients. The research also revealed poor quality workmanship, old construction techniques and the use of inadequate construction materials. Also, a lack of, proper contract forms and means of dispute resolution. There are no institutions for consultants or contractors and a lack of training and development. Together, these factors contribute to the client's poor image of the industry.

The research provides recommendations for reorganising the industry to improve its output. These include establishing Construction Industry Council, forming institutions for consultants and contractors, and establishing Housing Council.

Dedication

To the true meaning of sacrifice and love,

to my mother and father,

and to my wife and children.

Acknowledgement

My first greatest thanks is to almighty Allah, the Glorious, for His mercy and help. Without His support none of this work would have been possible.

I would like to express my deep sincerest appreciation and thanks to my director of studies Professor Peter Hibberd for his valuable comments, suggestions and his moral support and encouragement throughout the study. I am very thankful to supervisors Dr. Ramdane Djebarni and Dr. Falah Mustapha for their comments and valuable advice.

I wish to acknowledge Qatar University for the financial support of this study. Special thanks go to all the staff of the Qatari Cultural Attaché office in London; and to Mr. Mohammad Al-Kuwari and Mr. Mohammad Al-Jufairi of Qatar National Bank. Thanks are also expressed to Engineer Abdullah Al-Ajmi for his help during the field study of this research.

I would like to thank my father for his encouragement, support and sacrifice. All of my achievements are contributed to him.

My special warm acknowledgement is made to my wife Eiman for her kindness, companionship, patience, assistance and full understanding during all the period of my study, without which I would not have been able to complete my study. Finally not to forget my beloved children Latifa, Rashid, Abdul Aziz and Abdulrahman.

To all the many people who help and encouraged me throughout this endeavour, I express my deep gratitude. They share the credit for the worth of this work, but obviously none of them are to be blamed for any ineffectiveness.

Certificate of Research

This is to certify that, except where specific reference is made, the work described in this thesis is the result of the candidate. Neither this thesis, nor any part of it, has been presented, or is currently submitted, in candidature for any degree at any other University.

Signed Hassan Al-Derham

Candidate

Signed P.L. Hubbard

Director of Studies

Date 7 April 1999

Table of Contents

CHAPTER THREE

CHAPTER FOUR

CHAPTER FIVE

CHAPTER SIX

CHAPTER SEVEN

CHAPTER EIGHT

CHAPTER NINE

CHAPTER TEN

REFERENCES AND APPENDICES

List of Figures

List of Figure (continued)

List of Figures (continued)

List of Figures (continued)

List of Tables

List of Tables (continued)

CHAPTER ONE

1 GENERAL INTRODUCTION

1.0 GENERAL

In 1977 the Government of the State of Qatar issued a decree to regulate and control the financing of building housing projects for senior officials of the government. The decree was entitled Senior Staff Housing Project (SSH). The government will grant the beneficiary a piece of land and an interest free loan of QR 600,000 (US$ 165,000) for building a house, which the beneficiary, in turn, will repay only 80% of the loan over a period of about 25 years. Thus, the decree together with SSH regulations organise and control the procurement of SSH projects. Since then and up to January 1998 about 6000 clients have benefited from this housing scheme, with expenses reaching QR 4.5 billions (Al-Kuwari, 1999).

1.1 STATEMENT OF THE PROBLEM

Institutional weakness is increasingly being recognised as a leading impediment to housing in developing countries (Njoh, 1996). Over the years the number of applicants to benefit from the SSH scheme have increased with a fixed amount of government subsidies to the scheme, which has led to an increase in the waiting lists for both land and the loan.

A preliminary study done by the Supreme Planning Council (1993) stated that there is a lack of coordination between the different government departments involved in producing SSH in Qatar. Other problems include duplication of works, weak construction project management, and above all lack of a plan for housing in Qatar. The report also suggests that SSH regulations may have a major influence on the overall performance of the projects, which reflects the level of satisfaction of the clients (S.P.C., 1993). The policy of SSH regulations is that there is complete separation between design and construction, which means clients are limited when choosing the procurement method they want to select for building their homes. Another major influence of the SSH regulations is the funding procedure. The long periods between payments increased the uncertainty among contractors and consequently increased the overall cost of the projects.

The conclusion of the S.P.C. report draws attention to the need to reorganise the SSH scheme and its regulations. That is because, and according to the report:

> ***"The current difficulties and problems that face SSH scheme obstruct it from achieving its goals. They also limit its effectiveness and leads to the loss of resources, either directly or indirectly, without having any specific and planned actions to fulfil citizens housing needs, which led to the increase waiting lists for up to ten years. There is a great need to enhance the current scheme regulations to improve the effectiveness of its outcomes."*** p. 8

As the S.P.C. report calls for changing the SSH regulations, as these regulations were considered no longer suitable for the current situation, research became a necessity to evaluate SSH projects and to see what are the real factors affecting the performance of housing projects in Qatar.

There are few topics in the field of construction project management that are as frequently used and yet rarely agreed upon, as the notion of evaluating project performance. In general, the concept of measuring the outcomes of construction projects has remained ambiguously defined both in the project management literature and in the minds of the evaluators. Attempts to understand the effective implementation of construction projects are therefore a continual concern and interest among construction professionals.

On the other hand, the problems associated with the building process have been considered in relation to separation of design from construction (Emmerson, 1962), poor communication (Higgin and Jessop, 1965), lack of integration (Sidwell, 1982), uncertainty (Higgin, *et. al.*, 1966).

These problems, together with economic factors, such as inflation and recession, have led to a reduction in the performance of the construction industry, in general, and housing projects in particular. In order to overcome these problems, the construction industry in the West adopted alternative methods of procurement. The alternative methods that have been recently used in Qatar, include management contracting, design and build, and construction management.

In order to find out how the SSH regulations affect the outcome of SSH projects, it was decided that SSH projects should be evaluated in comparison with another housing scheme that does not belong to the government and not affected by the regulations. This was found to be private housing projects initiated and managed privately by individual private clients. Therefore, Senior Staff Housing (SSH) projects were evaluated in this research in comparison to Private Housing (PH) projects.

In summary, institutional weakness, housing regulations and funding procedures seemingly have influenced the performance of SSH projects negatively. This study investigates the overall performance of SSH and PH projects. Underlying this research is the need to establish how the implementation of the government policies may have had an impact on the overall performance.

1.2 AIMS AND OBJECTIVES

The research has the following objectives:

1. To explore the construction industry in Qatar.
2. To identify the problems that face the SSH and PH projects in Qatar.
3. To build a model to determine the effectiveness level of SSH and PH projects in Qatar in relation to several variables including economy, quality and satisfaction.

4. To identify and measure the relationship between client's satisfaction, economy and quality of SSH and PH projects in Qatar.
5. To identify factors that affect effectiveness and their implications to future housing policies, programmes, and research in Qatar.
6. To produce procurement guidelines for constructing houses more effectively in Qatar.

1.3 What are the Benefits of Evaluating the SSH Scheme?

Listed below are six important benefits of evaluation:

1. To identify whether the SSH scheme is meeting clients' (beneficiaries') requirements.
2. To help in understanding the SSH process. To confirm what is known or to reveal what is not known, and to know where the problems, if any, are.
3. To ensure decisions are based on fact, not emotion. Are decisions based upon well-documented facts and figures or on intuition and feelings?
4. To show if improvements need to be made. What could be done better? How could it be improved?
5. To show if improvements actually happened.
6. To reveal problems that bias, emotion, and longevity cover up. If the SSH scheme has been implemented for over twenty years without evaluation, it might be assumed incorrectly that things are going well. Although SPC study suggests otherwise, without proper evaluation there is no way to tell.

1.4 The Research Hypothesis

It is obvious that a project may be regarded as successful if the building is delivered at the right time, at the appropriate price and quality standard, as well as achieving a high level of client satisfaction (Naoum, 1991).

The analyses were undertaken based on the three components of the definition of housing project effectiveness. Those are economy, cost and time; quality and client satisfaction. In trying to analyse the causes and reasons for effectiveness with housing scheme projects, it was proposed that:

1. PH projects are more economical than SSH projects.
2. The quality of PH projects is higher than the quality of SSH projects.
3. PH clients are more satisfied with the outcomes of their projects than SSH clients.
4. PH projects are more effective than SSH projects.

1.5 Importance of the Research

In the field of housing projects in the construction industry of Qatar, this study could be considered as a pioneering research. Many areas are studied for the first time.

A comprehensive analysis of the current situation in the Qatari construction industry with special emphasis on SSH and PH projects and their problems, together with an investigation of the existing models will lead to refining, or designing, a model that will meet the needs and conditions of the housing projects in Qatar.

Most of the previous models, measured quality of the project from the client point view. This research also evaluates quality, technical and aesthetic, from independent expert perception.

In other words, this work contributes to knowledge in the field of construction in the following ways;

1. This is the first research that has been carried out in order to identify the problems that face the construction of housing in Qatar, in general, and the SSH and PH projects in particular.

2. The research establishes how the implementation of the government policies may have an impact on the overall performance.
3. The research develops the methodology to measure the effectiveness level of SSH and PH projects in Qatar. A multi-determinant measurement including: objective measures, such as deviation of time and cost from pre-set targets, and subjective measures, such as quality of housing and satisfaction level of the client, is used.
4. The development of the work from other studies. These studies have only measured quality of building from the client, or the user, point of view. This project embraces two new variables. Quality, both technical and aesthetic, is assessed by measuring physical, functional, and form characteristics of houses and their comparative standards.
5. Analysis of clients' satisfaction of their projects, as well as, post occupancy evaluation has been carried out.

The variables of time, cost, quality and client satisfaction, have been tested against the overall effectiveness (performance) of SSH and PH projects.

1.6 The Research Design and Data Collection

The method adopted in the research was one of cross-sectional case studies conducted through structured interviews with clients and observation techniques. A specific interview questionnaire was formulated for the purpose of this study. The housing quality techniques were also used to measure the quality of SSH and PH schemes.

Since this study is the first in the construction industry field in Qatar, exploratory interviews were conducted with several practitioners in Qatar before designing the research model. These include policy makers, policy implementers, designers and contractors.

A sample of 95 case studies, 61 SSH and 34 PH, were randomly selected. This number was thought to be manageable and large enough to allow conclusions to be drawn. The data collected were processed by computer using the Statistical Package for the Social Sciences (SPSS) programme.

1.7 THE STRUCTURE OF THE THESIS

The structure of the thesis is illustrated in figure (1.1), the Thesis Map. This research is composed of ten chapters. The first chapter has been a general introduction to the research and outlines the aim and objectives, and hypothesis to be tested.

Chapter two is concerned with giving an introductory background to Qatar, its economy and its construction industry. The chapter also reports some initial findings regarding the current construction practice in Qatar.

Chapter three looks at the housing policy in Qatar, the available housing schemes at the present and housing needs.

Chapter four examines the literature review on evaluating the construction projects. It discusses the evaluation process, identifies performance measures and factors affecting project performance.

The research model and its variables are presented in chapter five.

Chapter six outlines the research methods and tools used in this study.

Chapter seven presents the descriptive analysis of the client and project characteristics investigated.

Chapter eight presents the descriptive analysis of client satisfaction and quality. The major factors affecting client satisfaction and quality are identified.

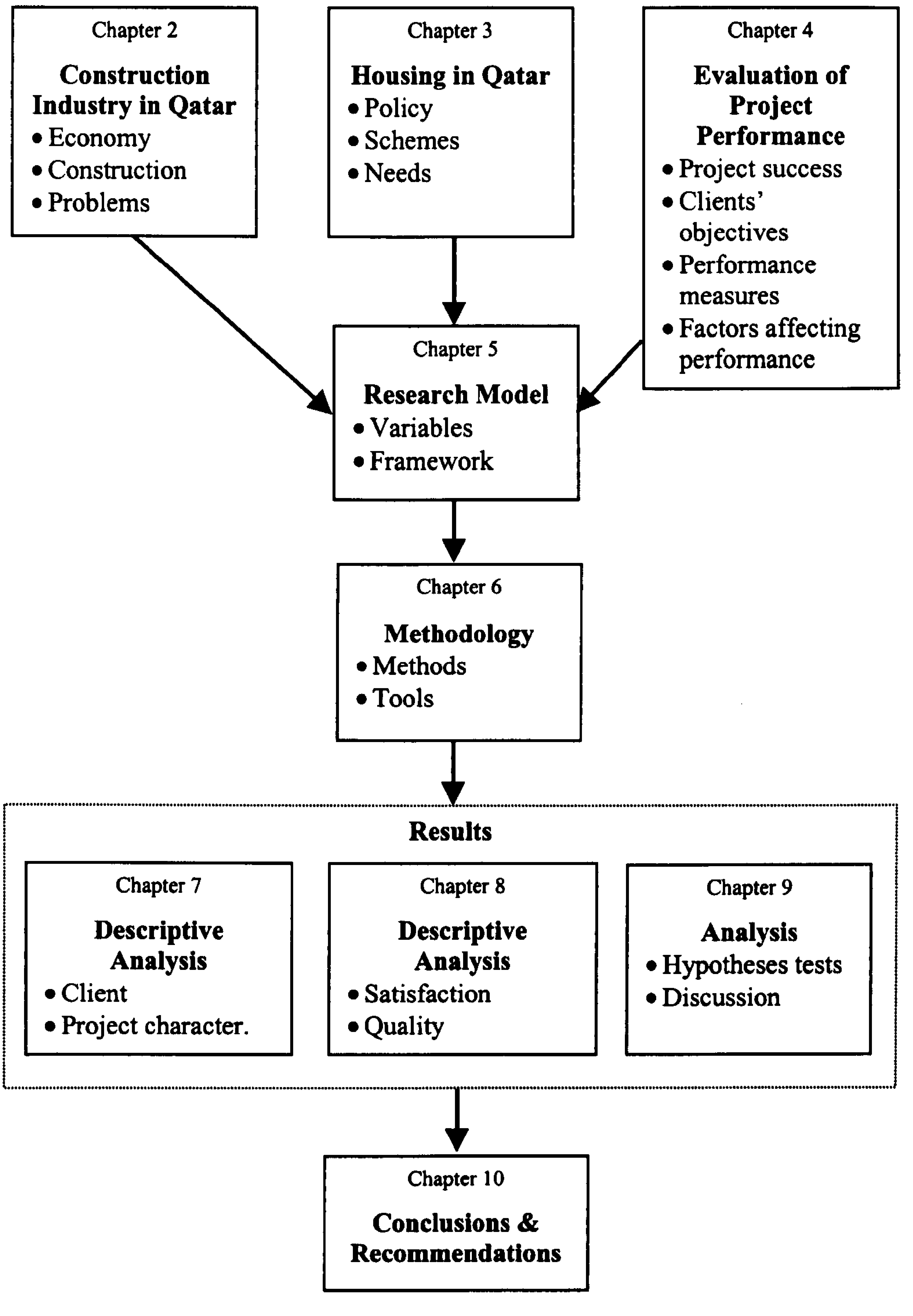


Figure (1.1): Thesis Map

Chapter nine tests the hypotheses of the research and identifies factors affecting project performance and its relationships. The chapter also discusses the results of the selected project performance.

Conclusions drawn from the findings of the research are outlined in chapter ten followed by relevant recommendations.

CHAPTER TWO

2 CONSTRUCTION INDUSTRY IN QATAR

2.0 INTRODUCTION

This chapter presents a general view of Qatar, its environment, and the conditions of the construction industry. This is seen as necessary to, acquaint the reader with the context of the study.

The chapter contains two main parts. The first part gives a general view of the country and includes a brief look at the economic situation. The second part deals with the situation of the construction industry in Qatar and it highlights the economic importance of housing projects.

2.1 COUNTRY PROFILE

Qatar is located between latitude 24' 27" and 26' 10" North and longitude 50' 40" East and so it is located halfway along the western coast of the Gulf. The country is a peninsula extending towards the north of the Gulf with a set of islands (see figure (2.1)). The length of the peninsula from south to extreme north is about 160 Km, and the total area including the islands is about 11,427 Km^2.

The State of Qatar is administratively divided into ten municipalities which are: Doha, AL Rayyan, AL Wakrah, Um Slal, AL Khor, AL Shamal, AL Ghuwairiyah, AL Jemailiya, Jeryan AL Batna and Mesaieed (see figure (2.2)).

Doha is the capital and commercial centre of the country. It is located midway along the Qatar's eastern coast and has a modern airport and important commercial port. Mesaieed (or Umm Said) as the second important town is located in the south eastern coast and is about 36 Km south of Doha. It is a modern industrial town and has two main ports; one is commercial and the other

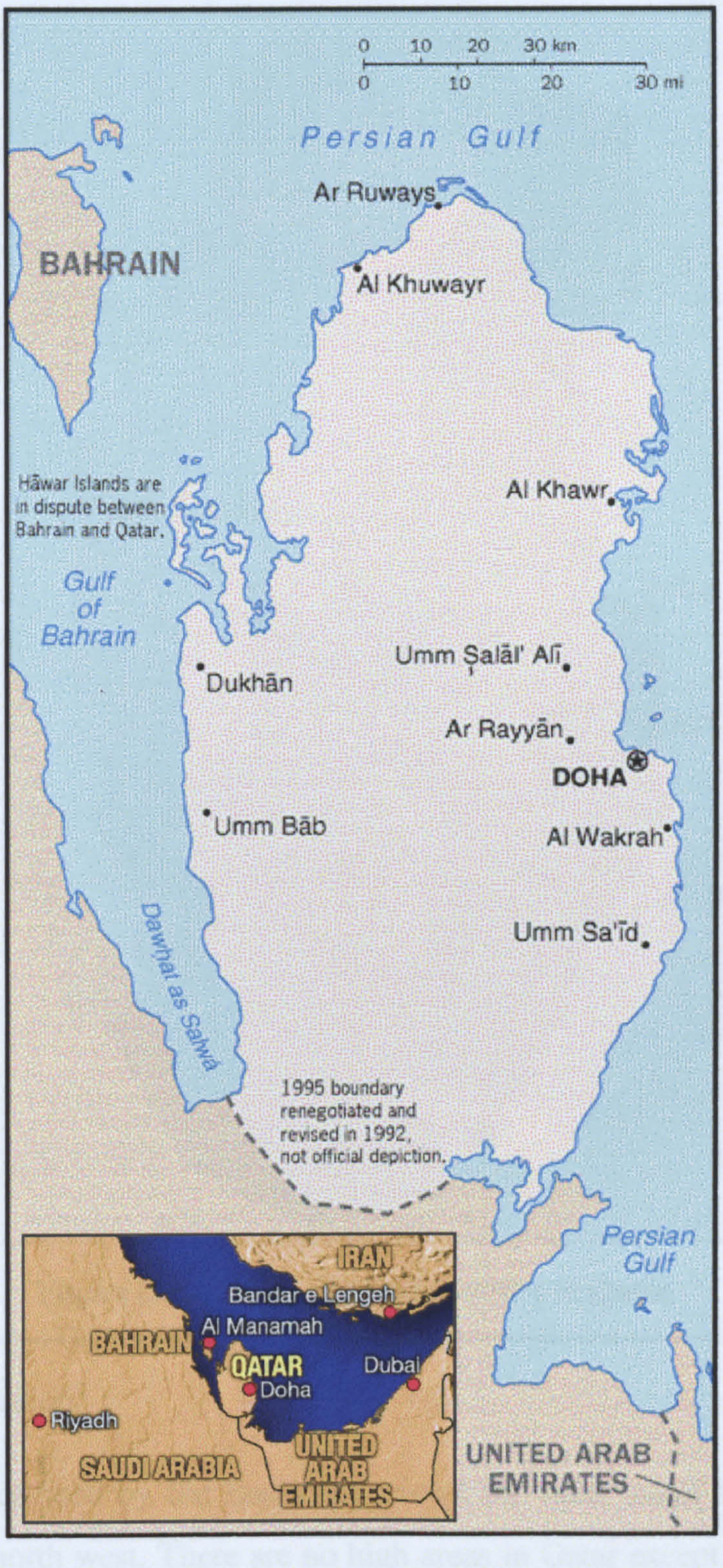


Figure (2.1): Map of the State of Qatar

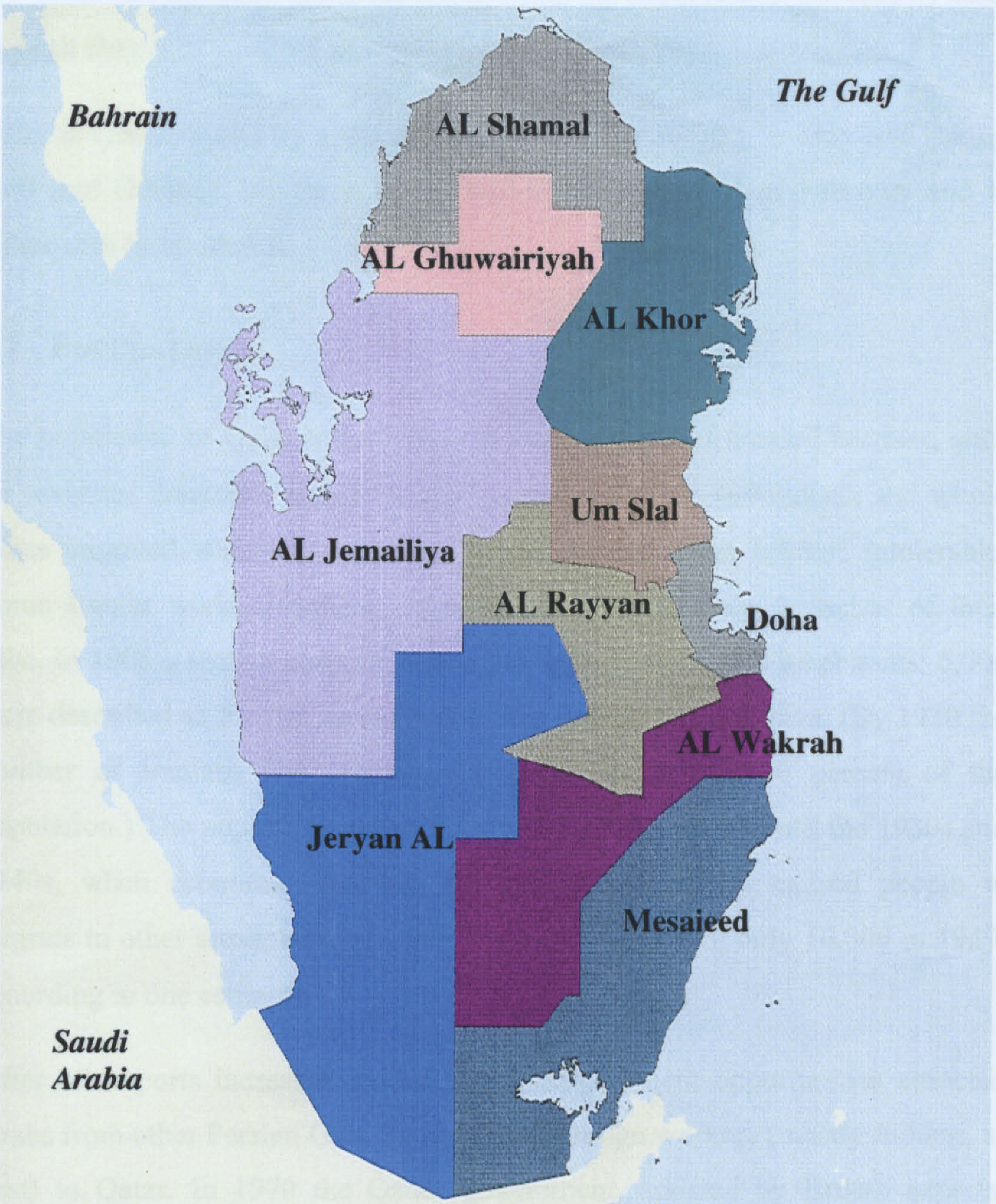


Figure (2.2): Zones of Municipalities in Qatar

is for oil exportation.

Qatar is characterised by flat landscape except for some small hills and high ground to the north west. There are no high areas in Qatar except few scattered sandstone and limestone hills. The highest are those of Dukhan (about 35 m).

The areas of vegetation are in the north, while the south is arid, covered by sand and salt flats.

Qatar is characterised by a hot and humid summer starting in May and lasting until mid October. Winter is from December till the end of February and is warm with little rainfall.

2.2 POPULATION

The population of Qatar before independence must be estimated because, until oil revenues created a reason to stay on the peninsula, individuals and whole tribes migrated when the economic or security situation became intolerable. Some sought work elsewhere; others joined neighbouring branches of their tribe. In 1908 a British observer estimated there were 27,000 inhabitants; 6,000 were described as foreign slaves and 425 as Iranian boat builders. (By 1930 the number of Iranians had increased to 5,000, or almost 20 percent of the population.) The population probably remained fairly stable until the 1930s and 1940s, when economic hardship and regional insecurity caused people to migrate to other areas, leaving Qatar with a population of only 16,000 in 1949, according to one estimate.

After oil exports increased in the 1950s, employment opportunities attracted Arabs from other Persian Gulf countries and foreign workers (mostly Indians, at first) to Qatar. In 1970 the Qatari government, assisted by British experts, carried out a census that reported a population of 111,113, of whom 45,039, or more than 40 percent, were identified as Qataris. With the oil boom of the 1970s and the resultant influx of foreign workers came the largest population growth, so that by 1977 it was estimated that 200,000 people lived in the country, about 65 percent of whom were non-Qataris. During the 1960-75 period, the population grew at an average annual rate of 8.9 percent; in the 1970-75 period it grew at 12.7 percent.

Table (2.1): Population and percentage distribution by municipality

Municipality	*March 1986*		*March 1997*	
	Number	*%*	*Number*	*%*
Doha	217,294	58.9	264,009	50.6
AL Rayan	91,996	24.9	169,774	32.5
AL Wakrah	17,245	4.7	24,283	4.7
Umm Slal	11,161	3.0	18,392	3.5
AL Khor	8,993	2.4	17,793	3.4
AL Shamal	4,380	1.2	4,059	0.8
AL Ghuwairiya	1,629	0.4	1,716	0.3
AL Jemailiya	7,217	2.0	9,836	1.9
Jaryan AL batna	2,727	0.7	4,521	0.9
Mesaieed	6,437	1.7	7,640	1.5
Total	**369,079**	**100**	**522,023**	**100**

Source: Central Statistical Organisation, 1998

The census of March 16, 1986, counted a population of 369,079, and the census of March 1997 counted a population of 522,023 (see table 2.1) only 20 per cent of them are Qatari citizens while the rest are temporary immigrants mostly from South Asia.

The 1989 birth rate was 31.8 per 1,000 population and the death rate 2.5 per 1,000, for a natural increase 29.3 per 1,000, a high rate for a developing country. The 1997 census showed that 83 percent of the population was concentrated in Doha and in the neighbouring town of AL Rayyan which saw the highest population expansion during 1990s. Other towns included AL Wakrah (population 20,205) and Umm Said (population 7,424). In total, 88 percent of the population was urban. Reflecting the high number of migrant workers, about 66 percent of the population was male. As the large natural gas projects in the northern part of Qatar expand, it is expected that more people will inhabit the cities of AL Khor (or AL Khawr) and Ras Laffan.

2.3 ECONOMY

The discovery of oil represents an important turning point in the history of Qatar. This discovery has led to numerous changes in the economic, social, educational, health, and other fields. The Government of Qatar has endeavoured its oil revenues in building comprehensive cultural advances in all fields. In fact, since independence from the United Kingdom in 1971, Qatar has striven to elevate itself to the level of a developed country. Qatar has a free market economy.

Oil is the backbone of the economy and accounts for more than 30% of GDP, roughly 75% of export earnings, and 70% of government revenues. Proven oil reserves of 3.3 billion barrels should ensure continued output at current levels for about 25 years. Oil has given Qatar a per capita GDP comparable to the leading West European industrial countries. Production and export of natural gas are becoming increasingly important. Long-term goals feature the development of off-shore petroleum and the diversification of the economy.

Qatar contains the third largest natural gas reserves and the largest non-associated gas field in the world. Qatar is also emerging as a major exporter of liquefied natural gas. As an OPEC member, Qatar exports over 600,000 barrels of oil per day.

The Government of Qatar began to utilise the oil revenues by developing the economy and increasing the living standard of its citizens. Expansion and development occurred in the capital city, Doha, as well as other cities. This includes developing a modern network of infrastructure, different utilities and modern houses.

Qatar's real gross domestic product (GDP) growth rates slowed in 1994 and 1995 to 1% and 1.5% respectively, after averaging 8% between 1972 and 1992. In 1996, GDP growth rebounded sharply, hitting 4.5% and increased further in 1997 to between 10.1% and 15.5% (see table 2.2). For 1998, GDP growth rates are projected to ease due to lower oil prices but remain strong at between 4% and 8.5%. This trend is expected to continue in 1999 through to 2003. Much of this growth will be supported by anticipated and significant increases in oil and liquefied natural gas (LNG) exports. Meanwhile, inflation remains in low, single digits, due in part, to lower import prices and a strong U.S. dollar, to which the Qatari Riyal is pegged. The inflation rate for 1997 was at 2.2% and is projected to fall to 2.1% for 1998.

In early April 1998, the Qatari government approved its budget for the fiscal year 1998-1999. Low oil prices, which have fallen by approximately 25% since the beginning of 1998, have forced the government to tighten its budget from the previous fiscal year. The 1998/1999 budget projects a rise in the budget deficit, despite drops in both expenditures and revenues. The budget forecasts revenues of US$ 3.3 billion and expenditures of US$ 4.3 billion, leaving a $ 1 billion deficit. These budget numbers represent a 7.7% decline in revenues and a 4.4% drop in expenditures from last fiscal year. The 1997/1998 fiscal year deficit was US$800 million. The government has set a goal of a balanced budget by 2000.

2.4 The Construction Industry in Qatar

The sponsoring ministry for the construction industry is the Ministry of Municipalities Affairs and Agriculture, with a number of functional departments – civil engineering, building development, land, survey, and town and country planning.

- The Urban Planning Department (UPD) is responsible for urban planning, control and development, covering both structure and local development plans, as well as setting and monitoring minimum environmental standards. The department also promotes local consultants and issues building permissions for the approved plans.
- The Civil Engineering Department (CED) is responsible for managing and supervision of various government projects such as roads, bridges, water, sewage and electrical works.

- The Building Engineering Department (BED) is responsible for managing and supervision of all government building projects from inception to completion.
- The Lands Department is responsible for planning and developing lands. It is also responsible for distributing lands for Qatari citizens.

2.4.1 Construction Industry Economy

As in most countries, especially developing countries, the Qatari construction industry has a special place in the nation's economy. Over the past two decades, the Qatari construction industry has contributed heavily to the country's Gross Domestic Product (GDP). Table (2.2) and table (2.3) show that since 1991 the share of the construction industry to the GDP is increasing year by year. Statistics show that in 1997 GDP of the construction industry was 6.8% at the current prices and 8.1% at constant prices. The latter fact suggests that not only the contribution of the construction industry is increasing within that year, but also its importance is increasing from the previous year.

As far as employment is concerned the censuses of 1986 and 1997 show that the labour force serving the industry represents one fifth of the total number of economically active population in Qatar (see table (2.4)).

Qatar's rapid development in all economic and social fields, necessitates an increasing demand for labour meet requirements. Most of these labourers and employees are foreigners. In fact the number of Qatari nationals who are economically active in the construction industry represents only 0.64% of the total number (see table (2.5)). Most of these Qataris are the owners or top executive directors of the companies and firms active in Qatar. The main sources of foreign labour come form India, Pakistan, Iran, Bangladesh, Philippines and Korea. Obviously, the main reason behind using this source of labour is that it is cheap and their ability to work in the Qatari climate.

Table (2.2): Estimates of the Gross Domestic Product of the construction industry at current prices 1990-1997 (In millions Qatari Riyals)

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
Total GDP	26792	25056	27832	26050	26843	29622	32976	33464
Construction GDP	1130	1029	1199	1196	1719	1963	2263	2270
Percentage to total GDP	4.22	4.11	4.31	4.59	6.40	6.62	6.88	6.78

Source: Central Statistical Organisation, 1995-98.

Table (2.3): Estimates of the Gross Domestic Product of the construction industry (at constant prices 1988) 1989-1996 (In millions Qatari Riyals)

	1989	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Total GDP	23134	23751	23563	25849	25700	26303	27075	28379
Construction GDP	972	1137	1165	1331	1168	1709	1617	2305
Percentage to total GDP	4.20	4.79	4.94	5.15	4.54	6.50	5.97	8.12

Source: Central Statistical Organisation, 1995-98.

Table (2.4): Economically active population (15 years and above)

	1986 census	*1997 census*
Total number of economically active population	200,238	280,122
Number of active population in the construction industry	40,523	56,106
Percentage to the total population	20.3	20.0

Source: Central Statistical Organisation, 1995-98.

Table (2.5) also shows that total compensation for employees active in the construction industry in Qatar in 1996 was QR 622 millions, with an average annual wage of about QR 20 thousands. The average GDP per person engaged in the construction industry during the period from 1993 to 1996 was QR 30,355.

Table (2.5): Employees and major economic indicators of building and construction sector 1993-1996 *

	1993	*1994*	*1995*	*1996*
% of Qataris employed	1.10	1.28	0.85	0.64
Compensation of employees[∇]	559,081	590,083	594,321	622,444
Average Annual Wages[♦]	17,547	18,581	17,805	19,578
Percentage of Goods Consumed to Total Output	50.40	53.68	48.57	47.06
Percentage of Services Consumed to Total Output	6.20	6.95	10.31	11.37
Productivity per person engaged[♦]	69,755	73,685	71,008	79,314
GDP per person engaged[♦]	30,248	29,006	29,198	32,969

* Not including workers employed by foreign companies involved in the development of the North Gas Field; [∇] In thousands Qatari Riyals; [♦] In Qatari Riyals.
Source: Central Statistical Organisation, 1995-98.

2.4.2 Construction Firms

Construction firms in Qatar are subject to General Law no. (3) issued in 1975 regarding trading, industrial and general establishments of a similar nature.

The exploratory interviews conducted in Qatar revealed that the construction industry in Qatar is very fragmented with construction firms varying widely in size as well as in the type of work they perform. A general contractor is usually appointed by selective tendering and/or direct negotiation in the private sector, and by competitive tendering in the public sector. Specialist contractors are usually employed for mechanical and electrical installations and, for major or prestige projects, international contractors are often appointed.

Tables (2.6) and (2.7) illustrate number and size of construction firms active in Qatar. Over the period of 1991-96 the number of construction firms with 50 to 99 employees reduced significantly from 107 to only 45 firms, while the number of smaller and very large firms increased substantially and the rest of the firms stabilised. In 1996 the total number of employees for very large firms, those employing 500 or more, jumped from 10,700 to 14,566 and accounted for 39 per cent of total employment in Qatar, though these firms share most of the large government projects.

Table (2.6): Number of construction firms by size of employment 1991–1996

Size of firms	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Less than 50	260	379	372	379	389	379
50 – 99	107	78	72	53	47	45
100 – 199	37	31	37	35	35	38
200 – 299	8	18	14	13	9	10
300 – 399	8	8	9	7	8	9
400 – 499	4	9	5	4	6	5
500 or more	6	6	9	12	14	17
Total	430	529	518	503	508	503

Source: Central Statistical Organisation, 1998.

Table (2.7): Total employment by size of firms 1991–1996

Size of firm	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Less than 50	5993	5993	5972	6164	6692	6595
50 – 99	7456	5264	4932	3904	3323	3019
100 – 199	5155	4410	5381	5117	5060	5486
200 – 299	1969	4188	3290	3150	2268	2388
300 – 399	2784	2618	2969	2337	2762	3246
400 – 499	1813	4010	2164	1720	2573	2223
500 or more	3442	4508	7154	9364	10700	14566
Total	28612	30931	31862	31756	33378	37523

Source: Central Statistical Organisation, 1998.

Table (2.8) illustrates number of the active construction firms working in Qatar from the period of 1994 to 1998 by type of activity, and grading prescribed by the Central Tendering Committee.

Table (2.8): Number of construction firms by grade and activity 1994-1998*

Type of Activity	*1994*	*1995*	*1996*	*1997*	*1998*
Buildings and maintenance	**286**	**321**	**359**	**388**	**459**
Grade A	22	22	23	25	25
Grade B	24	25	24	22	21
Grade C	29	27	29	29	30
Grade D	45	49	53	56	54
Grade E	96	117	129	143	159
Grade F	70	81	101	113	170
Electricity works	**156**	**142**	**138**	**150**	**159**
Grade A	17	16	19	20	20
Grade B	17	18	18	21	23
Grade C	45	39	40	39	31
Grade D	24	25	26	29	49
Grade E	53	44	35	41	36
Sewage	**75**	**81**	**86**	**90**	**84**
Grade A	17	17	17	17	16
Grade B	16	19	19	23	28
Grade C	42	45	50	50	40
Water	**77**	**78**	**78**	**81**	**72**
Grade A	11	12	13	13	13
Grade B	22	24	24	27	29
Grade C	44	42	41	41	30
Roads	**58**	**60**	**60**	**62**	**59**
Grade A	10	11	11	13	12
Grade B	17	16	17	17	22
Grade C	31	33	32	32	25
Air Conditioning works	**15**	**14**	**16**	**16**	**17**
Grade A	8	7	8	8	9
Grade B	2	2	2	2	3
Grade C	2	2	2	2	2
Grade D	3	3	4	4	3
Air Conditioning maintenance	**12**	**12**	**12**	**13**	**13**
Grade A	7	7	7	8	8
Grade B	2	2	2	2	2
Grade C	1	1	1	1	1
Grade D	2	2	2	2	2

* There might be more than one activity for some firms.
Source: Central Tendering Committee, 1998.

The Committee divides construction activities in Qatar into seven activities, each activity with different categories. These are: building and maintenance which is divided into six grades; electricity works is divided into five grades; air conditioning works and air conditioning maintenance are divided into four grades each; and finally roads, water and sewage are divided into three grades each.

The classification of construction firms is based on several criteria set by the Central Tendering Committee. These criteria include, number of employees, experience level of employees, available funds it can provide, type of equipment and past experience of the firm. Upon these criteria the Committee classifies construction firms in Qatar every year. The higher grade (A being the highest) a construction firm has, the larger government projects this firm can tender for.

In 1998 the Committee classified 459 construction firms which were active in building and maintenance, from which 72% were graded as E or F. Since 1994 the number of construction firms in these two groups has doubled, while the other groups have stabilised. This suggests that almost all of the new entrant construction firms were very small and with limited capabilities. Only 10% of firms received the top grades of A or B.

2.4.3 Construction Projects

The industry is very dependent on public sector projects. However, the share of the private sector projects has increased in recent years. Construction projects include buildings such as houses, multi-storied and commercial centres. It also includes civil engineering projects such as roads, electricity power plants and bridges. While most building projects are privately commissioned and financed, civil engineering projects primarily depend on the government finance initiative.

Exploratory interviews revealed that a majority of projects are undertaken by a main contractor through single stage competitive tendering on the basis of drawings. Construction management and management contracting are becoming more popular, while design and build is rarely used.

Table (2.9) illustrates the estimates of value added in the construction industry by type of projects for the period of 1987 to 1993. Through out this period building projects contributed the largest part of construction output in Qatar, except in 1990 where civil engineering projects represented 59.3% of the total gross output. That is solely due to the development works of the North Gas Field Project.

Table (2.9): Estimates of value added of construction projects by type 1987-1993*

Type of Building	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*
Production Inputs	**1241.2**	**1567.8**	**1522.3**	**2503.5**	**1811.8**	**1980.8**	**2033.0**
Buildings	833.7	836.4	755.5	826.7	1005.5	1071.6	1166.6
Civil engineeringϕ	407.5	731.4	766.8	1676.8	806.3	909.2	866.4
Gross Value Added	**993.2**	**1029.6**	**971.5**	**1130.0**	**1028.9**	**1198.8**	**1196.3**
Gross Output	**2234.4**	**2597.4**	**2493.8**	**3633.5**	**2840.7**	**3179.6**	**3229.3**
Buildings	1369.6	1469.8	1391.6	1331.3	1631.5	1740.1	1883.7
Civil engineering	714.5	932.9	980.9	2154.2	1053.1	1355.7	1267.8
Other revenues	150.3	194.7	121.3	148.0	156.1	83.8	77.8

* In millions Qatari Riyals; ϕ Includes imported prefabricated structures for the development of the North Gas Field Project.
Source: Central Statistical Organisation, 1995-96.

Table (2.10) shows the number of buildings in Qatar during the period of 1986 to 1993. The percentage of residential buildings to the total during this period was consisted at 88%. The largest percentage increase in residential buildings was for villas and flats. From 1983 till 1993, villas and flats increased by 36.4% and 28.3% respectively.

Table (2.11) illustrates the number of completed buildings for each year during the period of 1994 to 1997. The private house is the only building type that kept increasing, while numbers of Senior Staff houses, Arabic houses dropped substantially.

Table (2.10): Estimates of number of buildings by type at end of years 1986-1993

Type of Building	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*
Residential Buildings*	**48199**	**48734**	**49362**	**50079**	**51005**	**52001**	**53244**	**54958**
Palaces and villasϕ	13427	13952	14509	15100	15846	16525	17390	18313
Public houses	10160	10625	10943	11294	11548	11933	12386	12789
Arabic houses	17596	17525	17454	17376	17305	17239	17168	17179
Multi-storeyed buildings	2621	2712	2797	2911	3000	3093	3163	3549
Others	4395	3920	3659	3398	3306	3211	3137	3128
Flats within multi-storeyed buildings	15680	16332	13921	17711	18262	18990	19592	20111
Non-residential Buildings	**6249**	**6384**	**6513**	**6723**	**6927**	**7164**	**7390**	**7668**
Total	**54448**	**55118**	**55875**	**56802**	**57932**	**59165**	**60634**	**62626**
% of Residential Buildings to total	**88.5**	**88.4**	**88.3**	**88.1**	**88.0**	**87.9**	**87.8**	**87.8**

* Total residential buildings does not include flats within completed multi-storeyed buildings; ϕ Includes Senior Staff Houses.
Source: Central Statistical Organisation, 1996.

Table (2.11): Completed buildings by type of building 1994-1997

Type of Building	*1994*	*1995*	*1996*	*1997*	*1994-97*
Residential Buildings	**1421**	**1726**	**1752**	**1904**	**6803**
Private houses	813	1268	1344	1296	4721
Senior Staff houses	166	156	116	86	524
Public houses	335	201	171	432	1139
Arabic houses	19	5	9	7	40
Multi-storeyed buildings	84	91	88	80	343
Others	4	5	24	3	36
Non-residential Buildings	**181**	**177**	**212**	**166**	**736**
Total	**1602**	**1903**	**1964**	**2070**	**7539**

Source: Central Statistical Organisation, 1995-98.

Figure (2.3) illustrates the actual cost of buildings completed during the period of 1987 to 1997. The term cost here means actual amount of money spent for building during this period. Costs of residential buildings increased steadily throughout the years, except in 1997 where the costs dropped from QR 1,127.3 millions to QR 956.7 millions (see table (2.12) for more details). Cost of completed non-residential buildings increased dramatically in 1989. This is because major governmental and commercial buildings were completed in that year.

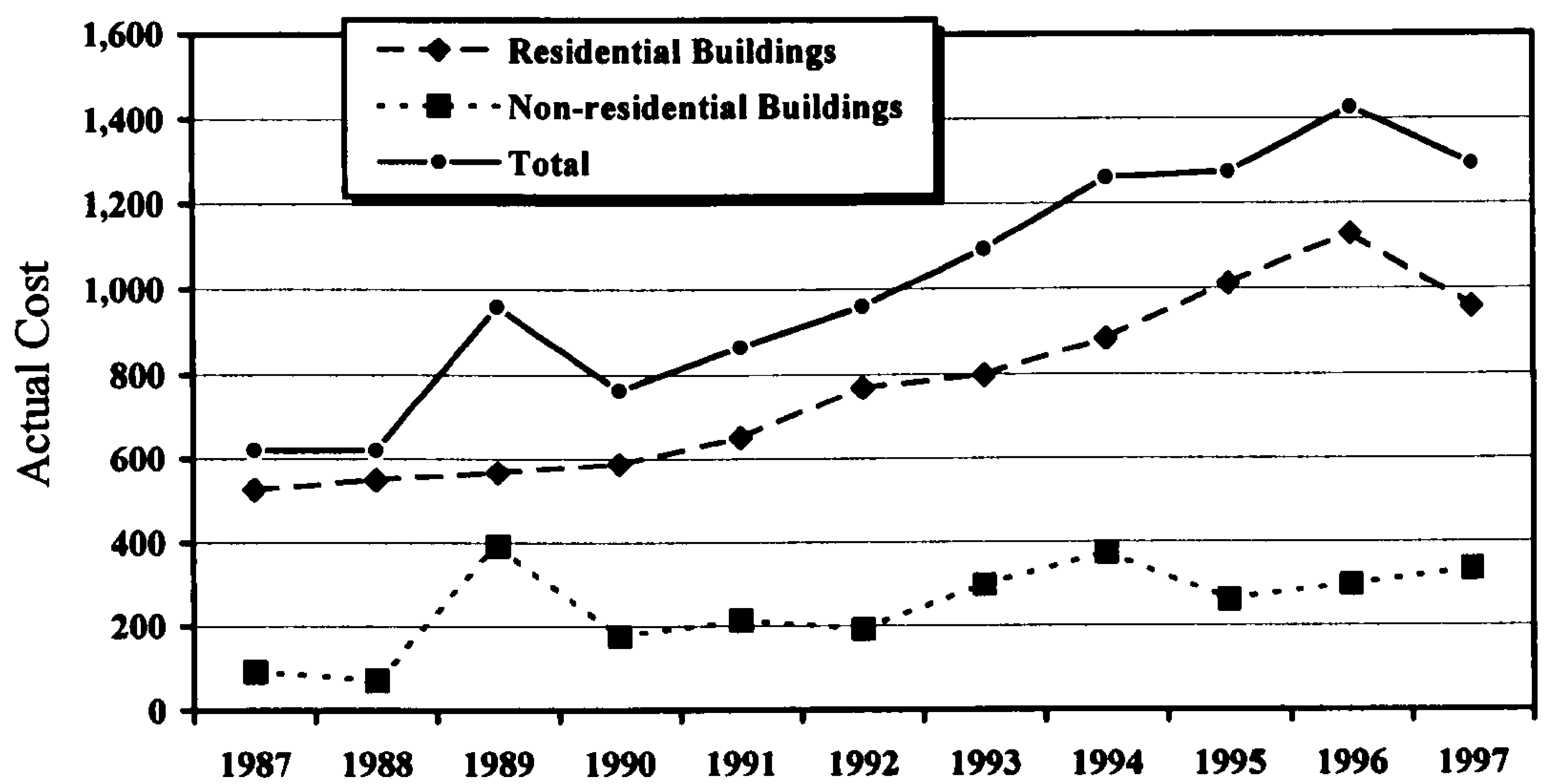


Figure (2.3): Actual Cost of Completed Buildings in Million QR 1987-97 (*Source: Central Statistical Organisation, 1995 - 98*)

Table (2.12) shows that amount of money spent for Senior Staff houses decreased from QR 146.4 millions in 1994 to QR 78.8 millions in 1997. That is a drop of 46.2%, whereas table (2.13) shows the average cost at current prices of building Senior Staff houses during the period of 1994 to 1997 increased from QR 881.9 thousands to QR 915.9 thousands.

Table (2.12): Actual cost of completed buildings by type of building 1994-1997 (In thousands Qatari Riyals)

Type of Building	*1994*	*1995*	*1996*	*1997*	*1994-97*
Residential Buildings	**883,052**	**1,010,860**	**1,127,310**	**956,740**	**3,977,692**
Private houses	460,835	655,933	704,001	604,163	2,424,932
Senior Staff houses	146,393	137,930	105,794	78,769	468,886
Public houses	96,936	53,322	48,478	127,819	326,555
Arabic houses	2,090	1,230	2,790	1,845	7,955
Multi-storeyed buildings	175,985	154,122	249,348	142,449	721,904
Others	813	8,323	16,899	1,695	27,730
Non-residential Buildings	**375,679**	**262,379**	**297,924**	**336,428**	**1,272,410**
Governmental	32,994	40,798	85,918	51,731	211,441
Commercial	240,219	157,458	137,278	164,937	699,892
Industrial	54,585	39,282	36,527	36,144	166,538
Others	47,881	24,841	38,201	83,616	194,539
Total	**1,258,731**	**1,273,239**	**1,425,234**	**1,293,168**	**5,250,372**

Source: Central Statistical Organisation, 1995-98.

Table (2.13): Average cost of Senior Staff houses at current prices 1989-1993 (in thousands Qatari Riyals)

Type of Building	*1994*	*1995*	*1996*	*1997*
Number of completed SSH	166	156	116	86
Cost of completed SSH	146,393	137,930	105,794	78,769
Average cost of SSH	881.9	884.2	912.0	915.9

Source: Central Statistical Organisation, 1995-98.

Table (2.14) shows average cost of building per square metre for buildings completed from 1989 to 1993 at current prices. Palaces and villas, which include Senior Staff houses, had the highest average cost at QR 1,183 per square metre for residential buildings (US$ 324), while Arabic houses had the lowest average cost at QR 961 per square metre (US$ 263). That is because the quality of the finishing materials for villas is higher than for Arabic houses. Compare this to the cost of detached houses in the UK and US which is US$ 502 and US$ 615 per square metre respectively (Spon's, 1994).

For non-residential buildings, government buildings had the highest average cost at QR 2,798 per square metre, while industrial buildings had the lowest average cost at QR 505 per square metre. The specifications of government buildings are much higher and stricter than other buildings.

Table (2.14): Average cost of building per square metre by type of building 1989-1993 (in Qatari Riyals)

Type of Building	*1989*	*1990*	*1991*	*1992*	*1993*	*89-93*	*89-93**
Residential Buildings							
Palaces and villasϕ	1,141	1,290	1,173	1,135	1,174	**1,183**	**324**
Public houses	1,050	948	853	998	986	**967**	**265**
Arabic houses	928	961	967	960	987	**961**	**263**
Multi-storeyed buildings	1,018	955	1,124	951	1,051	**1,020**	**279**
Others	871	835	1,027	954	1,590	**1,055**	**289**
Non-residential Buildings							
Governmental	2,557	2,439	3,639	2,419	2,935	**2,798**	**767**
Commercial	1,210	1,134	655	1,412	1,039	**1,090**	**299**
Industrial	412	597	487	510	520	**505**	**138**
Others	1,176	940	1,351	1,023	2,867	**1,471**	**403**

* In US Dollars, ϕ Includes Senior Staff Houses.
Source: Central Statistical Organisation, 1995.

Table (2.15): Average completion period per 100 square metres of building by type of building 1989-1993 (in months)

Type of Building	*1989*	*1990*	*1991*	*1992*	*1993*	*1989-93*
Residential Buildings*	2.7	3.3	3.7	3.8	3.7	**3.44**
Private houses	3.0	4.0	4.2	3.9	4.2	**3.86**
Senior Staff houses	3.6	3.9	4.1	4.3	4.1	**4.00**
Public houses	4.8	5.7	3.9	4.0	4.4	**4.56**
Arabic houses	7.6	1.2	3.6	7.1	6.1	**5.12**
Multi-storeyed buildings	1.5	1.5	1.8	1.4	1.1	**1.46**
Others	1.1	5.4	6.7	4.8	1.4	**3.88**
Non-residential Buildings*	2.4	1.2	1.6	1.3	1.6	**1.62**
Governmental	4.0	0.5	1.5	2.3	3.1	**2.28**
Commercial	1.7	0.8	1.2	0.9	1.0	**1.12**
Industrial	3.3	3.0	2.2	1.5	2.0	**2.40**
Others	2.1	1.2	1.8	1.5	3.0	**1.92**

* Averages are for the total number of buildings.
Source: Central Statistical Organisation, 1995.

Table (2.15) shows average completion period, in months, per 100 square metres during the period of 1989 to 1993. Non-residential buildings projects had higher building speed rate than residential building projects. On average, it took 1.62 months to complete 100 square metres for non-residential buildings and 3.44 months to do the same for residential buildings. That is twice faster than residential buildings. Multi-storeyed building projects were the fastest type of residential project with an average of 1.46 months per 100 square metres, while Arabic houses were the slowest at 5.12 months to complete the same area. For non-residential buildings, commercial building projects were the fastest at an average speed rate of 1.12 months per 100 square metres.

Table (2.16) illustrates the average area of building by type during the period of 1987 to 1993. On average, villas completed during this period have a gross floor area of 529 square metres, while flats have an area of 160 square metres. On the other hand commercial buildings completed in the same period have an average area of 1212 square metre.

Table (2.16): Average area of buildings by type 1987-1993 (in square metres)

Type of Building	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*87-93*
Residential Buildings								
Palaces and villasϕ	529	576	532	479	513	539	537	**529**
Arabic houses	266	188	514	335	221	275	264	**294**
Public houses	271	273	275	277	270	270	295	**275**
Multi-storeyed buildings	1418	1469	1447	1083	1379	1784	1611	**1455**
Flat	168	180	174	152	142	170	140	**160**
Others	460	1108	221	160	300	974	425	**521**
Non-residential Buildings								
Governmental	220	446	3627	1193	673	541	630	**1047**
Commercial	1335	639	1742	1154	1536	1387	692	**1212**
Industrial	793	473	599	721	1050	842	1035	**787**
Others	534	753	1276	973	892	562	936	**846**

ϕ Includes Senior Staff Houses.
Source: Central Statistical Organisation, 1995.

Finally, table (2.17) shows the cost group of building types completed between 1988 and 1992. Half of the palaces and villas completed in this period cost less than half a million Qatari Riyals. Almost all of the Public and Arabic houses, 27% of the multi-storeyed buildings and 60% of the non-residential building projects fall into the same category. The percentage of villas costing between half million and one million Qatari Riyals increased from 37% in 1987 to 44% in 1992. On the other hand, it dropped from 13% to 7% for villas costing between one million and five million Qatari Riyals. Less than half per cent of villas and palaces cost more than five million Qatari Riyals.

Multi-storeyed buildings which cost between one million and five million Qatari Riyals increased from 24% in 1987 to 45% in 1992.

Table (2.17): Completed buildings by type and cost group (% to total) 1988-1992

Type of Building	*1988*	*1989*	*1990*	*1991*	*1992*	*1988-92*
Residential Buildings						
Palaces and villas♦	100.0	100.0	100.0	100.0	100.0	**100.0**
Less than QR 500,000	49.2	51.7	55.1	48.9	49.0	**50.8**
QR 500,000 to QR 999,999	37.0	36.1	34.1	40.2	43.7	**38.2**
QR 1,000,000 to QR 4,999,999	13.0	12.0	10.3	10.6	7.3	**10.6**
QR 5 Millions or more	0.8	0.2	0.5	0.3	0	**0.4**
Public & Arabic houses	100.0	100.0	100.0	100.0	100.0	**100.0**
Less than QR 500,000	99.1	97.0	100.0	99.7	95.4	**98.2**
QR 500,000 to QR 999,999	0.9	2.2	0	0.3	4.6	**1.6**
QR 1,000,000 to QR 4,999,999	0	0.8	0	0	0	**0.2**
QR 5 Millions or more	0	0	0	0	0	**0**
Multi-storeyed buildings	100.0	100.0	100.0	100.0	100.0	**100.0**
Less than QR 500,000	32.5	34.0	29.8	29.9	9.6	**27.2**
QR 500,000 to QR 999,999	36.4	25.5	28.4	19.5	36.2	**29.2**
QR 1,000,000 to QR 4,999,999	24.7	35.8	38.8	46.0	44.6	**38.0**
QR 5 Millions or more	6.4	4.7	3.0	4.6	9.6	**5.6**
Non-residential Buildings	100.0	100.0	100.0	100.0	100.0	**100.0**
Less than QR 500,000	69.4	55.5	55.3	60.7	58.2	**59.8**
QR 500,000 to QR 999,999	10.6	16.3	17.7	20.9	20.3	**17.2**
QR 1,000,000 to QR 4,999,999	16.5	17.8	23.5	13.5	17.6	**17.8**
QR 5 Millions or more	3.5	10.4	3.5	4.9	3.9	**5.2**

♦ Includes Senior Staff Houses.
Source: Central Statistical Organisation, 1995.

2.4.4 Consultants Offices

Realising visions, assuring Government authorities and private investors of the soundness of investments and the accuracy and proper utilisation of data and information, all necessitate the existence of a party which specialises in providing services that satisfy these needs. This party is the Consultants Offices as they are sources of expertise.

It is doubtless that consultants offices, with their varied specialisation, play an important role in the service of society by the effective selection of investment direction and the effectiveness of the individual investments.

Consulting offices in Qatar are subject to General Law no. (3) issued in 1975 regarding trading, industrial and general establishments of a similar nature, and its Executive Bill, as Ministerial Decision no. (8) issued in 1979, defining the types of companies to which the Law applies, includes consultants' offices.

Licensing Consulting Offices is governed by the relevant rules stated in the Ministerial Memorandum no. (23) of 1989 regarding this subject. This memorandum defines professional consulting services and states conditions related to license applicants, either natural or juristic, premises and licensing procedures. It, also, states regulations specific to engineering consultants. The memorandum finally mentions the licensing procedures to be followed, until such time that legislation regulating the profession is issued. The Licensing Consulting Offices Committee is about to prepare a draft of a proposed Law in this regard to be put before legislation authorities in the near future.

1. Law no. (3) issued in 1975 regarding trading, industrial and general establishments and its executive bill issued according to the Ministerial Decision no. (10) of 1979.
2. Memorandum no. (23) of 1989 of the Minister of the Municipal Affairs and Agriculture.
3. The draft law proposed by the Ministry of Public Works in 1988 regarding professional consulting practice.
4. Various legal rules inspired from a proposed draft law covering professional consulting services that the Committee is currently preparing.

The Committee works to control consultant offices and exclude those that are proven to be technically incompetent or display unprofessional conduct. In addition, the Committee issues circulars to Government authorities advising

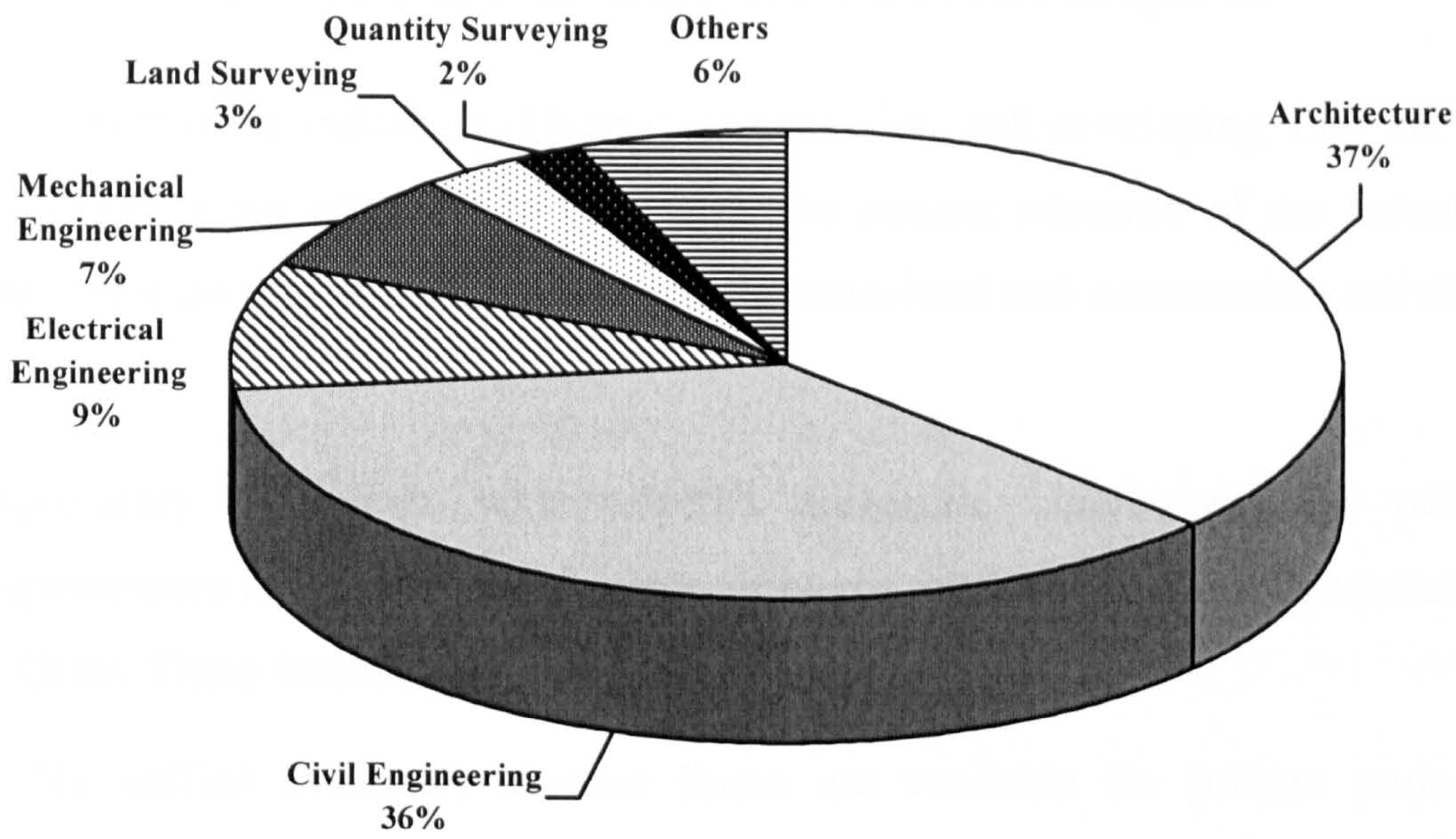


Figure (2.4): Distribution of Consutants Offices by Specialisation
(Source: Consultant Offices Registration Committee, 1996)

them against dealing with consultants that do not have licenses or whose licenses have expired, until they correct their legal positions. The Committee also stipulates that engineering consultants are to provide services engineers, electrical and mechanical, to ensure that their submitted designs conform with services' standards.

By the end of 1998 there were more than 110 consultant offices active in Qatar. Figure (2.4) shows the distribution of consultant offices in Qatar by specialisation. The figure shows clearly that the major consultants offices in Qatar are either architecture or civil engineering.

No guidance is published for the selection of consultants and even the government will not comment on its selection criteria. Professional consultants are usually appointed directly by the client without formal competition and whether the project is residential, non-residential, or civil engineering the method used in selecting consultants is broadly the same.

2.5 PROBLEMS OF THE CONSTRUCTION INDUSTRY IN QATAR

The construction industry in Qatar is immature and still developing. Law no. (3) of (1975) is not adequate to cope with the current situation of the industry. There is a need to issue a law to regulate consultant and construction activities in Qatar.

Exploratory interviews with selected designers, contractors and policy implementers in Qatar revealed major problems related to construction industry in Qatar. These include:

- No unified (national) contract forms are available for private projects, instead, consultants and contractors use their own form of contract. These contract forms are made to protect the consultants and the contractors but they do not protect the rights of the clients. Some policy implementers suggested that the Government should come up with set of contract forms that can save the rights of all parties involved.
- No alternative dispute resolution is available to settle disputes when they occur. Most of the disputes are solved though direct negotiations between the contractor's and client's representatives. These negotiations usually end with client's giving up, as the only other choice for them is to file charges against the contractors in the courts, which is a very long procedure. Some designers and contractors suggested that other alternative dispute resolutions such arbitration, litigation, conciliation, mediation and adjudication must be introduced in Qatar. These methods may save time and money and hence improve the project output.
- Old building techniques and poor innovation methods have led to poor creativity in designs and not applying new construction materials.
- No classification for the consultant offices in Qatar. Lack of experience and improper training.

- Design briefing is very limited and at its best in public and/or large size projects. In most cases, designers do not have briefings with their clients for residential projects, instead, they let their clients select from pre-prepared designs and make alterations to fit their needs. Only a few consultant offices do verbal briefing.
- Occasionally, designers provide designs that are not suitable for the Qatari environment, such as houses with steep sloping roofs, normally adopted in countries with high rainfall.
- Quality of drawings is poor with lack of details, specifications and bills of quantities (information problem).
- No quantity surveyors are practising in Qatar to manage client risk, control cost and add value. This often results in a large increase in uncertainty with final cost and time.
- Bad supervision on site by client representative.
- Except for top contractors, most of the contractors in Qatar have limited capabilities in terms of skilled manpower, equipment, access to funds and the use of modern project management techniques. A contractor having more than three projects at one time frequently leads to delays, as well as, increasing the final costs to the contractor. This leads to financial loss to the contractors, especially if fines are applied, according to the contract.
- Lack of good cost estimating of projects by most contractors, escalates the bid cost, as contractors wants to be on the safe side and not ending with loss.
- No professional institutions for consultants, contractors or sub-contractors. Such institutions can run training programmes to improve the skills of their members at all levels.
- The use of inappropriate construction materials for the climate of Qatar causes the deterioration of the building, and hence, shortens its life.
- Finally, all of the above factors have contributed to the poor image of the industry received by its clients.

Some contractors submit programmes of works for public projects at the commencement of the project, which may look good, but as soon as the project starts these programmes become unrealistic from a practical point of view because:

- Most of the materials are imported, a lot of construction firms do not have the technical teams that are familiar with materials used and the ways of testing them to ensure they meet the specification. This leads to delays in supplying the material within the required time, which leads to other delays on the programme.
- Some contractors do not understand the detailed project drawings at the tendering stage. Thus, at the time of project execution these contractors discover new hidden costs that they did not account for. The contractors in this case get into problems till they agree to implement the required specification, leading to more delays and financial losses.
- Some contractors have strikes because their workers have not received their monthly salaries, sometimes for up to four months. This also causes de-motivation and a reduction in productivity.
- Old equipment often fails and escalates delays.

The above points emphasise the immediate need to reorganise and restructure the whole construction industry in Qatar. That is, to issue laws to regulate the practice of consultant offices, contractors and sub-contractors firms. As well as, to enforce stricter laws governing specification and use of construction materials.

CHAPTER THREE

3 HOUSING IN QATAR

3.0 INTRODUCTION

This chapter starts by introducing the concept of housing and housing policy and then discusses housing policy in Qatar. Finally, it identifies housing provisions in Qatar by presenting the major categories of housing provision in the country and the major setbacks of the government's housing policy.

3.1 CONCEPT OF HOUSING

Housing is the most important need for humans after food and clothing. It provides a secure place for completing the human function process that strengthens the relationships among the family and then among society. Economic studies and economic planning programmes define housing as *shelter* and in some societies, especially the primitive ones, shelter is the only thing that housing can provide. But shelter, in fact, represents the wide understanding of housing, as the main function of shelter is to protect Man from nature and the weather. This protection only represents a small portion of housing need. The house also provides stability, comfort and privacy, as privacy is one of the fundamental needs of human beings. Rapoport (1981) wrote:

> ***"Housing is essential, it is a basic human need and central component in our daily lives. For most groups in our culture the dwelling is very central....most time is spent in it; it is one's most valuable possession."***
> p. 21

Housing consists of various elements that represent a complete system (Al-A'dhami, 1998) (see figure (3.1)). These housing system elements can be summarised as follow:

1. *Dwelling units* by all of its types flats, villas, palaces, apartments and so on.
2. *Technical Infrastructure* including lands, streets, lighting, and service utilities networks such as water, energy, communications, and sewage.

3. *Social Infrastructure* including schools, kindergarten, local shops, play grounds, health centres, religious places, and community centres.

Beside the above elements there are other elements connected with the housing system that have a direct influence. Those elements include the construction industry which includes construction materials factories, labourers, equipment, and transportation used for the process of housing production. Also government and local authorities, as well as, public and private institutions and individuals that deal directly or indirectly with housing have another influence on the housing system. As well as laws and regulations that regulate and organise the relationship between parties involved in the housing system.

The elements of this complex system of housing must react in a balance and in harmony with the social and economic variables within society, and if imbalance occurs within this process then housing problems will occur.

The problem of housing has a global dimension, as it occurs in all different types of countries and societies. It occurs in centrally controlled societies and in open market societies. It happens in developing countries, as well as, developed

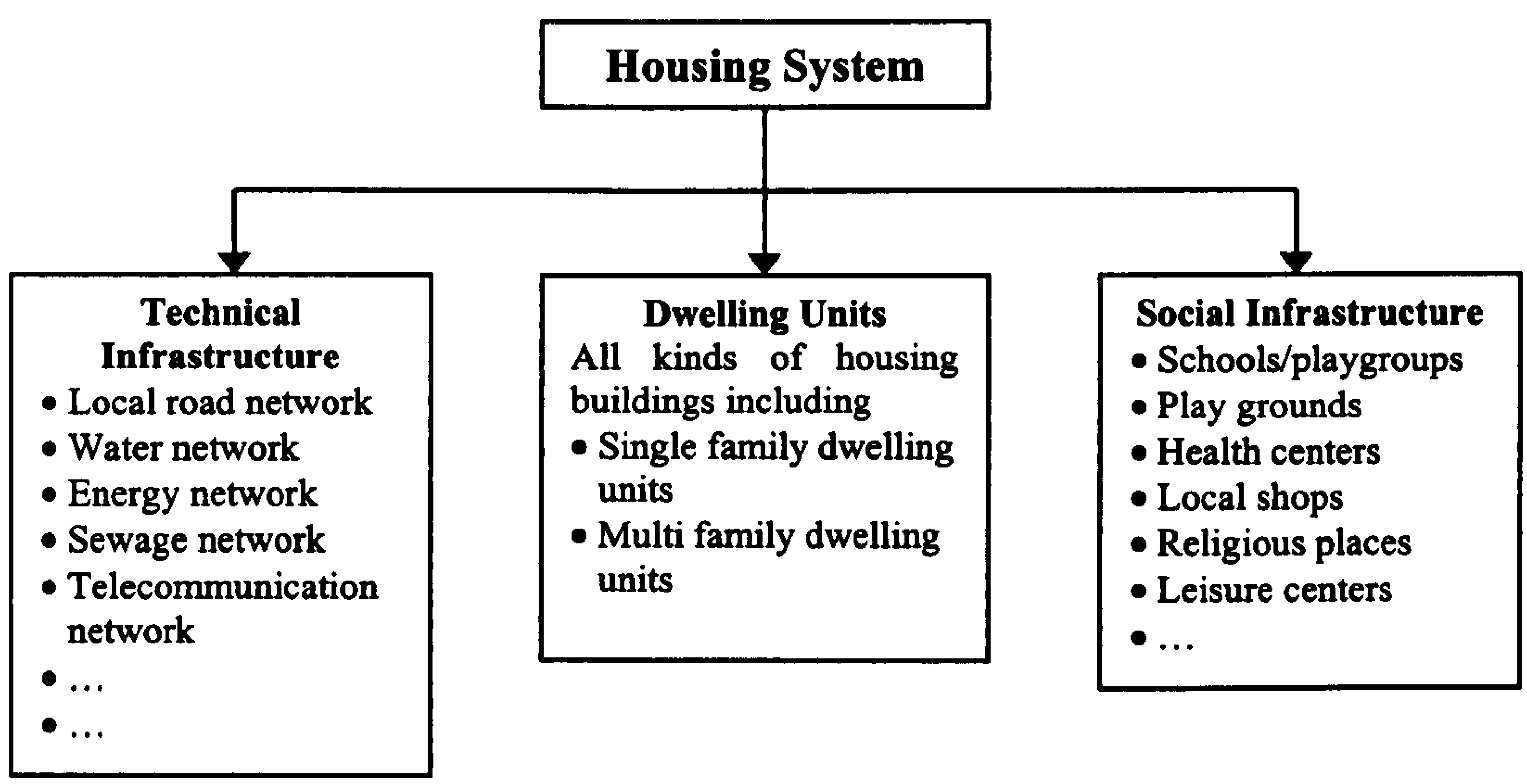


Figure (3.1): Housing System
Source: Al-A'dhami (1998)

countries. The spread of the housing problem is because housing is not only a product, but it is a complex continuos process that depends on a large number of variables. Some of the most important variables are, the economic situation of the country, the individuals and the influence of the rapid increases in population, whether through natural increase or the migration from rural areas to urban cities. This latter variable brings with it problems associated with lack of appropriate developed lands that are enough for accommodating this rapid increase in the urban population. It also brings problems with it, the over use of the technical and social infrastructures, which in turns leads to the reduction in their performance, a reduction in environmental health and social problems.

Notwithstanding the difference in the economic level of the developing and the developed countries, both of them suffer from a gap between the income level of the families, especially the housing needy families and the cost of the dwelling units available in the housing market. This leads to preventing a large group in the society from securing adequate housing.

The cost of a dwelling unit should be within the affordable limits of the family. In other words, providing an adequate house should not be an overly economic burden for the family, which prevents it from performing its role in society. This match between the cost of the dwelling unit and the income level of the family represents the ideal situation that every country would like to sustain through its intervention in the factors of production. The size and the quality of the dwelling units should also match the nature of the families that live in them and in a way that fulfils their needs (Al-Abed, 1996). If these harmonies do not occur then a large waste of economic resources of the country will occur and economic pressure on the families will arise.

3.2 HOUSING POLICY

Housing policy can be defined as a set of approaches and sequences that the government, or the responsible authority on the housing sector, issues in respect of housing development. This covers all items of this development, or part of it, in order to achieve the housing sector's goals (Al-A'dhami, 1998).

Housing policy is like any policy in different sectors and generally depends on the following foundations:

1. The general policy of the government and its political, economical, and social goals in the construction sectors.
2. The available economic resources, both people and materials that will be employed for the future development of housing, either directly or indirectly.
3. The nature of the housing needs, both in quantity and in quality, that usually arise from the continuous dynamic movement of the society from the demographic and economic perspective, such as number of families, size and its income level, and how it changes within a limited period of time.

The goals and objectives of housing policy can be divided into two main groups:

1. *The general housing goals*- those goals that usually reflect the country's ambitions in the housing sector, such as providing adequate dwelling units for every family in the society, regardless of its social or economical situation.
2. *The specific housing goals*- those goals that represent the specific goals and objectives of the housing sectors items and work in harmony way with the general housing goals and do not conflict with them. The specific goals can take several aspects, some of them are quantitative and the other qualitative. An example of the quantitative specific housing goal is building "x" amount of dwelling units during a specific period of time. An example of qualitative

specific housing goal is achieving a balance between the production of dwelling units and the land provided for housing.

Housing policy can take different forms depending on its level of comprehensiveness. The most comprehensive has all of the housing development elements and establishes goals and sequences. Housing Policy might also be incomprehensive with limited elements and limited goals as well.

The following is a list of the elements that comprehensive housing policies take into consideration:

1. Method of providing adequate lands for housing, whether directly to the citizens or in the form of housing complexes.
2. Housing financing system and method of providing capital, grants, loans and financial support.
3. Quotient distribution between the participant sectors in housing investment and production (public and private sectors).
4. Type of laws and regulations that govern the housing activities and urban development in general.
5. The departments and establishments that execute the planning activities and housing programmes, and the functional relationships between them.
6. The methods of procuring the dwelling units and the technical and social infrastructures, as well as the techniques used for producing them.
7. The ways and methods of producing, marketing and pricing the primary and secondary construction elements that are involved in housing production.
8. The general wages budget, especially the wages of the labourers who are working in the housing sector, with its different skill levels.
9. Dwelling units' rental level, its collection and form of conflict settlement between tenants and owners.

3.3 HOUSING POLICY IN QATAR

The State of Qatar can be considered as one of the leading countries in the whole world, nowadays, for supporting housing programmes for important sections of the Qatari society. The first housing legislation was issued in 1964 by Law no. (1) (1964) for providing adequate housing for the middle and limited income class of the citizens of Qatar. And in 1977 a new decree was issued for the Qatari senior staff by the Decree no. (7) (1977) in the name of Senior Staff Housing Decree.

One of the most important characteristics of the housing policy in Qatar is the government participation in the housing development by:

- Issuing the laws and regulations that organise the distribution of lands and loans that are related to the housing development.
- Providing lands for the citizens, in different regions of the country.
- Providing housing loans and financial support free of interest.
- Providing the managerial and technical support through different departments and sections such as:
    - Municipalities
    - Planning Department
    - Lands and Acquisition Department
    - Building Engineering Department
    - Civil Engineering Department
    - Property Registration and Notarisation Department
    - Housing Department
    - Government Housing Department
    - Lands Information Centre
    - Electricity and Water Departments
    - Civil Defence Department
    - Qatar Telecommunication Corporation

- Qatar National Bank

- Encouraging and supporting the private housing sector, whether individuals or companies, by providing developed lands and financing facilities. In this aspect the Government finances private housing projects and then rent from their owners for its employees in what is termed "Government Tenancy Housing".
- Constructing and providing houses for certain groups of society. The activity is aimed at the elderly and widows, as well as for other needy groups.
- Providing grants for furnishing citizens' houses.
- Providing technical and social infrastructures free of charge.
- Providing electricity and water services free of charge.
- Providing allowances as money substitutes to cover the rents for certain citizens of their residences.
- Providing allowances for certain groups of society, such as elderly and low-income families.

3.4 Major Categories of Housing Provision

Housing in Qatar falls into two major categories, public and private. These major categories are then subdivided into further categories as shown in figure (3.2). Thus, public housing provision is made up of housing project development (both estate and individual) and the government tenancy housing programme.

3.4.1 Popular Housing

The Government of Qatar issued the first housing legislation in 18/1/1964. The law was called Law no. (1) for 1964 for the Popular Housing Program. By this law the Government shall provide developed lands for the eligible citizens free of charge. The government also shall provide the proper amount of free interest loans for building houses to the beneficiaries, depending on the size of their families and their income level.

The law states that eligible candidates must:

1. Be a Qatari citizen.
2. Be from the limited income group.
3. Not less than 20 years old and not more than 50 years old.
4. Be married and father of a family that does not have any other provider except him.
5. Not individually own other property.
6. Not be able to build a house on his own.
7. Pass the medical examination showing that he is able to work.
8. Not have benefited from another government housing programme.

From the managerial aspect, the Lands Department assigns lands for building

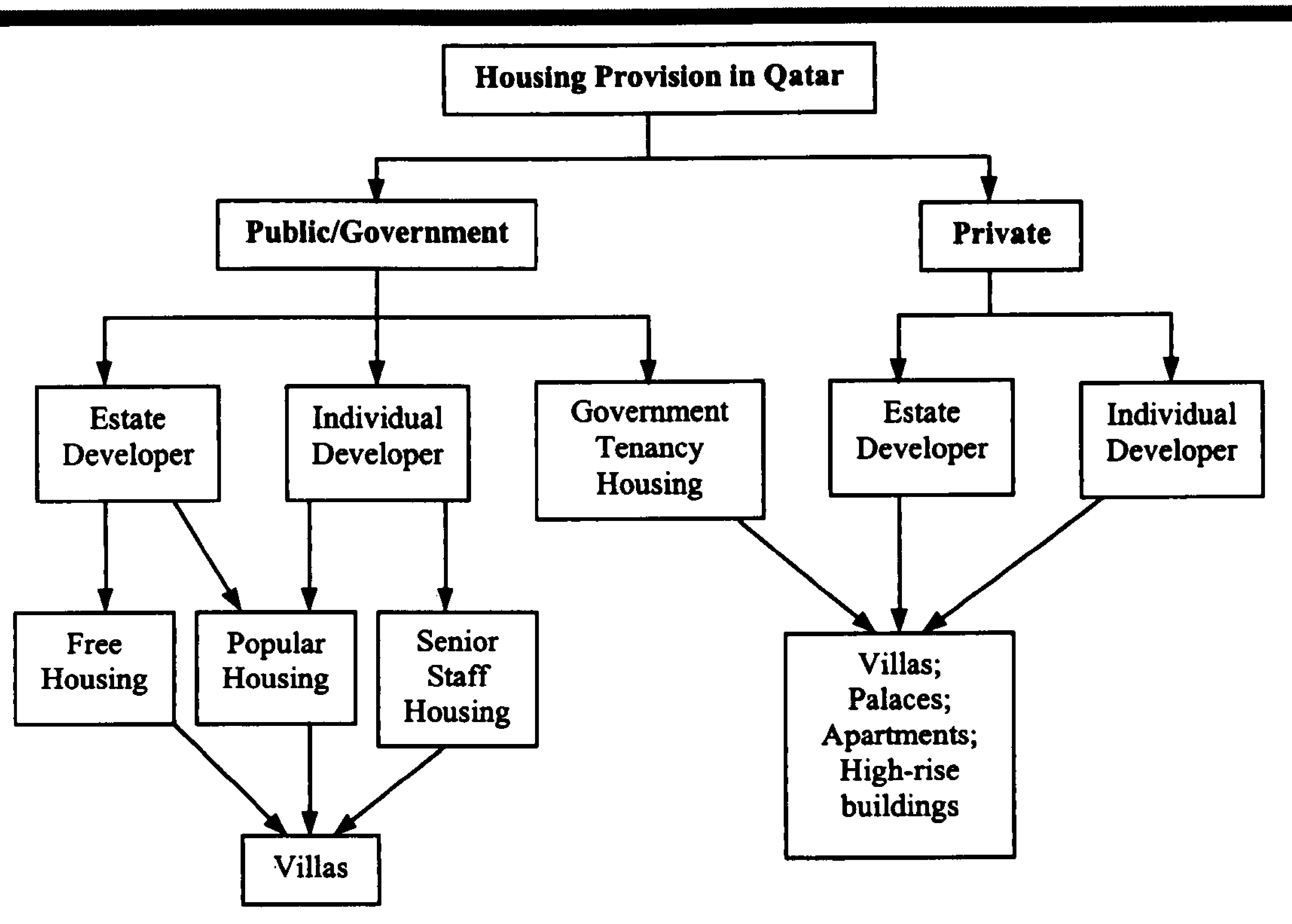


Figure (3.2): Housing Provision Topology in Qatar

popular houses. The candidates submit their applications for popular housing to the Housing Department which study them to find out who is eligible for Popular Housing. Those eligible then possess the assigned lands and apply for loans through the Qatar National Bank.

After reviewing the Housing Department's suggestions and consulting with the Government Property Section, the Minister of Finance assigns a budget for financing popular housing within the government planned yearly budget. The Government pays the loan assigned for the beneficiary, either directly, or to the selected contractor.

The Housing Department has a different number of designs with an average cost of QR 250,000, and which may reach as much as QR 300,000. The loan must be returned over a period of 20 or 25 years in low monthly instalments depending on the beneficiary's income level and should not exceed QR 600. The Housing Department takes the responsibility of collecting the instalments. In order to secure the return of the loan, the Government withholds the deed of the land and the structure built on it until the return of the full loan.

In the case of total disability or death of the beneficiary, he or his family is exempt from paying the rest of the loan.

3.4.2 Free Housing

Another housing provision regulated by the Law no. (1) of 1964 is called Free Housing Program. The Government takes the initiative to build popular houses and then rent them to the eligible citizens for symbolic rent. Free housing is mainly distributed among the elderly and widowed families. This housing programme also provides houses for divorced women. Law no. (1) of 1964 states that the eligible candidates must:

1. Be a Qatari citizen.

2. Be totally unable to work, or blind, or above 60 years old or an underage orphan who is unable to earn money.
3. Not individually own other property.
4. Undergo medical examination.

Over the years the Government had exempt the beneficiaries of the Popular and Free Housing from paying the rest of their loans. This happened in 1972 and 1992. And in 1982 the Government increased the furniture grant from QR 10,000 to QR 20,000.

3.4.3 Senior Staff Housing

The Government of the State of Qatar issued a decree on the 14th of February 1977 to regulate and control the financing of building housing projects for senior officials of the government. The law was entitled Senior Staff Housing (SSH). The first article of the decree states *"the aim of the law is to provide houses to senior staff by granting real estate loans."* Among the other programmes, SSH is the most regulated housing sector.

The beneficiaries from this programme must:

1. Be working for the Government or companies that the Government owns at least 50% of their shares. And if both the husband and the wife work for the government, then they can only benefit one house.
2. Be a senior staff government employee (at least at the fourth degree of the second circle of the employment system of the government).
3. Not benefited from another housing finance programme.

Every fiscal year, the Ministry of Finance will assign a budget for SSH projects. Qatar National Bank manages this budget, as well as representing the Government in the contract. Upon signing the contract, the Bank will finance the beneficiary (from now on called "the client")with a free-interest loan of QR

600,000 (approximately US$ 165,000/Feb. 1999) to build a house. The client will return this loan on a monthly basis for a period of about 25 years.

The clients are eligible for furniture grant of QR 50,000 from the date they acquire their houses. They are also exempt from repaying 20% of the loan. As far as the return of the loan, monthly instalments are paid to the Bank. The amount of instalment is 30% of the basic salary of the client but it must not be less than QR 1,000, or more than QR 2,000. Similar to Popular Housing, in the case of total disability or death of the client, he or his family is exempt from paying the rest of the loan.

For all of the above housing programmes, popular, free and senior staff housing, the clients must settle in their houses and they are not entitled to rent them except after obtaining the permission of the Finance Minster.

3.4.3.1 The Marathon of SSH

For a typical client, it will take him eight to ten years from the day he applies for land from the government to the day he receive the keys of the house. Figure (3.3) shows the SSH procedure.

3.4.3.1.1 Applying for Land

The SSH decree states that every beneficiary has to have a piece of land for building the house. In this matter, the decree requires everyone who qualifies for SSH funds to apply for land from the Lands Department. In order to get the land, the qualified person will have, generally, to wait from three to four years. This is because the amount of funds that the government can provide for

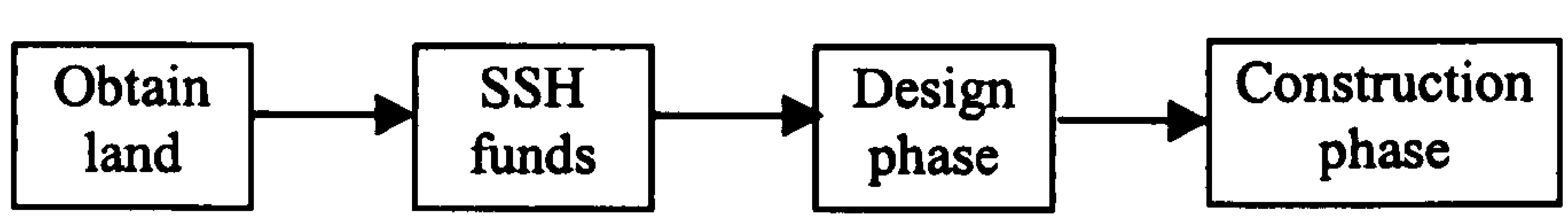


Figure (3.3): The process of SSH
Source: Al-Derham, et al. (1997)

planning and distributing among the applicants is less than what is required. As Qatari citizens want to have detached houses for more privacy, which means that the horizontal expansion of land is required. The plot costs the government about Q.R. 350,000 for land that has an area of 900 m^2. In order to overcome this problem the government gave qualified persons the right to buy land and would provide the owner with a lump sum of Q.R. 100,000, as compensation, provided that the land to be purchased is not less than 900 m^2. Whichever of these ways the land is obtained, the owner of the land cannot resell it for ten years.

3.4.3.1.2 The Funding Phase

After obtaining the land the client will apply for a loan from the bank. The SSH decree gives the bank the right to issue the laws that regulate the funding procedures, supervise the payments process, make sure that the money is used for its proper purpose, and collect the instalments. In this aspect the bank requires that the client pawn (mortgage) the title deed of the land. The client, then, has to wait for his turn, which usually takes a further three years.

3.4.3.1.3 The Design Phase

The SSH decree requires that the applicant for the loan provides a complete set of drawings of the house, before acceptance of funding the project is given. This means the separation of the design phase from the construction phase.

When the client's turn comes he will employ a designer to design the house. Upon completion of the drawings the designer will go to the Urban Planning Department at the Ministry of Municipality to obtain the building permission.

3.4.3.1.4 The Construction Phase

When building permission has been given the client will enter into the tender phase. The client will choose the contractor by either selected tender or open tender. After the selection of the contractor the client will sign the contract with the contractor. The client will take all the drawings, together with the contract for the construction of the project to the bank so that they can be reviewed by the bank's engineer with a view to securing approval. Upon approval by the bank, the client will sign the contract of funding for the project with the bank.

The loan will be given to the client through twelve payments during a period of two years, and these payments are subject to the completion of the different phases of the construction of the project and upon the approval of the bank's engineer. The client can choose any applicable method for constructing the house, as long as there is a separation between the design phase and the construction phase. That is because the bank requires all the drawings to be available before signing the contract of funding with the client. The most common procurement methods for this type of housing are the traditional and management contracting approaches. Construction management procurement approach is becoming more popular as well. During the construction phase, the

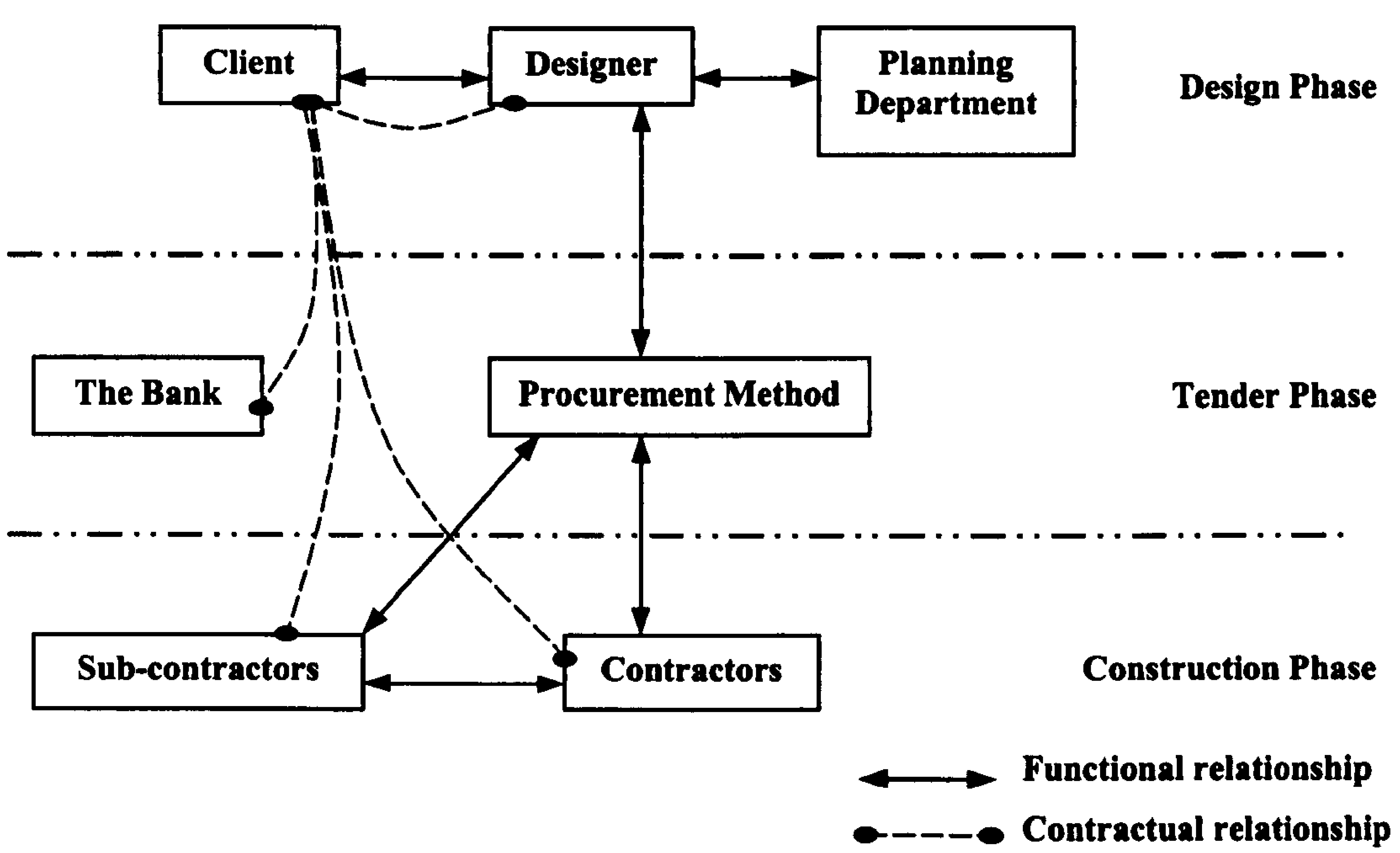


Figure (3.4): Functional and Contractual Relationships of SSH Project
Source: Al-Derham, et al. (1997)

role of the designer and the resident engineer will depend upon the selected method of procurement. Figure (3.4) shows the functional and contractual relationship between the different parties involved in the process.

3.4.4 Private Housing

Private Housing projects are those that have been initiated by individuals and procured and financed with out the help or the interference of the Government. Private housing (PH) projects in Qatar vary in size from large palaces to small houses, and from villas to apartments, for commercial and/or private use. It includes individual developers, as well as estate developers. The building process of PH is similar to the SSH process. However, they are not influenced by SSH and funding regulations, furthermore PH clients can use other procurement methods such as design and build.

3.5 Problems with the Current Government Housing Schemes

The Planning Council report of 1993 states:

1. The shortage of financing new SSH projects to the point that on some occasions giving loans have stopped completely, even though all the required approvals for obtaining the loan were completed.
2. The shortage of available land for house building, which led to a shortage in granting lands. There were real difficulties in completing the infrastructure services for planning new lands.
3. The multiple government departments and authorities that deal with the procuring of the SSH with the absence of sufficient coordination between them. This lack of coordination led to repetition and duplication of works and the unnecessary long procedures. The lack of harmony between the different departments leads to the waste of a lot of effort and time, as well as, loss of national resources.

4. The insufficient engineering supervision of the buildings during construction, which leads to decreasing the output quality of SSH.
5. There is no plan for the future housing needs in Qatar and the way to provide them.

Beside the above setbacks, the amount of the SSH loan has not increased since 1982. At the beginning of the decree in 1977 the loan was QR 500,000, and increased to QR 600,000 in 1982. Since then the loan was fixed although cost of housing construction increased due to inflation.

Figure (3.5) shows the value of the SSH loan at current year and the value of the loan at 1977 value with respect to inflation rates. The figure clearly shows that the value of SSH loan in 1997 equals two thirds of its value in 1977. In other words, because of inflation, clients need over QR 900,000 in 1997 to buy what they used to buy in 1977 with QR 500,000. This fact will reflect on the adequacy of the current amount of SSH loan for building house with the appropriate standards.

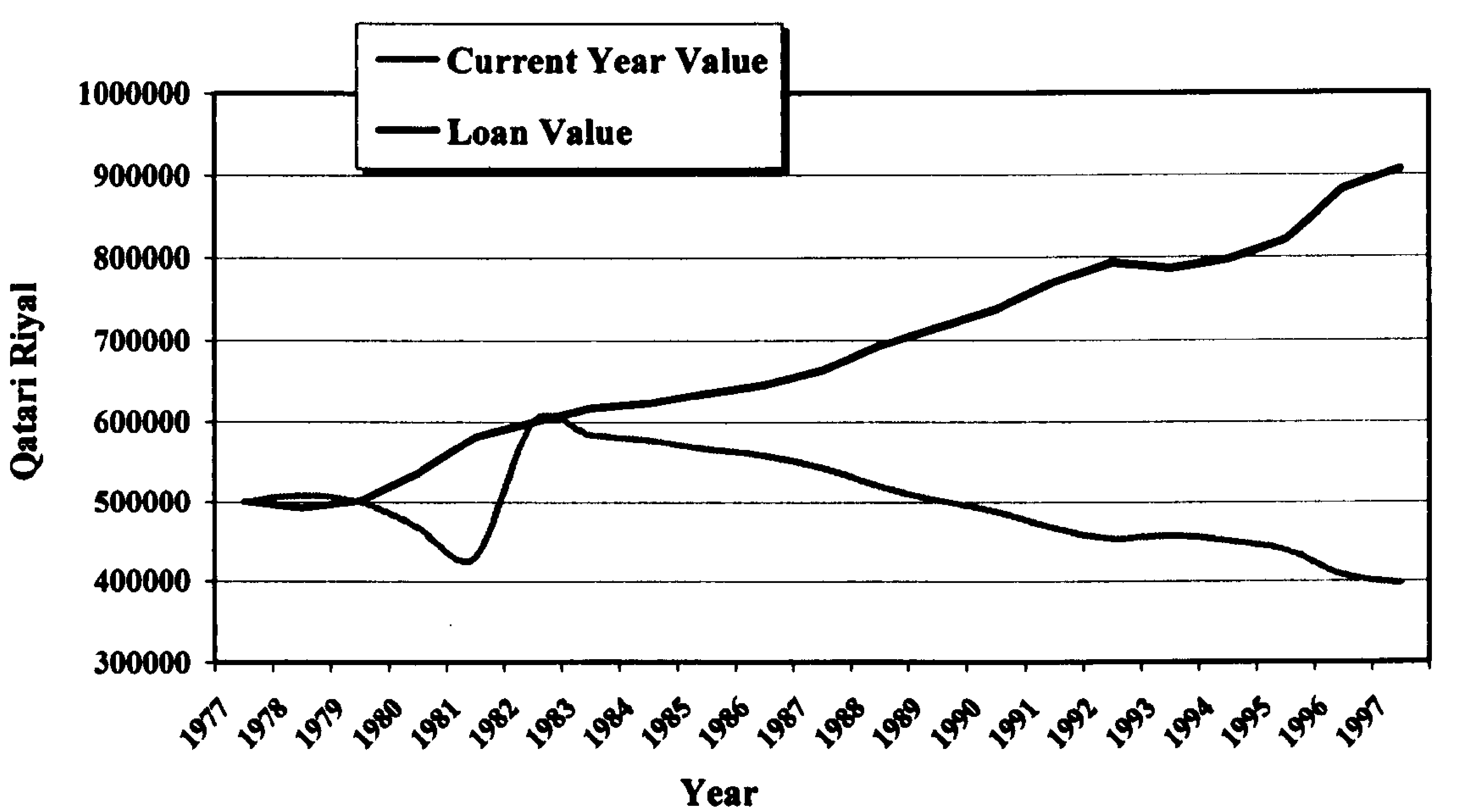


Figure (3.5): SSH Loan Values

3.6 HOUSING NEEDS IN QATAR

From the census that the Central Statistics Organisation provide from time to time, the number of the Qatari families can be identified. And by comparing it with the number of occupied houses, the number of new houses required can be estimated.

Their lists with the specialised department indicate the number of the applications for housing through the help of the government, but these lists are not constant, and generally they are increasing, with the waiting lists getting longer.

There are a number of reasons that create housing problems in Qatar, some of them include:

1. The population in Qatar is rising.
2. The continuous increase of foreign employment, and some of them bring their families with them, which means an additional rising population. This addition means providing new housing that needs new infrastructure, which will put more pressure on the budget assigned to housing.
3. Changing the old dwelling units with new ones as the life cycle of buildings in Qatar is relatively very short due to improper use of construction materials and lack of good maintenance.
4. The increased number of new families who want to live in independent houses, instead of where successive generations live in one house.
5. The increasing number of university graduates.
6. The existing waiting lists for housing.

A report published by the Supreme Planning Council (1993) highlighted some of the factors that decrease the amount of housing available in the market. These factors are:

1. The continuous rising cost of lands assigned for housing projects. The government purchasing of certain lands and buildings for re-planning reasons escalated this phenomenon.
2. The rising cost of the technical and engineering activities that prepare the studies and designs and then execute and supervise.
3. The inflation of the construction materials, where most of them are imported from other countries, and even the materials that are produced locally, such as cement and steel, has raised the construction costs.
4. Shortage of skilled labourers, the majority of them are foreigners. Recruiting skilled labourers means using agents that escalates the cost. This rising cost in labour increased the cost of building.
5. The weakness of the channels of financing housing projects for the needy ones and the high interest rates with the high conditions for paying the loans plus the difficult guarantees for the non-government employees.

Therefore, it can be seen that the rising cost of the elements of constructing housing projects, such as land, materials, and labour, makes it very difficult for the citizens to build without the help of the government. This later fact reduces the available housing on the market for ownership. The gap is also widening because of housing replacement.

3.7 Financial Obligations Toward Government Housing Schemes

Tables (3.1) and (3.2) illustrate what have been completed in the past, numbers of waiting lists and government financial obligations toward these lists.

The tables show clearly that financing government housing schemes under the current system can not fulfil the existing applications. The problem will turn into crises in the near future as the number of new applicants increases and government revenues decrease due to the fall of oil prices.

Table (3.1): Number of distributed Popular and Free Houses and financial obligations toward new applicants

	Housing Scheme	Number	Cost*
Houses distributed since the beginning of the scheme in 1964 till October 1991	Popular Houses	9,258	
	Free Houses	1,230	
Applications waiting for government financing	Popular Houses	3,677	1,088
	Free Houses	768	138
Government financial obligations		4,445	**1,226**

* In QR millions
Source: Fax from Ministry of Labour, Social Affairs and Housing dated 12/9/1992

Table (3.2): Number of distributed Senior Staff Houses and financial obligations toward new applicants

		Number	Cost*
Completed houses since the beginning of the SSH scheme in 1977 to October 1998		4,214	2,317
Houses under construction		941	269
Applications waiting for government financing	Before 1996 list	275	151
	1996 list	757	423
	1997 list	503	273
	1998 list	419	234
Government financial obligations			**1,350**

* In QR millions
Source: Fax from Qatar National Bank dated 2/11/1998

The Supreme Planning Council study (1993) suggested that the government should establish a real estate bank and call it "Bank of Housing". The idea behind such a bank is to co-ordinate all housing programmes under one umbrella, as well as, to finance housing projects on a commercial basis. The government should provide the capital for the bank and pay the interest of the loans on behalf of the clients. Establishing such a bank has a potential interest for both the policy makers and policy implementers. Having said that, the government has postponed it till the capital for such bank can be provided.

3.8 SUMMARY

Housing is a basic human need, though it consists of various elements including the dwelling units, the technical and the social infrastructure.

Since the mid sixties the government of Qatar has been financing and procuring different housing schemes for its citizens, making it one of the best housing government support programmes in the whole world. These programmes are designed for all different groups of the society, including limited income, high income, elderly and widowed families.

By the nineties, the waiting lists for benefiting from the current housing schemes has increased due to the fall of government revenues and the increasing population. This has led housing planners in the country to call for the establishment of a housing bank. However, such an idea was not implemented due to lack of financial resources.

CHAPTER FOUR

4 PROJECT EVALUATION AND PERFORMANCE MEASURES

4.0 INTRODUCTION

In order to evaluate the effectiveness of housing projects some measures of performance are required. These measures need to reflect the objectives determined by the client at the commencement of the project and as such may vary from one client to another.

However, a review of the performance measures adopted in previous research, reported below, will serve to indicate the scope of the topic and provide a basis for the choice of measures used in this research.

4.1 DEFINITIONS

Before attempting a discussion of the project evaluation, it is first important to define some of the key concepts in this chapter, in an effort to remove some of the ambiguity from concepts which are often subject to a wide range of individual interpretations.

4.1.1 Project

While almost everyone has had experience with projects in one form or another, developing a definition of what exactly a project is, is often difficult. In an attempt to establish a general definition for the term *project*, Pinto and Slevin (1988a) stated that any definition of a project must be general enough to include examples of the wide variety of organisational activities which managers consider to be *project functions*. However, the definition should be narrow enough to include only those specific activities which researchers and practitioners can meaningfully describe as *project-oriented*.

Two of the many definitions of projects that have been offered may be considered as follows:

> ***"A project is an organisation of people dedicated to a specific purpose or objective. Projects generally involve large, expensive, unique, or high risk undertakings which have to be completed by a certain date, for a certain amount of money, within some expected level of performance. At a minimum, all projects need to have well defined objectives and sufficient resources to carry out all the required tasks."*** (Steiner, 1969) p. 498

The second definition is offered by Cleland and Kerzner (1985), in their work *A Project Management Dictionary of Terms*, and includes the following characteristics:

> ***"[A project is] A combination of human and non-human resources pulled together in a temporary organisation to achieve a specified purpose."*** p. 199

A project, then, can be defined as possessing the following characteristics:

- A specific, preordained goal or set of goals.
- A defined beginning and end (specified time to completion).
- A series of complex or interrelated activities.
- A limited budget.

4.1.2 Evaluation

Evaluation is the interpretation of results of monitoring by comparison with targets (Beaumont and Libiszewski, 1993). The term evaluation contains the word "value" and thus, as project evaluations must state explicitly whose values are referred to in a given case. An evaluation must also state whose values are used as the context within which performance will be tested (Preiser, 1994). A meaningful evaluation focuses on the values behind the goals and objectives of those who wish their projects to be evaluated, or those who carry out the evaluation.

4.2 PROJECT EVALUATION

Construction project evaluation is one of the most important parts of project management. It is the technique to review the current status of the project against the plan and to provide practical, comprehensive and forward looking recommendations for corrective action where necessary. In general terms project evaluation considers:

- project objectives in terms of cost, time and quality;
- management;
- organisation;
- suitability of contracts;
- performance of consultants and contractors;
- work to date in terms of cost, time, and quality.

Though project evaluation can be used from the approval stage (by evaluating the chosen option against the objectives in the appraisal) throughout the project's life, ending with the post-project evaluation and occupancy review (see figure (4.1)). Every construction project can be visualised as a series of steps requiring a variety of technical skills to manage inherent risks.

Initially objectives must be defined and options for achieving them generated and evaluated before deciding which option should be implemented. Project evaluation techniques provide the sponsor with an additional means for controlling and monitoring the progress of a project (C.U.P., 1993).

It is worth noting, at this point, the argument developed by Ducasse (1929), who suggests that:

> ***"Any standards of evaluation cannot themselves be evaluated, except in terms of some standard not itself in any way vindicated but only dogmatically laid down. And any standard evaluated in this manner may itself equally well be laid down in turn as absolute, and be used to evaluate the standard, which before was evaluating it."***

"Evaluation" is usually taken to be the post-project assessment of a completed project, as opposed to "project appraisal," which is its pre-project feasibility assessment. "Monitoring" refers to reviews of ongoing projects in this semantic hierarchy (Overseas Development Administration, 1988). It is important to note the term "evaluation" in this research is concerned with post-project (project outcomes) evaluation only.

There is a wide range of people who can claim to have an interest in evaluating the outcome of a project. The client's evaluation has a particular status but the participants in the process of producing the project, e.g. architect, contractor and so on, also can lay claim as, of course, can the occupants and the end users.

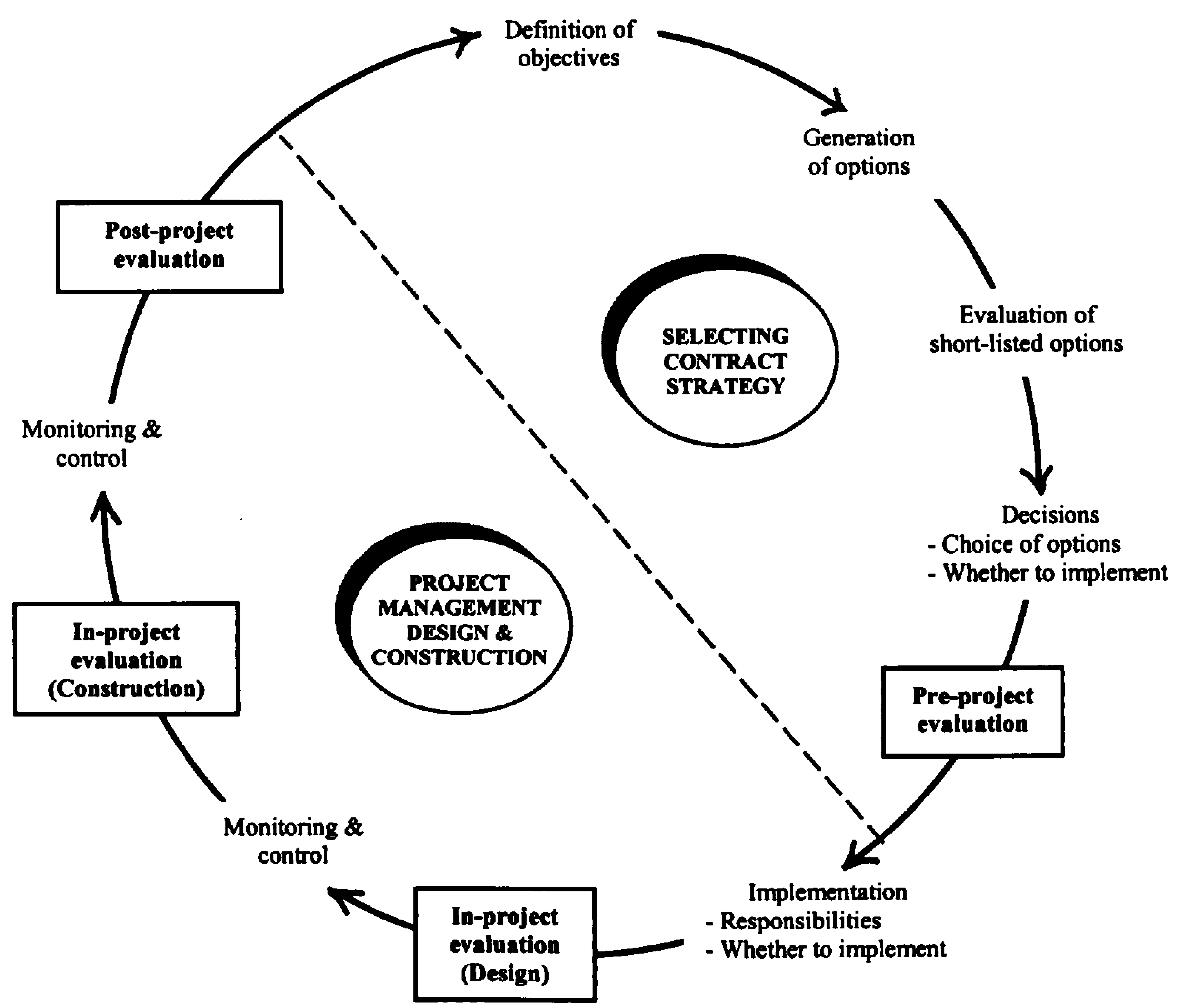


Figure (4.1): The Project Cycle
Source: C.U.P. (1993)

Preiser (1994) developed a concept to evaluate the performance of buildings. This concept is based on the assumption that a building is designed and built to support, even enhance, the activities and goals of its occupants. Performance evaluation and feedback as shown in figure (4.2) relates the goals and performance criteria to the objectively and subjectively measurable effects of buildings on people. The concept embodies two features. The first feature is that everything shown in the shaded area is dependent upon the relativity of person/environment relationships. For example, the same building and its physical attributes, which can be objectively measured and described, may be perceived by the same people differently at different times, or differently by different people at the same time.

The second feature is that the evaluator is inside the shaded area, implying again the relativity of perceived building performance. The evaluator is the driving force of the evaluation system, and thus, he/she introduces biases, he/she sets the scope of the evaluation, and he/she presents the findings to the client.

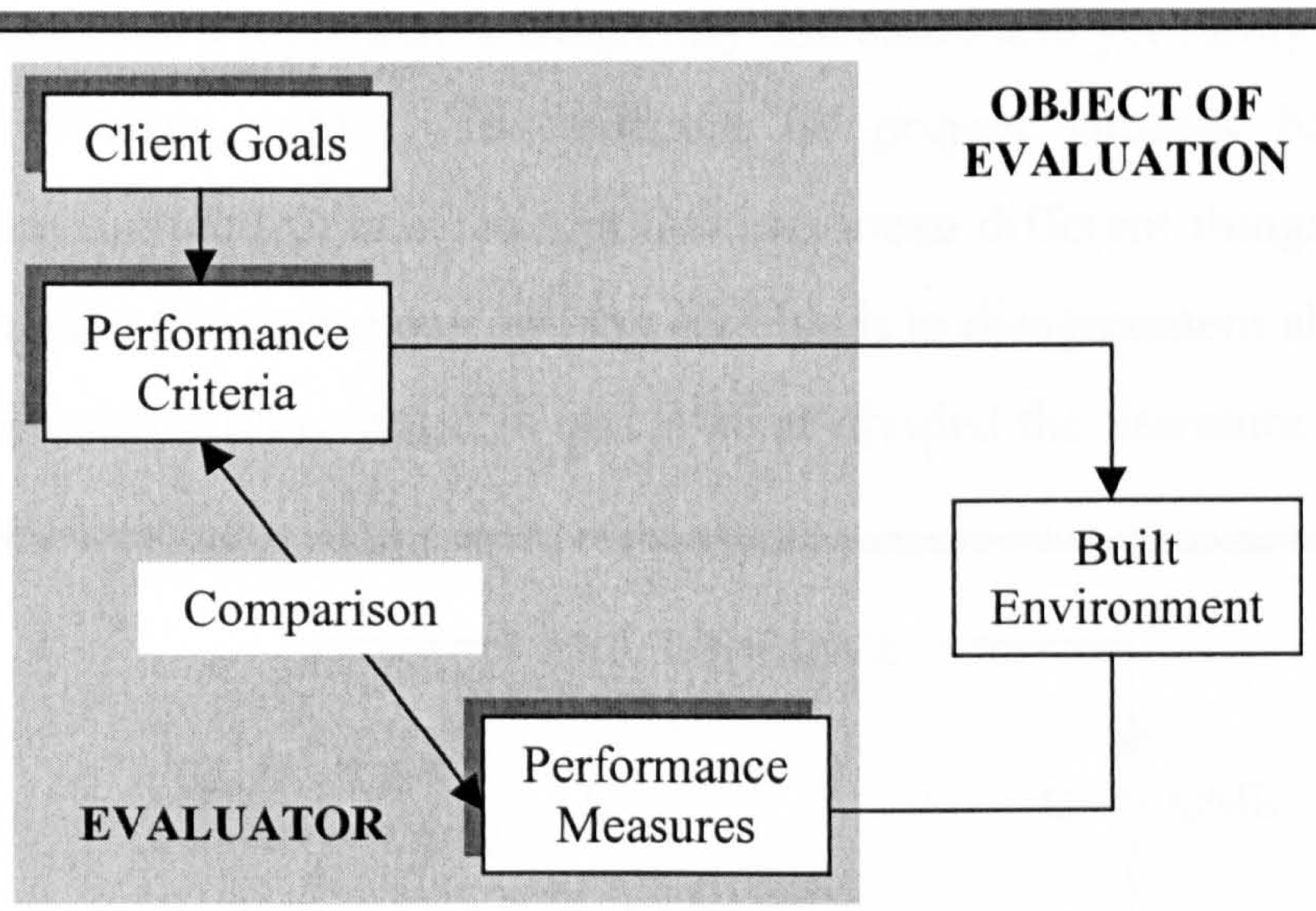


Figure (4.2): The Performance Concept
Source: Preiser (1994)

Figure (4.3) illustrates the behaviour-performance-outcome (B-P-O) cycle, which is well established in industrial/organisational (I/O) psychology for examining how people formulate goals, evaluate performance and perceive outcomes. This framework was adopted by Liu and Walker (1998) for evaluating construction project outcomes.

Liu and Walker argued that in order to understand how evaluation of a project outcome occurs, a framework for modelling the discrepancy is required. Project outcome often is referred to loosely as a project success (or failure). However, the cycle of defining the project's objectives and converting them into a brief, the actual acts (behaviour patterns) of the members of the project team which by their performance (e.g. designing, contracting) create a product (the project), the outcome of which is evaluated. Performance evaluation is the term for describing performance strengths and weaknesses within and between individuals (Landy, 1989).

4.3 PROJECT SUCCESS

Project success is a topic that is frequently discussed and yet rarely agreed upon (Liu and Walker, 1998). The concept of project success has remained ambiguously defined. It is a concept that can mean different things to different people because of varying perceptions, and leads to disagreement about whether a project is successful or not. Liu and Walker divided the literature dealing with

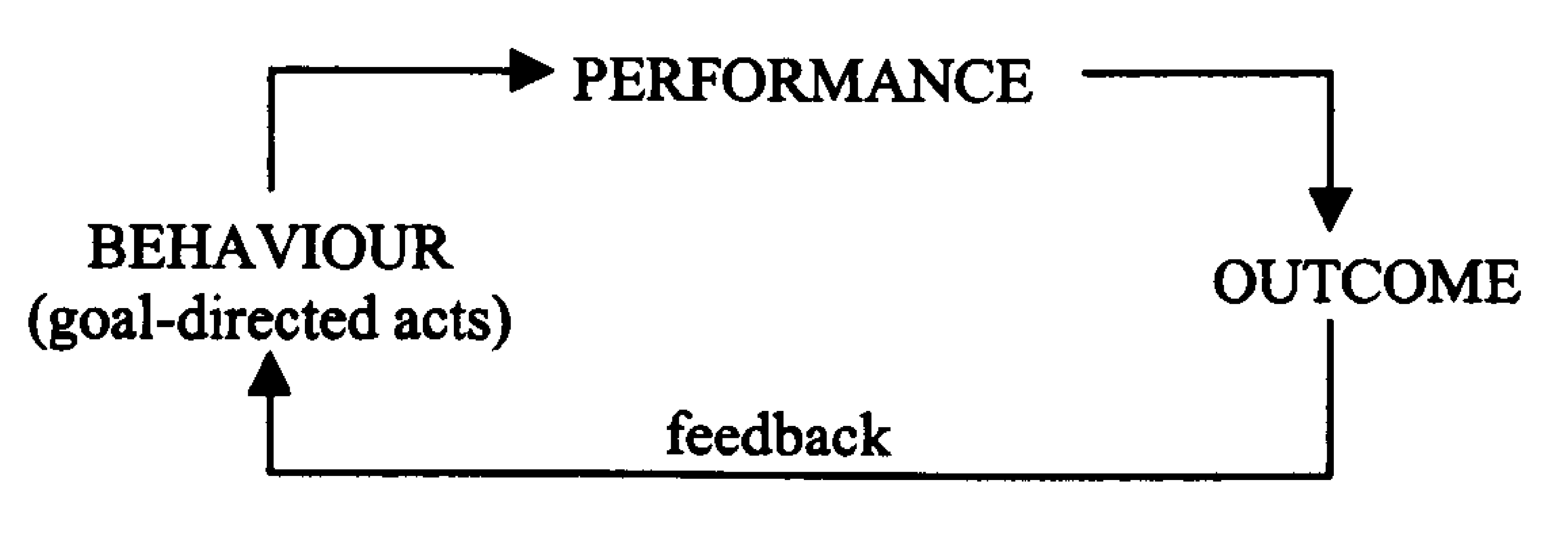


Figure (4.3): Behaviour-Performance-Outcome Cycle
Source: Liu & Walker (1998)

project success into three categories:

1. *Project goals:* commonly cited goals are those concerning budget (cost), schedule (time) and functionality/technical/quality specification (Gaddis, 1959; Avots, 1969; Olsen, 1971; Bromilow, *et al.*, 1980; Sidwell, 1982; Nahapiet and Nahapiet, 1985a and 1985b; Ireland, 1983; Morris and Hough, 1987; Tuman, 1988; Naoum, 1989; Betts, 1991; Trauner, 1983; Williams, 1993; CIOB, 1994; Handa and Adas, 1996; Kumaraswamy and Thorpe, 1996). Recent research has also included other aspects such as safety and environmental sustainability issues. However, these can be interpreted as subsumed under the project goal of quality.
2. *Satisfaction of the claimant(s):* An additional component for a successful project concerns the satisfaction of the demanders, for example, the client (Barrie, 1980; Bedell, 1983; Baker *et al.*, 1983; Ashley *et al.*, 1987; Lock, 1994; Pinto and Slevin, 1988a,b; Sanvido *et al.*, 1992; Ndekugri and Turner, 1994; Ahmed and Kangari, 1995).
3. *Perception and awareness of different claimant(s):* Project demanders with different orientation may have different views of what constitutes a successful project outcome (deCottis and Dyer, 1979; Trauner, 1983).

In the early 1980's Voogd started with research on multi-criteria evaluation techniques for spatial plans for large building projects (Voogd, 1983) The aim of the analysis is to find the best alternative from a set of alternatives given a set of evaluation criteria (Heijden, 1991). Multi-criteria analysis is used as a tool for ordering the decision process but not for making decisions.

A recent study done by Lim and Mohamed (1999) gives a more holistic perspective on how to define the success of construction projects. They argue that

> ***"... project success should be viewed from the different perspectives of the individual owner, developer, contractor, user, the general public, and so on. These perspective differences will explain the reason why the***

same project could be considered a success by one and unsuccessful by another."

Lim and Mohamed (1999) classify the perspectives of project success into two categories: the macro and the micro viewpoints. The macro viewpoint of project success will address the question: Is the original project concept achieved? This achievement depends on the users or the stakeholders. On the other hand, the micro viewpoint of project success will deal with project achievements in smaller component levels. It is usually referred to the achievement of project goals, which commonly include multiple parameters such as time, cost, performance, quality and safety.

Lim and Mohamed (1999) suggest that the sets of completion criteria and satisfaction criteria are sufficient to determine the macro viewpoint of project success, whereas the set of completion criteria alone is sufficient to determine the micro viewpoint of project success.

4.4 Client Types and Client Objectives

Numerous classification approaches of client types have been reported in the construction management literature. For example, Nahapiet and Nahapiet (1985a) considered that the needs of the clients are influenced by two important characteristics: whether they are 'primary or secondary constructors' and 'their level of project experience'. Masterman and Gameson (1994) suggest that clients should be classified according to their construction experience and whether they are primary or secondary constructors. When these two characteristics are combined, the following client types are created: primary experienced; primary inexperienced; secondary experienced and secondary inexperienced (see Table 4.1).

It is important to restate that this research is based around the performance of the housing projects as perceived by the client. Taking this as a reference point the following review indicates feasible objectives of the client. The fact that other building team members (i.e., client, designer, contractors) have different objectives is accepted and it is acknowledged that these objectives will affect relationships within the team, or coalition, and so modify performance. Nevertheless, what is being presented here is a definition of the frame of reference within which the research has developed.

Table 4.1: Masterman and Gameson's (1994) client type classification

Classification	Definition
Primary	Clients such as property developers, whose main business and primary income derive from constructing buildings.
Secondary	Clients from whom expenditure on constructing buildings is a small percentage of their turnover, and from whom buildings are necessary in order to undertake a specific business activity, such as manufacturing.
Experienced	Recent and relevant experience of constructing certain types of building, with established access to construction expertise either in-house or externally.
Inexperienced	No recent and relevant experience of constructing buildings with no established access to construction expertise.

Source: Masterman and Gameson (1994)

Wood (1975) notes that the criteria mentioned most consistently were: meeting the budget; low maintenance costs; time; cost; functionality. He adds that

> ***"A relatively complex amalgam of these components goes into the concept of value for money..."*** p. 105

Value for money is perhaps by the most important criterion for publicly accountable clients.

Bromilow (1974) succinctly states that in his opinion:

> ***"The most significant overall objectives in building operations are to define the design and specifications, price and timing of the proposed building, and, once they have been agreed by the client, to meet them."***

This simplicity does not necessarily exist in practice, however, as Sidwell (1982) admits of the fact that, despite the definition by the client of his objectives, the matter is complicated by "the degree of conformity between expectations, interpretation of the brief, and realisation of the project" all of which are functions of the client's, designer's and constructor's abilities and skills.

NEDO (1983) worked from the assumption that the key objective of certain industrial clients was speed of construction. This formed the basis for the research undertaken but other objectives were identified and formulated as priority ratings in "Thinking About Building" (NEDO, 1985) which was based on the 1983 research report. These objectives include:

- early completion of the project;
- need to make variations during construction;
- price certainty before commitment to proceed;
- level of quality in design and workmanship;
- price competition in choice of building team;
- division of contractual and professional responsibility;
- risk avoidance.

In discussing client's needs Ferry and Brandon (1986) relate the client's time and cost requirements to contractual arrangements. Time requirements range from no critical requirement and early completion unwelcome to shortest time (overall of construction work) and earliest start. Reliable guaranteed completion dates and provision for phased completion are also included as needs. Cost requirements follow a similar format and also include low maintenance costs, balance between capital and maintenance costs, cash flow, share in the risk of development and minimum capital commitment. Thus, predictability of cost/time, lowest cost and shortest time for sections or phases of the project are regarded as different objectives applicable to different clients and projects.

Ireland (1983) reviews a number of objectives found in the literature and lists over thirty different criteria. He points out (p13) that it is impossible to pay attention to all of these objectives and accepts for analysis, the objectives of:

- reducing time;
- reduced cost;
- increasing quality.

In a survey of 84 construction clients Baker and Orsaah (1985) found that the most influential factors which affect clients in choosing their contractors are:

- low price;
- company financial standing;
- company reputation;
- early completion date.

They also noted that most clients compromise their objectives to achieve what is most important to them.

Ashley *et al.* (1987) investigated the determinants of construction project success. They adopted six criteria to measure project success, four of which relate specifically to client objectives. These are: budget performance, schedule performance, client satisfaction and functionality.

Likewise, in a study of both construction and other types of project Morris and Hough (1986) adopts three measures of success, two of which relate specifically to client objectives. These are "Project Functionality - does the project perform financially, technically or otherwise in the way expected?" and "Project Implementation - was the project implemented to budget, on schedule, to technical specification?" Morris and Hough reported that both measures are important, as success or failure in one is independent of the other; the former reflects long term objectives of the performance of the facility in use and the latter the short term objectives of provision of the facility, as, when and how required. On the other hand Baker *et al.* (1983) concluded that adherence to budget, schedule and specification does not adequately define success and they develop a definition from their study of 650 projects for NASA which they termed "perceived success of a project". This definition included attainment of a high level of satisfaction from the parent, client, users and project team (also included by Morris and Hough) as well as meeting project technical specifications. They found that budget and schedule performance were not significantly related to perceived success or failure.

In evaluating the public housing projects in Singapore, Betts (1991) stated that:

> ***"... total building evaluation should be seen as the time, cost, and quality and the certainty with which these achievements may be made. ... Evaluation should be in terms of how it leads to the achievement of value for money in building procurement. We need an effective understanding of the trade-offs between time, cost and quality and ultimately a means of their integration."*** pp 988-9

In his PhD research Naoum (1989) stated that:

> ***"It is an axiom of construction management that a project may be regarded as successful if the building is delivered at the right time, at the appropriate price and quality standard, and achieving a high level of client satisfaction."*** pp 1

Love, *et al.* (1998) also stated that a project might be regarded as successful if the building is delivered at the right time, at the appropriate price and quality standard and provides the client with a high level of satisfaction.

Walker (1996:90) stated that the client's expectation at the very beginning of the project is to be fully satisfied with the outcome. The components of the client's satisfaction can be taken as a function, including aesthetics, price and time, and the client expects to get the building wanted at the price quoted, on the date promised. He concluded that whilst such criteria are typically used (Bresnen and Haslam, 1991), and are initially appealing they are not without difficulties (Ward *et al.* (1991) such as trades-offs of objectives, measuring goal attainment, goal setting and external factors.

In his final report, Latham (1994) stated that clients would commission projects that contribute to their wider objectives. He outlined that clients' wishes will also normally include the following:

- value for money;
- pleasing to look at;
- free from defects on completion;
- delivered on time;
- fit for the purpose;
- supported by worthwhile guarantees;
- reasonable running cost;
- satisfactory durability.

Chinyio, *et al.* (1998) evaluated 50 different project needs of UK building clients. The evaluation indicated that 'functionality of buildings', 'timeliness of completion' and 'value for money' were the most common aspects of needs for the building clients in the UK.

As Cossack (1991) contended, to decrease the duration of any project more money must be invested. Nkado (1992) argued, that if likely duration of various phases of the building process can be reliably and objectively assessed ahead of events then uncertainty will be reduced to the benefit of the client, and the management of the process. It is logical, therefore, that clients should establish realistic and achievable objectives.

The problem of multiple objectives becomes more complicated as the impact of competing groups, within a client body, and the change of objectives with time are introduced (Cherns and Bryant, 1984). It is obvious to say that it is not necessarily that all these objectives weight equally. The researcher is faced with the task of either assessing the changing objectives of each individual client body for every project studied, which effectively limits the size of the sample, or adopting universal criteria for every client and studying more projects. The adoption of universal criteria based on time, cost and quality of building projects has the added advantage of allowing comparisons to be made with previous research (Sidwell, Ireland, Wood, Graves, Rowlinson, Naoum) and so such a mechanism was chosen for this research. The details of the actual measures adopted are discussed in chapters 5 and 6 of this thesis.

4.5 PERFORMANCE MEASURES

Numerous studies have evaluated the effectiveness of construction projects objectively (time and cost), or subjectively (quality and client satisfaction). However, housing effectiveness can be defined as the relationship between the actual standards of the built dwelling (within its total context) and the level of satisfaction with it, set against the objectives and goals set down prior to building (within its cost and time limits) (Mustapha *et al.*, 1995). Most studies assess project performance by considering either objective or subjective measures, and few studies combined the two approaches by measuring time and cost objectively, and quality and client satisfaction subjectively.

Taking the criteria of time, cost, quality and client satisfaction as the basis for consideration, as discussed above, a number of different measures can be identified in the literature. These measures reflect different objectives and have been developed for differing purposes. They are reviewed here in order to provide the background to the choice of measures adopted in this research.

4.5.1 Time and Cost

Since the late 1960's, many researchers have explored the apparent relationship between the cost of a project and the duration of the project. In an extensive research programme spanning the 60's and 70's Bromilow led a team which investigated the performance of building projects in Australia. The work was painstaking, it took two years to collect the data in a consistent format

(Bromilow, 1974), but in 1974 some 370 building projects had been studied. Out of this data Bromilow derived an equation, which is still in use today.

Bromilow first expressed time as a function of project value in 1969. The formula used for time as a function of cost was given by Bromilow and Henderson (1977) as:

$$T = K.C^{B}$$

where T was the actual construction time in working days

C was the project value in millions

K was a constant characteristic of building time performance in Australia

and B was a constant indicative of the sensitivity of time performance to cost level.

From the above equation Bromilow developed models of the time, T, number of floor stories, N, and value, V, of variations and had begun work on a model to predict preconstruction time, P. These models were all a function of the cost, C, of the project. The relationships were expressed as follows:

$$T = 313\ C^{0.3}$$

$$N = 147\ C^{0.81}$$

$$V = 110\ C^{1.25}$$

$$P = 343\ C^{0.27}$$

Bromilow was seeking to develop a frame of reference within which to compare performance and produce a procedure whereby the timing of building projects could be planned more realistically.

His results showed that contracts overrun on cost by five per cent on average but by forty seven per cent on time, a dumbfounding figure. Only twelve per cent of all projects were completed on time. When assessing variations he found that the client had generated forty one per cent of all variations (Bromilow, 1970). Thus Bromilow made use of mathematical models of the relationship between cost and (1) preconstruction time; (2) time; (3) variations. These provided norms for the speed of the building process and the occurrence of variations. He also analysed overruns on cost and time that provided a measure for the accuracy of the industry's cost and time predictions.

Wood (1975) adopted a similar approach to Bromilow in the United Kingdom when analysing public sector contracts. He conducted a survey of 300 public sector clients which examined over 2000 projects in order to identify procedures leading to good and bad performance. Fifty in-depth case studies were conducted with 250 participants who certainly gave the data richness in its reported form. Although the statistics given are all descriptive the commentary adds a prescriptive narrative study. Time and cost yardsticks (calculations of overruns) were adopted to measure performance and forty per cent of the sample were found to have cost variances greater than five per cent (p 80). The average time overrun was over seventeen per cent with sixty per cent of projects overrunning by more than five per cent and more than thirty per cent by over twenty per cent (p 79). Wood also investigated alterations (variations), final account and retention as part of the survey.

Of direct relevance to Wood's study is Graves' report (1978), "Construction for Industrial Recovery", which was designed to make known the views of manufacturing industry on the performance of the construction industry. Graves reported that seventeen per cent were dissatisfied with the time taken from design to completion and eleven per cent of customers with recent construction experience were dissatisfied with the final cost of construction work (p 48). It is interesting to note here the use of subjective measures of time and cost performance compared to the objective measurements of Bromilow and Wood. Such measurements are less time consuming to collect but are opinions rather than factual data. Thus, although they may not reflect actual performance in physical terms, they do indicate compliance or otherwise with objectives that the client has set himself in dealing with the building industry. Grave's report also investigated satisfaction with the service provided by the construction industry in design and planning, the construction process and defect rectification.

The Slough Estates report (Mobbs, 1976), which compared construction performance experienced by seven development companies associated with Slough Estates in Australia, Belgium, Canada, France, Germany, UK and the USA, may well have been the spur for Construction for Industrial Recovery. Among the findings reported were that total time from inception to completion in the UK was at least seventy per cent longer than in any other country investigated in the study; preliminary design phases were more complex; prices in the UK were comparable to those in Europe but more than those in North America. This international comparison adopted the approach of comparing identical buildings, a very difficult point to determine, on the basis of actual times and costs of their production. Obviously, exchange and interest rates would have a significant influence on these comparisons of costs and a better approach may have been to consider labour, plant and material input to ascertain a surer comparisons of costs (Rowlinson, 1988).

From a study of 32 projects within the framework of his research model Sidwell (1982) noted that publicly funded projects were more costly and less timely than privately funded ones and that integrated teams were used for higher cost projects. Design and construct teams were associated with projects of short build times and short total times. In order to draw these conclusions Sidwell adopted "success" as a dependent variable. The success measures were subjective and objective, namely: client satisfaction on cost and time; overrun on cost and time; overrun in cost and on time as a percentage of the planned cost and time. Build rate (average turnover per month of the project) and design, construction and total times were also included in the analysis as project variables.

In his investigation of whether the means of procurement influence project performance, Naoum (1994) used ten factors to measure project performance: (1) Preconstruction time; (2) construction time; (3) total time; (4) speed of construction; (5) unit cost of building; (6) time overrun; (7) cost overrun; and client satisfaction with (8) time, (9) cost, and (10) quality. A theoretical framework was used to assist in comparing project performance in a case study sample of 39 management contracts and 30 traditional contracts. He concluded that in order to achieve project success, all the parties who are involved in the construction process need to match the various organisational forms to the client's characteristics, criteria, and priorities with respect to time, cost, and quality.

A massive survey of 5,000 industrial construction projects was undertaken in 1980-81 out of the 9,000 constructed each year, in order to compare procurement methods with respect to project time and was published by NEDO in 1983. These were used as the basis to analyse the time required to produce buildings within given cost ranges. Design build and management methods were picked out as providing projects up to fifty per cent faster than normal.

Study of a support document for the report by Beamish (1982) brings up questions about some of the figures in the main report however. Much of the data were collected from contractors quarterly returns which record work in progress and output and which are, in reality, estimates rather than factual data: the report points out the discrepancy between output recorded and value of new orders for the sample year 1980. Although contract price increases and a low level of orders compared with previous years are contributory factors to this discrepancy it is likely that mis-reporting could also be a contributory factor. All later conclusions on speed appear to be based on regression equations, for time as a function of tender price, derived from this data. This poses two problems: how accurate is the derived equation?; how certain are the researchers that, say, design build project tender prices are comparable to traditional tender prices for the same project? For example, design fees, not included in traditional tender prices, are likely to be reflected in design build tender prices. If the different procurement methods produce different tender prices one cannot say with certainty that a project is quicker than average based on these equations!

Project cost, building cost, construction time, project time, architectural quality and commercial quality are the aspects that Ireland (1983:94) identifies as likely to be affected by the use of managerial actions. Of these, Ireland found that project cost could not be measured satisfactorily and project time was not a reliable measure. Thus, in his analysis, four measures were used in hypothesis testing: architectural quality (a qualitative measure); construction time per square metre; building cost per square metre (excluding foundation costs); commercial quality (income per square metre). Contract variations per unit of building cost was also included, as a managerial action, in the analysis but data on this variable were only available for twelve out of twenty five projects studied. These measures were first investigated for the way that managerial actions affected them (using a correlation approach) and then substituted in regression equations in order to determine the magnitude of the effect that each identified action had on the measure.

Chan (1996) developed a model to facilitate investigation into which factors are important for achieving an outstanding project result and how these factors relate to project success. The model takes six main groups of independent variables, namely those that affect the client, the project, the project environment, the project team leader, the project procedure and the project management action. The impact and interaction of these variables determine project success. In order to measure the success of 110 projects, Chan used ten project performance variables. Namely speed of construction; percentage net variation; unit cost; client's satisfaction on time, cost, quality and functionality;

client's overall satisfaction; designer's overall satisfaction and contractor's overall satisfaction.

Other approaches to measurement of success can be envisaged. Productivity comparisons between different construction projects offer another alternative measure of performance and Griffith (1986) indicates how such data can be used to investigate the concept of buildability. He also indicates at least fifteen other "managerial and project oriented factors" which influence productive activity. Mohsini and Davidson (1986) adopt an interesting approach in their study of building team performance by measuring conflict as an indicator of the appropriateness of a procurement strategy. Wilemon and Baker (1983), in their study of behavioural dimensions in non-construction project management, see conflict as inevitable and measure performance in terms of the project managers ability to deal with this conflict. Might (1984) adopts a more conventional approach and uses the objective measures of time and cost overruns and four subjective measures of success - an overall rating and technical success related to: the initial plan; compared with other projects; the problem identification process.

4.5.2 Client Satisfaction

The term satisfaction is defined as the result of some comparison process in which expectations are compared with what is actually received (Czepiel, 1985). According to Mustapha *et al.* (1995) satisfaction exists when needs are being provided for and fulfilled.

The terms perceptions, attitudes, and satisfaction are related but have different meanings. The theoretical model of Schewe (1976) points out that perceptions are beliefs about an object and related objects. Attitudes result from evaluations of those beliefs. Satisfaction includes both perceptions and attitudes about an object and related objects. According to Allport (1935) satisfaction

"in a given situation is the sum of one's feelings or attitudes toward a variety of factors affecting that situation." p. 531

4.5.2.1 Studies of Client Satisfaction Outside the Construction Industry

Models of client (or customer) satisfaction (CS) processes have been well researched for consumer goods and services (e.g. Oliver, 1980; Churchill & Surprenant, 1982; Cadotte, *et al.*, 1987; Tse & Wilton, 1988; Brown & Swartz, 1989; Bolton & Drew, 1991; Halstead, *et al.*, 1994; and Spreng, *et al.*, 1996).

In accord with the findings of Churchill and Surprenant (1982); Tse and Wilton (1988); and Oliver and DeSarbo (1988) and as discussed by Yi (1990), client satisfaction is expressed as a function of pre-purchase (pre-service) expectations and post-purchase (post-service) perceived performance, both of which, in line with Rational Expectations Theory, are expected to have positive effect:

Customer satisfaction = f (expectations, perceived performance)

Tse and Wilton (1988) provide theoretical and empirical support for including the direct effect of perceived performance on satisfaction and suggest that it may actually have a stronger influence than expectations in determining satisfaction.

Much research has been dedicated to discovering effective ways to measure the customer's perception of quality. Examining expectations as a way to understand and improve service quality has been accepted for some time (e.g. Miller 1977; Swan & Trawick 1980; and Prakash 1984).

Expectation of service quality and satisfaction have been defined in various ways, but two major thrusts predominate. In the literature on satisfaction, expectations have been defined as predictions of what the consumer thinks he or she is likely to receive (Miller, 1977; Swan & Trawick, 1980; and Prakash, 1984). In contrast, in the service quality literature, expectations have been viewed as desires or wants of consumers. In other words, what the consumer thinks should be offered (Miller, 1977; Swan & Trawick, 1980; and Parasuraman, *et al.*, 1988). Researchers have also discussed other levels of expectations: Miller (1977) describes a minimum level of performance which he labelled as minimum tolerable expectations, and Parasuraman, *et al.* (1991) discuss a zone of tolerance between adequate service, and desired service (see figure (4.4)).

A conceptual model proposed by Zeithaml, *et al.* (1993) attempts to incorporate all of these concerns into one framework by specifying three different levels of customer expectations:

- desired service, which reflects what customers want;
- adequate service, the standard that customers are willing to accept;
- predicted service, the level of service customers believe is likely to occur.

From the literature discussed above it can be adduced that client satisfaction is the client's perception that the service provider's performance meets or exceeds his or her expectations.

4.5.2.2 Studies of Client Satisfaction in the Construction Industry

Construction clients are frequently disappointed by construction performance and the outcome has been a predominance of disputes and litigation highlighted by Sir Michael Latham's interim and final reports (Trust and Money 1993 and Constructing the Team 1994).

Figure (4.4): Service level expectations
Source: Parasuraman, et al (1991)

Morledge, *et al.* (1996) stated that

> ***"... it is frequently the expectations developed by, or for, the client which are unrealistic and unachievable, rather than the performance of the contractors themselves which is underachieved."***

They developed a graphical model from an analysis of the data collected by Building (1995) in their Gallup poll of 400 clients. The model facilitates more realistic construction times which will reduce the variance between time expectation and realisation. They argue that the successful completion of construction within realistic programmes or contract duration's may reduce disputes and increase client satisfaction.

The study of Ward, *et al.* (1991) identified that client expectations are frequently based upon either their own experience of similar works or on advice from specialist advisors. Furthermore, it was found that inexperienced clients are heavily dependent upon their advisors who propose a short completion time in order to persuade their client to go ahead with the project, or conversely, a long completion time to facilitate an easy pace and a claim of time saving on completion. France (1993) examined those issues and concluded that project managers should be more honest in their assessments and should recommend that more time is needed or that a start on site not be made until all preparation work is completed.

There are few established methods to measure client satisfaction in the construction industry. Ashley, *et al.* (1987) investigated the determinants of construction project success. In their pilot study, they concluded that successful projects emphasised planning effort, project-manager goal commitment, project-team motivation, project-manager technical capabilities, scope and work definition, and control systems. Six criteria to measure success were budget, schedule, client satisfaction, functionality, contractor satisfaction, and project-manager/team satisfaction.

A study by Wilemon and Baker (1983), on human factors of project management, shows that to attain high levels of perceived success (including client satisfaction), effective co-ordination and relations patterns are extremely important. Moreover, success criteria salience and consensus between client and project team are crucial. Ahmed and Kangari (1995) developed a model to predict factors affecting client satisfaction. In a survey of 101 client companies they have identified six factors: cost, time, quality, client orientation, communication skills, and response to complaints. In investigating the design and build procurement system, Ndekugri and Turner (1994) developed a client satisfaction index (CSI) which compares the client's satisfaction with cost and quality at the end of the project.

4.5.3 Quality

The word and concept of quality mean different things to different people. These differences have produced various interpretations of the term quality and innumerable definitions. In fact, quality has been given almost any interpretation that a researcher, writer, or a reader has cared to put on it. As a result, there is no consensus, either upon the definition, or upon the procedures used, to define and measure the quality of buildings.

The *Oxford English Dictionary* definition of quality includes the terms: *nature*, *character*, *kind* and *attributes*. The Building Research Establishment report (1978), in attempting to answer the question of quality related to buildings, defines it as:

> ***"The totality of the attributes of a building which enable it to satisfy needs, including the way in which individual attributes are related, balanced and integrated in the whole building and its surroundings."***

The BRE report considered quality in the context of three main aspects:

1. *External attributes:* the effect of the project on its surroundings and vice versa, such as appearance, compatibility and safety.

2. *Performance attributes:* aspects of the building that make it operationally efficient and provide reasonable conditions for users, such as size and layout of spaces, environment, security, safety, services, maintenance, longevity and adaptability.
3. *Aesthetics and amenity:* internal, such as comfort, and external attributes, such as landscaping, of a standard higher than is needed just to meet mandatory and performance requirements.

Quality also can be defined in four ways in construction (Winch and Schneider 1993, Winch *et al.* 1998):

1. *Quality of specification* refers to the technical standards set for the building and the level of finishes required. Fitness for purpose is the keynote here and techniques such as life cycle costing and value management are well developed quality management tools for establishing appropriate levels of specification.
2. *Quality of conception* in terms of elegance of form, contribution to the urban culture, spatial articulation and the like.
3. *Quality realisation* is determined by client review of the process, and those techniques associated with total quality management such as customer oriented organisational learning are most appropriate for managing this form of quality.
4. *Quality of conformance* concerns the manner in which the objectives set for conception, specification and realisation are met in practice. Here, quality assurance and control techniques are most appropriate.

Seymour and Fellows (1999) stated that the topology of approaches consider quality as "presence features" of a product or service, including fitness for purpose, functionality, appearance, maintainability and comfort. Whilst others consider quality as being an absence of negative factors including discomfort and ugliness.

4.5.3.1 Quality Evaluation

Quality is a subjective parameter. However, quality evaluation can be divided into three separate components, namely client/occupant evaluation of quality, aesthetic quality (the art in the design) and technical quality (as determined by the performance specification).

4.5.3.1.1 Post Occupancy Evaluation

The achievement of quality in any building project is recognised as a key factor that contributes to the ultimate success of that project (Bowler *et al.*, 1996). In order to investigate the level of quality achieved, feedback is required. A means of providing this data is the application of Post Occupancy Evaluation (POE) techniques in respect of the building being studied.

POE is a formal evaluation of a building by its occupants after it is completed (Becker and Sims, 1990). The focus is on user satisfaction. Preiser (1995) described POE as,

> ***"a new tool which facilities manager can use to assist in continuously improving the quality and performance of the facilities which they operate and maintain."*** p. 19

In an earlier paper he claimed that POE could be used to measure the functionality and appropriateness of design (Preiser, 1994).

In recent years a number of researchers and facilities management practitioners have begun to see the value of having standardised tools and measures that were valid and reliable and would allow for comparisons with other buildings (Zimring and Reizenstein, 1980; Preiser, *et al.*, 1988; Preiser, 1994; and Preiser, 1995).

4.5.3.1.2 Aesthetic Quality Evaluation

The subject of aesthetics has been of philosophical interest since the Greeks sought the ideal form (Ormerod, 1996). Aesthetic judgement generally involves making qualitative statements upon the object being assessed (Ormerod, 1995).

Most of the studies mentioned in the previous sub-sections assess quality by level of client's satisfaction, which is a subjective indicator. Measurement, however, usually involves comparative judgements based upon quantitative assessment. As Ormerod (1995) argues that any aesthetic judgement system must provide a mechanism to help decisions on the aesthetic merit of a particular building design. Aesthetic judgement techniques for buildings could be applied to evaluate unbuilt schemes as well as existing buildings.

Holgate (1992) refers to striking an optimum balance between *cost*, *efficient functioning* and *aesthetics*. Also, the term *aesthetic accountancy* is introduced to assess aesthetic merit but this is not pursued further probably due to scaling problems.

Another method for assessing aesthetics in architecture is that of critical statements (Beardsley, 1958; Holgate, 1992). Their work can be seen culminating in the six principles exemplified by Cantacuzino (1994). Critical statements, however, normally require an expert panel of judges, to interpret buildings into the defined categories.

The use of *mathematical formula* to arrive at an overall figure for aesthetic criteria is used as the basis for the Caudhill, Rowlett and Scott model for building appraisal (Brandon and Powell, 1984). This system is currently used by the Building Design Partnership (1980) for internally assessing projects at one of the following five stages of the design process: concept, outline proposals, scheme design, detail design and completion. The main objectives of the appraisal are to:

- maintain and improve quality in all BDP products;

- ensure that all projects satisfy a minimum BDP acceptable standard and compare well with achievements of other design practices;
- optimise opportunities inherent in any project.

The basis of this system is the criteria of:

- *Function:* how the building works for people and others;
- *Form:* what the building looks and feels like;
- *Economy:* maximum effect with minimum means in relating function and form.

The uses of the three criteria are to assess schemes on a scale of 1 to 10. Each criterion has a checklist of questions to aid scoring. By the use of a *quality quotient* formula these are converted into a single figure.

$$QQ = 0.433\,(a\,b + b\,c + c\,a)$$

where is QQ is quality quotient
a is function mark
b is form mark, and
c is economy mark.

The value of the quality quotient represents the area of a triangle of the criteria in they are set at 120 degrees to each other (see figure (4.5)). Differing buildings will produce triangles with different shapes and angles. The aim is to achieve a high quality quotient and equilateral triangle. The judgement of the building seeks to balance the three criteria, an uneven triangle will not achieve a good quality quotient. The criticism levelled at this method of evaluation has been on the de-motivational aspect to the design teams whose projects are not rated highly. This is due to the method being used in-house on several design teams. For housing projects evaluation research, however, this problem does not exist.

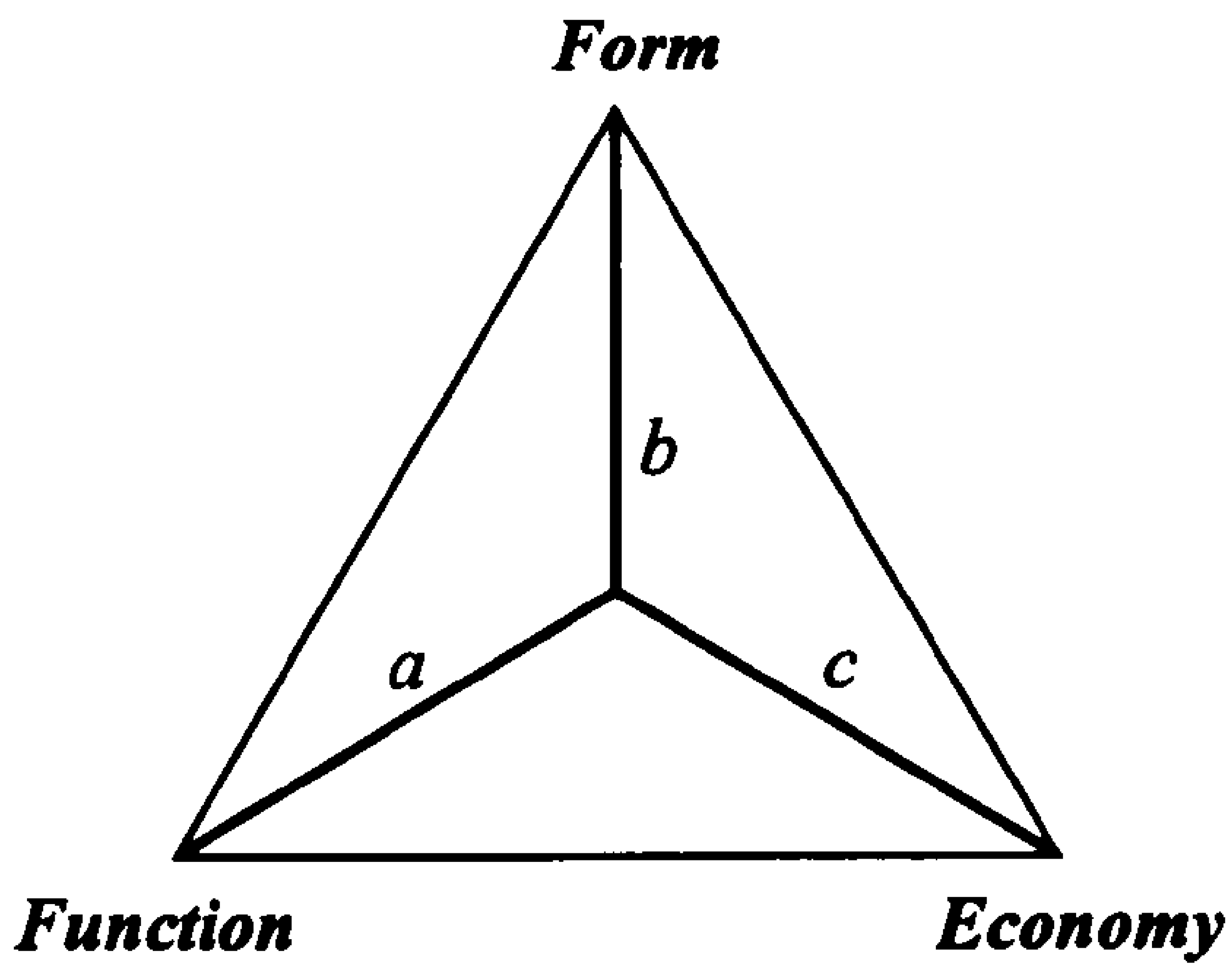


Figure (4.5): Quality Quotient
Source: BDP (1980)

There are assessment processes that incorporate some judgement of aesthetic elements as part of a more global assessment of the scheme. Such techniques as *value management*, *cost benefit analysis* and *whole life cycle costing* should include some aesthetic judgement (Ormerod, 1996).

4.5.3.1.3 Technical Quality Evaluation

The main objective method, which has been used in measuring technical housing quality, was noted by Morris *et al.* (1972), who classified three areas of housing quality:

1. Structural quality, which refers primarily to durability of the shell;
2. Service quality, which is concerned with the kinds of equipment, facilities, and conveniences which the house provides; and
3. The state of maintenance and caretaking.

Their measure of quality consisted of 26 items that measured these three identified areas. The resulting item scores were summed to provide a measure of housing quality.

Duncan (1971) presented a number of different models for measuring housing quality in the USA and UK. These vary considerably in their origins and dimension. To encompass a more flexible and practical approach, Duncan (1971) developed the housing and environment defects index (HEDI) which has been used in the Scottish Development Department. Similar to the work of Morris, *et al.* (1972), Duncan (1971) classified three dimensions to housing quality, which are:

1. basis of the house interior schedule;
2. basis of the house exterior schedule;
3. basis of the environment schedule.

This method involves a weighting scheme to distinguish between defects of greater and lesser significance so that the cumulative result can be meaningful and capable of comparison. Figure (4.6) illustrates the weighting pattern that was adopted by Duncan with a rating system ranging from zero to a maximum of 30 penalty points.

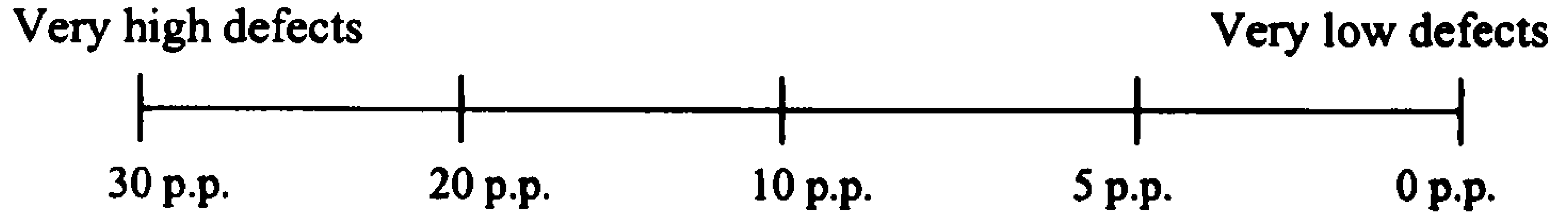


Figure (4.6): Duncan's Penalty Points Scoring System

During the last phase of writing this thesis the Department of the Environment, Transport and the Regions (DETR) in the United Kingdom in cooperation with the Housing Corporation was about to publish a set of Housing Quality Indicators (HQI) that seeks to address the issues of the overall assessment of the quality of housing (DETR, 1999). The HQI system allows key features of a housing project to be assessed in three main categories: location, design and performance. These categories produce 10 "Quality Indicators", which make up the HQI system that provides a profile of the quality of the housing scheme.

Implementing the HQI assessment will let potential developers and their designers to be able to make design decisions that result in higher quality housing with minimal cost implementations. Having said that the HQI system needs to be piloted on a wide range of housing schemes in the public and the private sector before it can be applied.

4.6 FACTORS AFFECTING PROJECT PERFORMANCE

A review of the literature has established that the performance of construction project is determined by numerous factors. Much of the literature has concentrated upon project scope as a useful predictor of construction time. Bromilow's seminal work (Bromilow, *et al.*, 1980) is widely cited and his ideas have been developed and extended by those developing construction time prediction models. While previous models have explained construction time by project scope measured by construction cost or gross floor area and numbers of floors (Ireland, 1983; Nahapiet and Nahapiet, 1985a and 1985b) there is wide spread acceptance that other factors must be considered.

A number of researchers have linked non-scope factors to construction time performance. Sidwell (1982) studied the impact of client decision-making upon the construction process and project success, and Ireland (1983) investigated the impact of managerial actions upon time, cost and quality performance in building. Both identified influences upon cost and project time performance from inception to completion and concluded that client experience, form of building procurement, and project organisational structure are elements of a complex causal model of project time and cost performance.

In reporting results from a study of 69 projects Naoum (1991) concludes that

> ***"... the major factors that affect cost and time overruns are the procurement method adopted and the designer's experience..."*** p.31

In 1982 the Department of Industry and the Department of the Environment in the UK produced a guide comparing the performance of traditional, management and design & build procurement systems against three cost criteria. Differences were not quantified but subjectively evaluated as "higher" or "lower" than the traditional procurement route.

However, Bresnen, *et al.* (1990) in a study of 138 projects concludes that there was only slight association between type of project or type of client, and construction time performance. Insignificant association was found between contract type and construction time performance.

In the same stream Masterman (1994) found no evidence, in two studies of clients' selection procedures, of cost differences being considered when choosing a building procurement system.

Parallels can thus be drawn with the investigation of the relationship between the building team, procurement method and project performance by Naoum and Mustapha (1994). Their investigation did not yield enough evidence to confirm the claim that alternative procurement methods shorten construction times.

Walker (1995a) in Australia developed a model that describes factors affecting construction time performance. In a 33 case study investigation he concludes that contract type does not affect the speed of construction. He revealed that several client related factors proved more significant, particularly, good construction time is primarily dependent upon the construction manager's aptitude to overcome environmental challenges of a physical and economic nature and problems emanating from communication breakdowns between the design team and the client's representative and construction manager. Walker (1995b) also found that the four factors affecting construction time performance and best practice world-wide were:

1. construction management effectiveness;

2. the sophistication of the client and the client's representative in terms of creating and maintaining positive project team relationships with the construction management and the design team;
3. design team effectiveness in communicating with construction management and client's representative teams;
4. a small number of factors describing project scope and complexity.

Kumaraswamy and Chan (1998) had also identified six factors that contribute to the delay of both building works and civil engineering works. These common factors are:

1. unforeseen ground conditions;
2. poor site management and supervision;
3. low speed of decision making involving all project teams;
4. client initiated variations;
5. necessary variations of works;
6. inadequate contractor experience.

Lim and Price (1995) cited the following seven factors identified as affecting overall construction productivity in Singapore:

1. buidability;
2. structure of the industry;
3. training;
4. mechanisation and automation;
5. foreign labour;
6. standardisation;
7. building controls.

Lim and Price also identified the following ten factors as affecting labour productivity:

1. quality, number and balance of labour force;
2. motivation of labour force;

3. degree of mechanisation;
4. continuity of work as affected by supply of materials, performance of other contractors or subcontractors, availability and adequacy of technical information, and variations;
5. complexity of project;
6. required quality of finished work;
7. method of construction;
8. type of contract;
9. quality and number of managers;
10. weather.

Of the above factors identified by Lim and Price(1995); Kumaraswamy and Chan (1998) stated that the apparent complexity is magnified when considering:

1. the possibilities of interactions between such factors affecting labour productivity; and
2. the fact that similarly complex networks of factors may simultaneously affect other factors productivities, such as that of equipment.

Maloney (1983) confirmed that labour has a significant influence in construction productivity, and management in turn, has a major impact on labour productivity. He identified sets of specific *driving*, *induced*, and *restraining* forces acting positively and negatively on productivity levels, and formulated approaches based on such forces to facilitate productivity improvements.

Beside the above factors, Hashim (1996) stated other factors that affect construction project performance. In a survey of 45 projects he stated that construction time was affected by location of site, delay in approval by the statutory bodies, inadequate detail designs by the consultants, long tender process (for traditional projects), approval for loans, purchase of land, and land conversion. Types of projects, size, nature of construction, level of quality standard of the building materials and complexity of the design affected cost of construction.

Nkado (1995) demonstrated the prioritisation of construction-time-influencing factors that can be incorporated in an information system, which could then help in planning project duration. He used 12 project related variables, such as gross floor area, to develop this particular model, but had also previously examined a total of 33 time-influencing factors that had been identified from the literature. From the latter, he identified the ten most important factors, including for example client and designer's priority on construction time. He also identified the ten least important factors from this set of 33, including for example the form of contract and its suitability for the project.

4.7 SUMMARY

The evaluation of construction projects, in general, and housing construction projects, in particular, is a diversified area of research. Views of project success and client objectives were reviewed. Many performance measures have been identified within construction management and in more general project management research. Whilst many focus on the objective measurement of cost and time performance, use is also made of subjective measures of these and other less tangible concepts such as quality, function and overall performance. The objective measurements can be made in terms of predictability of estimates (i.e. overruns) and also by comparison of absolute values with the sample, or population, norms (e.g. speed). Evaluating quality objectively is also reviewed, with some promising techniques especially in housing projects evaluation. The use of subjective measures is justified by the argument that they overcome, in part at least, the lack of data concerning individual, multiple and changing objectives.

CHAPTER FIVE

5 THE RESEARCH MODEL

5.0 INTRODUCTION

In the previous chapters attempts have been made to outline what is commonly referred to as "construction industry and housing provisions in Qatar". The previous chapter also identifies construction project evaluation and its related issues. Within the review a number of models have been discussed or alluded to. This chapter is devoted entirely to the development of a housing projects evaluation model.

A model forming a framework for the definition and ordering of data on a subject which it visualises and which allows separate occurrences to be compared. Thus, a model is a key element in determining the scope of the research, it points to those variables that must be considered or controlled on data collection and analysis. Echenique (1970) classified the model as can be made for prediction, description, exploration or planning, and can be either conceptual (i.e. mathematical model) or physical (i.e. architectural models). Fellows and Liu (1997) classified models as iconic, replications, analogues and symbolic. For research purposes, the more common forms of model are analogue and symbolic, whilst in the construction industry, iconic models and replications are usual.

5.1 CONTEXT OF THE MODEL

The research objective is to compare the outcomes of Senior Staff Housing (SSH) projects with the outcomes of Private Housing (PH) projects. This task is to be accomplished by setting out a number of performance criteria for the outcomes of SSH and PH projects. This research also aims to identify variables, and contingencies amongst variables, peculiar to the construction industry in Qatar, which affect housing project performance. Such research requires study of a number of projects rather than intense investigation of one or two case studies. The client's objectives and criteria are adopted as the frame of reference. Therefore, variables that deal with managerial actions done by the designers and/or the contractors are not included in the model.

It is important to establish a model for studying the complex determinants of any system. A model has to be set in order to be able to achieve the research objectives and provide a rational procedure for evaluating the effectiveness of SSH and PH projects in Qatar.

5.2 FACTORS AFFECTING THE OUTCOMES OF HOUSING PROJECTS IN QATAR

From reviewing the literature on factors affecting project outcomes together with the construction industry and housing schemes review in Qatar, factors affecting housing project outcomes can be categorised as follows:

1. ***Client characteristics:*** figure (5.1) illustrates the selected client characteristic variables that may affect the performance of the project and its outcomes.

Client Characteristics

- (H1) Age of client
- (H2) Educational level
- (H3) Monthly income
- (H4) Construction experience
- (H5) Previous place of living
- (H6) Years of marriage
- (H7) Family size
- (H8) Importance of cost
- (H9) Importance of time
- (H10) Importance of quality

Figure (5.1): Client Characteristics Variables

Land Acquisition

- (L1) Way of obtaining land
- (L2) Time for obtaining land
- (L3) Location of land
- (L4) Area of land

SSH Regulations*

- (S1) Heard of SSH regulations
- (S2) Read SSH regulations
- (S3) Time for obtaining SSH loan
- (S4) Read SSH loan contract
- (S5) Adequacy of SSH loan

Design Phase

- (D1) Way of selecting the designer
- (D2) Design cost
- (D3) Time of design
- (D4) Design domination
- (D5) Total gross floor area
- (D6) Employed project manager
- (D7) Type of project manager
- (D8) Percentage of design cost to final cost of the project

Disputes

- (P1) Dispute with the Land Department
- (P2) Dispute with the Bank
- (P3) Dispute with the designer
- (P4) Dispute with the Planning Department
- (P5) Dispute with the contractor
- (P6) Dispute with any sub-contractor(s)
- (P7) Dispute with any utility department

Construction Phase

- (C1) Procurement method
- (C2) Tender type
- (C3) Contract form
- (C4) Construction time
- (C5) Construction cost

Figure (5.2): Project Characteristics Variables
* Applies only to SSH projects

2. ***Project characteristics:*** these are factors that relate to the project itself and the way it effects its outcomes. Thus, project characteristics are made of five sub-categories: land acquisition; SSH regulations; design phase; construction phase; and disputes (see figure (5.2)).

5.3 Choices of Measures

Much research and the views of practitioners related to measuring effectiveness confirms the view that it should be a multi-determined measure (which includes objective and subjective measurement tools). As Walker (1996) states:

> ***"… in evaluating the outcome of projects, it is necessary to spell out the perspective being taken (e.g. use, owner, project team) and the criteria***

> ***against which the evaluation is being carried out. It also illustrates the problems and perhaps, inappropriateness of attempting to arrive at a single measure of the outcome of a project across all perspectives of a building."*** p. 245

Consequently, this research attempts to measure the effectiveness of housing projects by combining both objective and subjective indicators. Therefore, an in-depth analysis of these indicators is essential before any attempt to build such a research model.

Chapter 4 has identifies a wide range of project performance measures. These measures include both quantitative and qualitative measurements. Since the framework of this research is evaluating the outcomes of housing project, the end product, in Qatar, the research model will only use measure that assess the final outcomes of the projects. Thus, the use of novel measures such as labour productivity or conflict are rejected in favour of the use of the following measures:

1. (M1) Unit cost of building.
2. (M2) Cost overrun.
3. (M3) Speed of construction.
4. (M4) Time overrun.
5. (M5) Client satisfaction with time.
6. (M6) Client satisfaction with cost.
7. (M7) Client overall satisfaction.
8. (M8) Client rating on quality.
9. (M9) Aesthetic quality evaluation.
10. (M10) Technical quality evaluation.

The use of unit cost, speed rate, and time and cost overruns allows the identification of those projects on which performance is particularly good or bad. Measurement of aesthetic and technical quality evaluation allows identification that the project's resources of cost and time were properly spent.

The relationship between relative performance and quality evaluation can thus be investigated. The subjective measurements allow the fulfilment of objectives to be assessed whilst, among other things, avoiding the disturbing effect of post-hoc rationalisation of good or bad performance on the stated objectives. The measurement of these performance indicators is discussed in Chapter 6.

Quantitative and qualitative measures of housing quality will be used in order to complete the research model. This research will adopt the mathematical formula technique used by BDP (1980) for assessing the aesthetic quality of housing projects under investigation.

Duncan's method of assessing the technical quality of housing will be used in the current research with the necessary adaptations to fit the conditions in Qatar. This is achieved through a pilot study conducted on SSH and PH in Qatar and by talking to the residents to check the validity of indices developed by Duncan (1971).

5.4 The Research Model

It is evident that some of the variables discussed above should be measured by objective means, some by subjective means and some will include both forms of measurements. Justification for combining both objective measures and subjective measure within the proposed model is supported by Campell (1976) who stated that:

> ***"By themselves, objective indicators are often misleading and will remain so until indicators of the human being attached to them are obtained. Likewise, by themselves, subjective indicators are insufficient as guides to policy."***

In the present model it is therefore assumed that economy together with quality and satisfaction are to be considered as sufficient indicators to show the effectiveness of a housing project in meeting the clients' needs.

The research model, see figure (5.3), clearly shows that the effectiveness of housing project schemes is established by combining economy with quality and satisfaction (the major assumption in the definition of effectiveness), and includes the basic elements by which subjective and objective measurements are linked. The three principal model variables are:

1. ***Independent variables***: these are client and project characteristic variables.
2. ***Intervening variables***: these are the ten selected performance measures.
3. ***Dependent variables***: these are economy, quality and satisfaction.

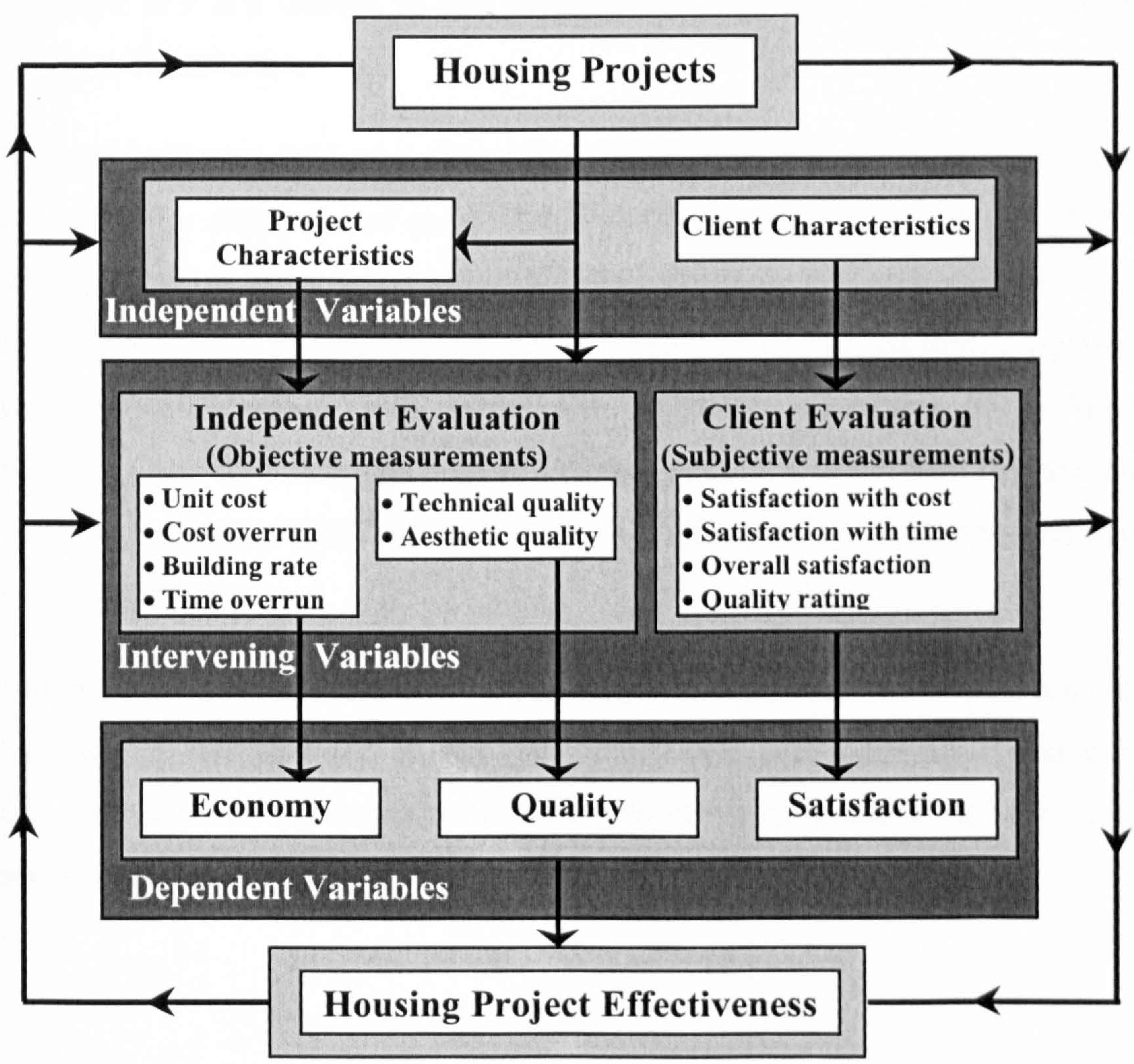


Figure (5.3): Research Effectiveness Model

The intervening variables are categorised under two groups:

1. ***Independent evaluation***: objective and subjective measurements.
2. ***Client evaluation***: subjective measurements.

The feedback loop presented by the left side arrows of the model indicates that the effectiveness of a housing project is subject to change when one of the elements of the model, at a given time and place and in a given environment, is changed. The flow of the right side arrows indicates that the project may have a direct effect on effectiveness beyond the control of other variables in the model. Thus, housing project effectiveness is dependent on a wide range of interrelated variables and any change in one of these variables will change the housing project effectiveness.

Implicit in the model is the notion that satisfaction with a housing project is related to the evaluation of many variables (see figure (5.1) and figure (5.2)). The satisfaction level is expressed by clients' subjective evaluation of their housing projects. Measuring the actual condition of the buildings (quality assessment), however, will assess the objective evaluation of building adequacy, and the researcher who is a Qatari national will do this. This should avoid any misunderstanding and misinterpretation between the researcher and the respondents.

Combining client satisfaction (a qualitative measure) with economy (a quantitative measure) and quality (both qualitative and quantitative measures) will then produce a measure of housing project effectiveness as defined in the previous sections.

CHAPTER SIX

6 RESEARCH METHODS AND TOOLS

6.0 INTRODUCTION

This chapter investigates the main research methods available to this study. It also gives an insight into the strengths and weaknesses of various research techniques and tools that could be used in order to select the most appropriate one. Results of the pilot study are discussed together with the influence of their outcomes on the formulation of the data collection techniques and methods. Finally, brief examinations of the statistical methods used in this research are presented.

6.1 THE SCOPE OF THE STUDY

The aim of this research is to establish how the implementation of the government policies may have an impact on the overall performance of housing projects. It also aims to determine the level of effectiveness of SSH and PH projects in Qatar.

Thus, the research will highlight the main problems that housing projects in the Qatari construction industry face today. The research will assess the effectiveness of SSH projects and Private Housing projects (PH), which are at the same level of SSH but are not covered by the SSH regulations, in the State of Qatar that were completed between 1991 and 1996.

The objectives of the research are:

- Exploring the construction industry in Qatar.
- Identifying the problems that face the SSH and PH in Qatar.

- Identifying and measuring the relationship between the selected project performance variables, housing regulations and funding procedures.
- Identifying and measuring the relationship between client's satisfaction, economy and quality of the housing projects in Qatar.
- Producing procurement guidelines for constructing houses more effectively.

As mentioned in section (3.6) and section (4.3), the determination of housing needs and project success should be based on the requirements and objectives of the consumers and their perception of need. In this respect the consumers' approach has been adopted, in which the clients' perception of their housing projects are considered of utmost importance, and hence become the focus of the analyses.

6.2 AN OVERVIEW OF RESEARCH MODES

The goal of a study can significantly influence a researcher's plan of action. In fact the research may have several goals. The goals might be the explanation of certain behaviour, the exploration of an unstudied topic, or the description of an event. However, these goals are not mutually exclusive. A research project may include one or all of them (Djebarni, 1993). According to Djebarni (1993), there are three main recognised modes of research: exploratory, descriptive and analytical. These modes are identified according to the goal of the research. Therefore, there is no best mode of research. The one type that achieves the desired objectives is the best.

6.2.1 The Exploratory Study

An exploratory study is one that has as its purpose discovery and understanding in a new area of research. Exploratory studies are useful in generating new hypotheses for future research. They are best applied when measurement techniques are not explicit or where no precedent exists. According to Djebarni (1993), "the exploratory [mode] is typically undertaken when … concepts and relationships between variables have not been established or tied to existing theory".

6.2.2 The Descriptive Study

A descriptive study aims to report an event, a phenomenon, or a situation and to describe the relevant interactions, conditions on occurrences and the units (i.e. clients, projects) involved. It does not attempt to conclude any relationship or to interpret any observations. The emphasis in such a study is to examine a phenomenon without regard to how the units might be tied together or what relationship they might have to each other.

6.2.3 The Analytical Study

An analytical (explanatory) study has as its target the explanation of certain events, or phenomenon. It goes beyond the simple description of events to find answers to all reasonable queries. Analytical research is based on the assumption that enough is presently known in an area of research to designated concepts, theory, hypotheses, variables and data collection techniques, and to begin addressing questions of association. Hence, this type of research involves examining a cause-effect relationship as it attempts to establish causality between two or more variables by the use of probability statistics (Dane, 1990).

6.3 An Overview of Research Methods

The importance of research method in any science can not be overemphasised. Concern with methods improves theory and measurement, and lends credence to research findings. Careful thought and planning in the preparation of the research methods, data collecting tools, techniques and measurements is very important for conducting research.

According to Yin (1994) there are several ways of performing behavioural research. They include histories, experiments, surveys and case studies. Each way has its particular advantages and disadvantages, depending upon three conditions:

1. the type of the research;
2. the control the researcher exercises on actual behavioural events;
3. the focus on contemporary as opposed to historical phenomenon.

Table (6.1): Relevant Situations for Different Research Methods

Method	Form of research question	Requires control over behavioural events?	Focuses on contemporary events?
History	how, why	no	no
Experiment	how, why	yes	yes
Survey	who, what *, where, how many, how much	no	yes
Case Study	how, why	no	yes

"what" questions, when asked as part of an exploratory study, pertain to all these methods.

Source: Yin (1994)

Table (6.1) illustrates research methods and its form in relevant situations. Given the fact that this study focuses on contemporary events and does not require control over behavioural events, only survey and case study methods are discussed.

6.3.1 The survey Method

According to Phillips (1967), the survey constitutes a method of data collection that utilises interview or questionnaire techniques for recording the verbal behaviour of respondents. The manner in which questionnaires or interviews are administrated may differ according to the circumstances and conditions of the field. The salient features of the survey method are as follows:

1. It is appropriate for collecting specific quantitative data.

2. It is feasible and relatively cheap.
3. Broad generalisations and inferences can be made from a small sample.
4. It offers greater possibility for replication. The user has prior knowledge of the answers likely to procured.

6.3.1.1 Interview Techniques

Interviews are one of the most frequently used of all data-gathering techniques. The interview can be thought as a continuum of types, in which the polar ends are structured and unstructured. The chosen form hinges mainly on the nature of research and the personality of interviewee.

6.3.1.2 Questionnaire Techniques

The questionnaire is a self-administrated interview. It requires self-explanatory instructions and effective question design since there is often no interviewer to help explain what may appear ambiguous to the respondent (Smith, 1981). In fact, questionnaires are different from interviews mainly in the way they are administrated. Self-administrated questions are referred to as questionnaires, while questions delivered face-to-face are referred to as interviews.

6.3.2 The Case Study Method

The case study usually involves the in-depth study of a specific setting rather than a random sample. The researcher relies on a repertoire of instruments to collect data including informal interviewing, the use of knowledgeable informants and participation in and observation of events as they happen.

According to Yin (1994), a case study is

> ***"... an empirical inquiry that investigates a contemporary phenomenon within a real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."*** p. 1

Some salient characteristics of the case study method are as follows:

1. It is appropriate for building up a qualitative contextual illustration of the setting.
2. It is appropriate for examination of complex social relationships and intricate patterns of interactions.
3. It offers richness of data in-depth and penetration in analysis.
4. The user has a limited prior knowledge of the setting.
5. Limited generalisation can be made of the data gathered.

6.4 THE RESEARCH HYPOTHESES

6.4.1 Exploring the Case Study Country

The major problem faced in this study was understanding the background of the housing construction in Qatar. There are no previous studies about housing projects, in particular, or even about the Qatari construction industry in general. In the field of construction and housing, it is believed that this study is a pioneering work. Much preliminary work had to be undertaken in order to prepare the background of the hypothesis of this research. These efforts mainly involved interviewing the people involved with housing projects, and/or construction activities.

There are two types of interviews in conducting any research:

1. *Exploratory interviews:* in-depth interviews, or free-style interviews.
2. *Standardised interviews:* these include unstructured, semi-structured and structured interviews. such as used, for example in public opinion polls, market research and government surveys.

The purpose of the exploratory interview is essentially heuristic: to develop ideas and research hypotheses rather than to gather facts and statistics. The job of the in-depth interviewer is thus *not* that of data collection but *ideas* collection.

It is essential for the exploratory interviews to be recorded on tape. In this way it is easy to be analysed in detail afterwards. Oppenhiem (1992) stated that a useful set of exploratory interviews can greatly broaden and deepen the original plan of the research, throw up new dimensions to be studied, suggest many new ideas and hypotheses, help to identify the variables to be measured, and signifies the differences, if any, between groups of respondents. The process helps to ensure that, despite the requirements of reliable measurement, we retain the qualitative framework of our respondents.

Thus, because of the nature of this research and to achieve its objectives it is important to adopt the exploratory type of interviews.

6.4.2 Formulation of the Research Hypotheses

Formulating the hypotheses is one of the major steps in the research process, as they constitute an important part in that process. Hypotheses may be divided into descriptive and relational types. In a descriptive hypothesis, the question asked deals with the distribution or occurrence of a given variable with no attempt to explore the relationships among variables. A relational hypothesis, on the other hand, seeks to know whether a given variable is related to another (Djebarni, 1993).

The main target of this research is the assessment of effectiveness level of Senior Staff Housing (SSH) and Private Housing (PH) projects, as a function of economy, quality and satisfaction. Therefore, these three factors were taken into account in this research.

The main hypothesis of this research project is:

> ***"Private Housing projects are more effective than Senior Staff Housing projects."***

Based on the theoretical part of this research, this hypothesis can be divided into three main hypotheses each with sub-hypotheses:

***Hypothesis one*: Private Housing projects are more economical than Senior Staff Housing projects.**

Sub-hypothesis 1.1: Private Housing projects have less unit cost than Senior Staff Housing projects.

Sub-hypothesis 1.2: Private Housing projects have less percentage of overrun in cost than Senior Staff Housing projects.

Sub-hypothesis 1.3: Private Housing projects have faster building rate than Senior Staff Housing projects.

Sub-hypothesis 1.4: Private Housing projects have less percentage of overrun in time than Senior Staff Housing projects.

***Hypothesis two*: Private Housing projects have better quality than Senior Staff Housing projects.**

This hypothesis is divided into two sub-hypotheses:

Sub-hypothesis 2.1: Private Housing projects have less technical defects than Senior Staff Housing projects.

Sub-hypothesis 2.1 is also divided into three sub-sub-hypotheses:

2.1.1: Private Housing projects have less interior technical defects than Senior Staff Housing projects.

2.1.2: Private Housing projects have less exterior technical defects than Senior Staff Housing projects.

2.1.3: Private Housing projects have less environmental technical defects than Senior Staff Housing projects.

Sub-hypothesis 2.2: Private Housing projects have better aesthetic quality than Senior Staff Housing projects.

Sub-hypothesis 2.2 is also divided into three sub-sub-hypotheses:

2.2.1: Private Housing projects have better aesthetic function than Senior Staff Housing projects.

2.2.2: Private Housing projects have better aesthetic form than Senior Staff Housing projects.

2.2.3: Private Housing projects have better aesthetic economy than Senior Staff Housing projects.

***Hypothesis three:* Private Housing clients are more satisfied with the performance of their projects than Senior Staff Housing clients.**

This hypothesis is subdivided into four sub-hypotheses:

Sub-hypothesis 3.1: Private Housing clients are more satisfied with the overall cost of their projects than Senior Staff Housing clients.

Sub-hypothesis 3.2: Private Housing clients are more satisfied with the total time of their projects than Senior Staff Housing clients.

Sub-hypothesis 3.3: Private Housing clients are more overall satisfied with the building process of their houses than Senior Staff Housing clients.

Sub-hypothesis 3.4: Private Housing clients are more satisfied with the quality of their houses than Senior Staff Housing clients.

6.5 DEFINITIONS AND MEASUREMENTS OF VARIABLES

6.5.1 Quantitative Measurements

6.5.1.1 Unit Cost (M1)

Was defined by the construction cost of the building divided by the square metre of gross floor area.

6.5.1.2 Percentage of Cost Overrun (M2)

Percentage of construction cost overrun for each project was measured by percentage increase or decrease on budget in Qatari riyals.

6.5.1.3 Speed of Construction (M3)

Was defined by the gross floor area in square metre divided by the construction duration in months.

6.5.1.4 Percentage of Time Overrun (M4)

Percentage of construction time overrun for each project was measured by percentage increase or decrease on the estimated programme in months.

6.5.1.5 Aesthetic Quality of the House (M9)

This research adopted the mathematical formula technique used by BDP (1980) for assessing the aesthetic quality of housing projects under investigation (see appendix B). The quality quotient for each house will be calculated by

$$QQ = 0.433\ \{(function)(form) + (function)(economy) + (form)(economy)\}$$

Where function, form and economy consists of 6, 4 and 4, respectively, individual characteristics, each item were given a scoring point ranging from 10, perfect, to 1, complete failure. The averages for function, form and economy were used for the formula to obtain the quality quotient (the aesthetic quality). Quality Quotient Value scale, derived from the Characteristic Value scale, thus becomes:

Table (6.2): Quality Quotient Value

	QQ Score
Perfect	130
Excellent	105
Very good	83
Good	64
Fair	47
Acceptable	32
Poor	21
Far below acceptable	12
Critically bad	5
Complete failure	2

6.5.1.6 Technical Quality of the House (M10)

Duncan's method of assessing the technical quality of housing was used in this study (see appendix C). Table 6.3 shows the components of technical quality evaluation and the maximum penalty points for its defects.

Table (6.3): Technical Quality Components and its maximum penalty points

	Maximum Penalty Points
Interior	230
Exterior	385
Environment	150

6.5.2 Qualitative Measurements

Client satisfaction with cost (M5), time (M6), overall satisfaction (M7) and client rating on the overall quality of the house (M8) are the main qualitative variables of this study. However, since this study is the first of its kind dealing with housing projects in Qatar, clients were asked to rate their level of satisfaction with the parties and phases of the project. Clients were, also, asked to rate the quality level of their houses.

Three scaling methods are used in social sciences, namely the Thustone, Likert and Guttman scales (Oppenhiem, 1992). As the qualitative measurements in the analysis of the effectiveness of housing projects under study are ordinal, the most appropriate scale to use is the Likert scale, which is widely used in the professional literature. In this scale, generally, five categories of responses are provided for each item (measure). In the current work these are: very dissatisfied, dissatisfied, neutral, satisfied and very satisfied. In this five point continuum, weights of 1, 2, 3, 4 and 5 are assigned, whereby 1 is assigned for very dissatisfied, 2 for dissatisfied, 3 for neutral, 4 for satisfied and 5 for very satisfied.

A five points scale was used by many studies (for example, Rowlinson, S., 1988). The Likert scale is not restricted to five points. Many studies use a three points scale (for example, Naoum, S., 1989) depending on how detailed the required data are. The five points scale is however, the most widely used in research work. In piloting this study three and five point scales were tested to determine the most appropriate. The five points scale was found to be more discriminating and achieved the best results, the three point scale being insufficiently sensitive and hence too general. The five points scale therefore was used for all of the ordinal items of the questionnaire.

Table (6.4): Main project performance measures used in the research model and their type of data collections

Performance Measure	Type of data collection
(M1) unit cost (M2) percentage of cost overrun (M3) construction speed rate (M4) percentage of time overrun (M5) satisfaction with total cost of the project (M6) satisfaction with total time of the project (M7) overall satisfaction with the project (M8) client's rating on the quality of the house	Administrated questionnaire with client
(M9) Aesthetic quality of the house (M10) technical quality of the house	Technical quality and Aesthetic quality measurement check lists observed by the researcher

6.6 THE RESEARCH METHODOLOGY

The current research is partly exploratory, as there was no preceding research on the effectiveness of housing projects in Qatar. Its design includes both the descriptive and analytical modes. The descriptive mode will report the principal data collected in order to quantify the key variables and assess the effectiveness of housing projects. The main target of the analytical mode is to assess the relationships between variables and to test consequent hypotheses. The survey method was chosen as the most appropriate means to obtain data and information and to achieve the research objectives.

The nature of this research is a comparable one and there are, broadly speaking, four methods to conduct the study. These can be summarised below, based on Vroom (1971) and previous researchers:

1. In one, data from one sample is collected and analysed and then compared with what is already known from another sample.
2. Longitudinal study. Here, the data is collected directly from semi-structured interviews to gather the necessary information. This method was used by Nahapiet and Nahapiet (1985b) in case studies from the USA and UK, and by DHSS (1986) in comparing two management contracts and one traditional contract.
3. An attitudinal survey is used widely in social sciences.
4. To match one sample against another by collecting comparable data using interviews, questionnaires. This method was used by Mobbs (1976), Sidwell (1982), NEDO (1983), Rowlinson (1988) and Naoum (1989).

As this study evaluates the outcomes of housing projects from the perspective of the client, the author chose a combination of the last two methods outlined above. The comparison would not be fair and valid in the first one due to unmatched samples. A longitudinal approach is not appropriate as the housing projects under investigation are in Qatar.

In social science research, there has been a growing interest in using both qualitative and quantitative methods for collecting data to facilitate an understanding of the case under study. Cohen and Manion (1989) stated:

> ***"If one favours the alternative view of social reality stresses the importance of the subject experience of individuals in the creation of the social world, then the search for understanding focuses upon different issues and approaches then in different ways... The approach now takes on a qualitative as well as quantitative aspect."*** (p.8)

In this study, therefore, both qualitative and quantitative techniques were used to test the research hypotheses. The decision was taken to use both methods of data collection for two main reasons:

1. To improve the face validity of the collected data.
2. To provide an insight into the phenomena under investigation (i.e. clients' perception towards the quality of their houses).

Bogdan and Biklen (1992) suggest that it is common in social research to use both qualitative and quantitative methods to collect data. They stated that before designing a research tool, for example a questionnaire, an open ended interview can be conducted to identify possible items to include in the questionnaire. Moreover, Warwick (1983) indicates that integrating various methods in collecting data would:

- provide additional data;
- improve accuracy in measuring a single phenomenon;
- make the findings generalisable.

In this study, qualitative and quantitative measures were used to address different issues. For example, an observation technique was used to gather information relating to aesthetic and technical quality of the housing projects, which would supplement qualitative data with quantitative evidence, while a questionnaire was used to investigate clients' attitudes towards the quality of their houses, in order to provide qualitative data. Another example is the comparison between the satisfaction with the total time of the project with the speed rate of building. Integrating both methods, quantitative and qualitative, to test a research hypothesis or to study a case can provide a better understanding of the case and give more accurate evaluation to the housing projects under investigation.

Bulmer and Warwick (1993) point out that using various data collection methods (both quantitative and qualitative) is important, especially in Third

World countries. One reason for this is that it can be very hard to locate and find research data in a specific field. A second reason is that Third World countries people are not used to expressing their opinions frankly; they have a tendency to say what the other person wants to hear. Therefore, in this study it was thought sensible to use multi data collection methods to improve the face validity of the data.

This study was carried out in three stages. The first stage was exploratory interviews with the policy makers and implementers; and selected designers and contractors. The second stage involved piloting the data collection methods. The third stage was concerned with conducting the field study.

The sequence of the research is outlined diagrammatically in figure (6.1). The main subject of the research is housing projects. The data collection took the form of interviews, questionnaire and observation techniques to test the research hypotheses and achieve the objectives of this research.

6.6.1 Stage 1: Exploratory Interviews

The main objective of stage 1, which was carried out during the summer of 1996, is to lay the background of the research. As, explained in section 6.5.1, there was no previous research work on housing projects and the construction industry in Qatar, it was necessary to conduct exploratory interviews with the major groups and individuals that are involved with housing projects in Qatar. These interviews took the shape of unstructured to semi structured ones. The interviewees were divided into three main groups:

Group A - Policy Makers:

- Former minister of Labour, Social Affairs and Housing.
- The Deputy Minister of Finance, Trade and Economy.
- A member of the Municipality Council.

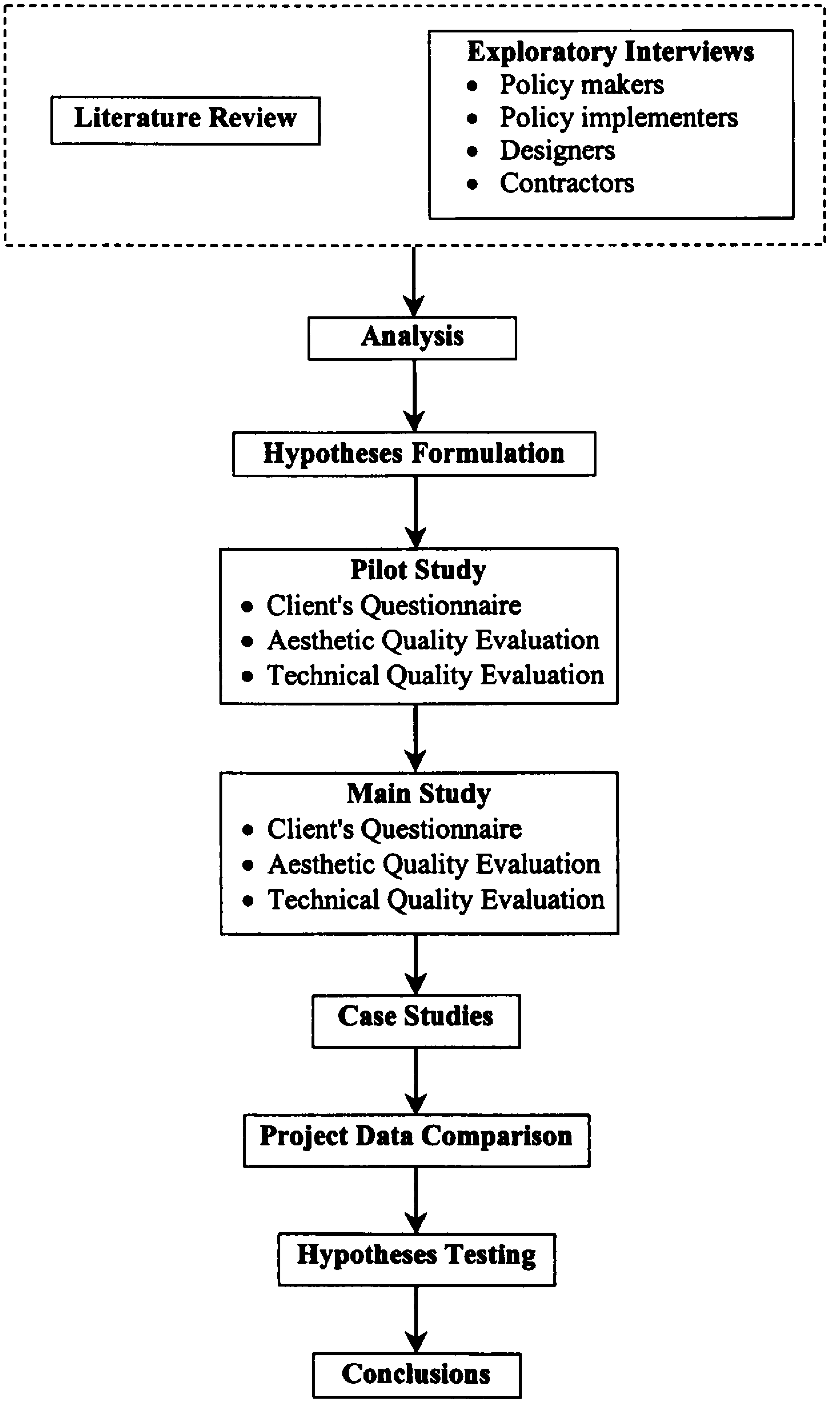


Figure (6.1): The Research Sequence

Group B - Direct Policy Implementers:

- Manager of the Estate Loans Department at Qatar National Bank.
- Manager of the Public Housing Department at the Ministry of Public Service and Housing.
- Manager of the Lands Department at the Ministry of Municipality Affairs.
- Manager of the Municipality of Doha.
- Manager of the Senior Staff Housing Project at the district of Modern Doha.

Group C - Independents:

- Five independent consultant designers.
- Five independent contractors.

The first problem the research faced in undertaking the fieldwork for this study was the lack of cooperation from many of the selected interviewees, especially from group C. Although efforts were made for assuring the confidentiality of the information obtained from the interviewees, most of them refused their interviews to be taped, as they were afraid that the tapes could be used against them in the future. Therefore, it was decided that these exploratory interviews would not be tape-recorded but for notes to be taken during the interview (see Appendix E for group A and B; and Appendix D for group C for the questions of the interviews). The materials obtained were largely edited and discussed throughout chapter 2 and 3, and used to support the results of the main study in chapter 7, 8, and 9.

6.6.2 Stage 2: The Questionnaire Design

Wiersma (1986) defines the questionnaire as:

> ***"a list of questions or statements to which the individual is asked to respond in writing; the response may range from a checkmark to an extensive written statement."*** p. 179

The questionnaire technique of collecting data is, according to Kemmies and McTaggart (1988), probably the most commonly used method of inquiry.

Kemmies and McTaggart describe three types of questionnaire. The first is the mailed questionnaire, in which a prepared list of questions is mailed to the respondents for answering and return. The second type is the group-administered questionnaire, in which a group from the sample concerned is gathered in one place to fill in the questionnaire. The third is the personal contact questionnaire, where the researcher personally contacts the respondents and has them complete the questionnaire.

As a data collection technique, the questionnaire has several advantages and limitations, and these are summarised in table (6.5). Nachmias and Nachmias (1992) point out that questions are the foundation of all questionnaires. They proceed to argue that the questionnaire ought to translate the study objectives into specific questions; the answers to these questions should provide the data for testing the research hypotheses or questions. Researchers such as Gay (1992) and Slavin (1984) have provided general guidelines to be taken into consideration when constructing a questionnaire. These researchers suggest that a questionnaire should:

- be as clear and simple as possible
- avoid questions that are too long
- ask only important questions which respondents can answer
- avoid questions with two parts
- follow a natural logic and order
- in multiple choice questions, ensure that all the possibilities are covered

All these principles were taken into consideration when constructing the questionnaire for this study. Furthermore, a number of other criteria were used in designing the questionnaire:

- The question asked should be objective
- As there have been no previous studies in this area of research in Qatar, the questions should cover the widest range of attitudes/opinions of the clients.

- When considering their attitudes towards the phases of constructing their houses and toward their own quality evaluation, it was felt useful to detail the construction project phases, the different parties involved and the quality aspects of the house, in order to avoid the ambiguity of generalisation, and to get as wide a range of information as possible.

Table (6.5): Advantages and disadvantages of the questionnaire technique

Advantages	Disadvantages
Easy to administer; quick to fill in	Analysis is time consuming
Easy to follow up	It is difficult to get a list of good questions together
Data are quantifiable	Some respondents do not answer honestly
Makes tabulation of responses quite effortless	Effectiveness depends very much on reading ability and comprehension of the individual
Provides direct comparison of groups and individuals	Response rates are often low, due to fear of lack of anonymity
Appropriate for large samples	Difficult to get questions that explore in depth
Provides direct responses of both factual and attitudinal information	Respondents try to produce the "correct response"

Adapted from Gay (1992)

6.6.2.1 Construction of the questionnaire

The covering letter: The covering letter is an important part of any survey involving a questionnaire. It helps to introduce individuals to the questionnaire and motivates them to respond (Wiersma, 1986). The covering letter for the clients' questionnaire contained a paragraph stating the purpose of the questionnaire and indicating that the responses would be treated anonymously.

The questions were constructed and designed to elicit information specific to this study, and were therefore divided into nine sections:

Section 1: General information related to the project. Including the names of the client, the designer and the contractor, as well as the type of the house (private house or senior staff house).

Section 2: In this part of the questionnaire clients were asked to give general information about their land, such as location and size, and how did they acquire them.

Section 3: This section is devoted to SSH clients only. They were asked about familiarity with the SSH regulations and loan contract, duration for obtaining the SSH loan and whether it was sufficient to build their houses.

Section 4: This section was devoted to collect information related to the design phase, such as the way and criteria for selecting the designer, and total gross floor area of the house.

Section 5: This section was devoted to collect information related to the construction phase of the project, such as the estimated cost of the project.

Section 6: Clients were asked to rate their level of satisfaction with the different phases of their projects, such as the total time and cost of the project, as well as the different parties involved in the construction of their houses, such as the designer and the contractor. SSH client were also asked to rate their satisfaction with the SSH regulations and procedures.

For any item that were given "dissatisfied" or "very dissatisfied", clients were asked to state the reason(s) for their dissatisfaction.

Section 7: Clients were asked to evaluate the quality of their house. In order to avoid ambiguity quality were divided into 13 sub-items covering aesthetic quality, function design, finishing materials and the internal and external environment of the house.

Section 8: In this section clients were asked to state any disputes, if any, occurred with any party or utility department that led to the delay of handing the project on time.

Section 9: General information related to the client, such as age, education level, income, previous construction experience and family size. Clients were also asked to state any changes they would make regarding the construction of their houses if they had the chance to build them again. This question shows how much the clients learnt from the experience of building their houses and what are their real needs and capabilities for achieving these needs.

6.6.2.2 Validity and Reliability of the Questionnaire

It is vital for any successful research to employ valid instruments. Borg (1987) defines validity as the:

> ***"degree to which a test or other measurement tool measures what it claims to measure."*** p.92

Slavin (1984) and Gay (1992) identify four types of validity: (a) content validity, (b) concurrent validity, (c) construct validity, and (d) predictive validity. Slavin defines *content validity* as the:

> ***"degree to which the content of a test matches some objective criterion, such as the content of a course or textbook, the skills required to do a certain job, or knowledge deemed to be important for some purpose."*** p.81

He defines concurrent validity as the:

> ***"correlation between scores on a scale and scores on another scale or measure of established validity given at about the same time."*** p.82

Gay (1992) defines *construct validity* as the:

> ***"degree to which a test measures an intended hypothetical construct."*** p.157

and predictive validity as the:

> ***"degree to which a test can predict how well an individual will do in a future situation."*** p.159

Establishing the content validity was the main concern here. Nachmias and Nachmias (1992) argue that there is no one best way by which validity can be established or evaluated. However, Gay (1992) suggests that content validity can be determined by expert judgement. 'Usually', he writes:

> ***"experts in the area covered by the test are asked to assess its content validity. These experts carefully review the process used in developing the test as well as the test itself and make a judgement concerning how well items represent the intended content area."*** p.157

Therefore, the questionnaire was given to six experts in Qatar University to advise on its content validity, bearing in mind the research aims and questions.

After making a number of changes and modifications to both the content and the format of the instruments, the judges agreed that the instruments used in this study had significant content validity. Table (6.6) shows the names and academic positions of the advisers.

Table (6.6): List of names and academic positions of the content validity judges

Name	Position
Dr. Mohammad Ayman Abdul Salam	Professor of Civil Engineering
Dr. Ahmad Sanousi	Associate Prof. of Civil Engineering
Dr. Mohammad Al-Ansari	Assistant Prof. of Civil Engineering
Dr. Khalid Al-Khayareen	Assistant Prof. of Civil Engineering
Dr. Abdul Aziz Al-Hor	Assistant Prof. of Educational Science
Dr. Ahmad Al-Marzouqi	Assistant Prof. of Educational Science

Next to validity, reliability is, according to Gronlund (1976),

"the most important characteristic of evaluation results ... Reliability (1) provides the consistency which makes validity possible, and (2) indicates how much confidence we can place our results." p. 105

Nachmias and Nachmias (1992) define reliability as

"the extent of which a measuring instrument contains variable errors, that is, errors that differed from observation to observation during any one measuring instance or that varied from time to time for a given unit of analysis measured twice or more by the same instrument." p.163

Consistency of measurement is the most important aspect of reliability. There are different types of consistency and they should be determined by different methods (see table (6.7)). Gronlund (1976) notes that

"different types of consistency are determined by different methods – consistency over a period of time, consistency over different forms of the instrument, and consistency within the instrument itself. The reliability coefficient resulting from each method must be interpreted in terms of the type of the consistency being investigated." p. 108

Table (6.7): Methods of estimating reliability

Type of Reliability measure		Procedure
Test-retest method	Measure of stability	Give the same test twice to the same group with any time interval between tests from several minutes to several years
Equivalent forms method	Measure of equivalence	Give two forms of the test to the same group in close succession
Test-retest with equivalent forms	Measure of stability and equivalence	Give two forms of the test to the same group with increased time interval between forms
Split-half method	Measure of internal consistency	Give test once. Score two equivalent halves of test (e.g. odd items and even items); correct reliability coefficient to fit whole test by Spearman-Brown formula
Kuder-Richardson method	Measure of internal consistency	Give test once. Score total test and apply Kuder-Richardson formula

Adapted from Gronlund (1976)

Gay (1992) suggests that questionnaires should be piloted before they are conducted. He points out that pre-testing questionnaires not only serves to identify the problems in understanding the directions and questions in them, but also

> ***"yields data concerning instrument deficiencies as well as suggestions for improvement. Having two or three available people complete the questionnaire first will result in the identification of major problems. The subsequently revised instrument and the covering letter should then be sent to a small sample from your intended population or a highly similar population. Pre-test subjects should be encouraged to make comments and suggestions concerning directions, recording procedures, and specific items."*** p. 229

For these reasons the questionnaire was piloted before implementation.

6.6.3 Stage 3: The Pilot Study

The purpose of the pilot study, which was carried out in December 1996, was to test whether the concepts and language used in the questionnaire were comprehensible to the people participating in the case study, and whether the question order would influence the clients' responses. The pilot study not only evaluated the questionnaire items, but also:

- The quality of the interviews;
- The length of the interviews;
- The overall appropriateness of the survey method to the problem in question.

12 copies of the client's questionnaire were given to 7 SSH and 5 PH clients from the intended population. Clients were told the purpose of the study and encouraged to write comments and suggestions concerning directions and questions in the questionnaire. All 12 questionnaires were returned with a number of suggestions and comments. The analysis of 12 responses revealed certain areas of the questionnaire which could affect the reliability of the data collected. These areas were concerned with:

- Length of the questionnaire: to encourage the clients to participate in the study the orientation of the questionnaire was changed from portrait to landscape format. This change made the questionnaire look shorter than it was.

- Order of the questions: sensitive questions were found to be better answered when asked towards the end of the interview, as by this time a level of trust had been established between the interviewer and the interviewee.

Based upon the findings of the pilot study some questions were rephrased to ensure clarity. For example, since people in Qatar are more familiar with their income on a monthly basis, question 3 of section 9 was changed from asking for the yearly income of the client to the monthly income. The technical quality check list index (Appendix C) was also altered with the necessary adaptations to fit the conditions of Qatar.

The questionnaire was revised in the light of the pre-test subjects' comments. The final version of the questionnaire was discussed with the judges in person. Five days later, the questionnaire was given to the same 12 clients to obtain test-retest reliability (coefficient of stability). The correlation coefficient of the client's questionnaire test-retest was 0.83. This suggests that the correlation between the two applications of the questionnaire was reasonably high. As a result, the final questionnaire was printed.

6.7 Main Study and Sample Size

The field study which was carried out during June and July of 1997 ended with a sample size of 96 case studies, of which 61 were SSH and 35 were PH. All of the projects were commenced and finished between 1987 and 1997.

Analysing the collected case studies for outliers in the main performance measures revealed that the unit cost of one PH case study is an outlier. This case study was excluded from the sample ending up with 61 SSH and 34 PH case studies. Thus, the sample size was sufficient to carryout the required

(6.2) shows the five regions of Doha. Other parts of Doha that were not included in the study had very low construction activities for housing.

6.8 METHOD OF ANALYSIS TO TEST THE HYPOTHESES

The data collected was analysed by the statistical techniques provided by The Statistical Package for Social Science (SPSS). Various statistical methods were used, and they varied from descriptive to relational analysis. In the following subsections the important statistical techniques used in this research are introduced.

6.8.1 t-test

The unrelated t-test was used for experimental designs with two conditions testing one independent variable. The t-test allows one to determine whether or not the means of the two samples differ so much that the samples are likely to have been drawn from the same population (Cohen and Holliday, 1982).

$$t = \frac{\frac{\sum X_1}{N_1} - \frac{\sum X_2}{N_2}}{\sqrt{\left(\frac{\sum X_1^2 - \left[\left(\sum X_1\right)^2 / N_1\right] + \sum X_2^2 - \left[\left(\sum X_2\right)^2 / N_2\right]}{N_1 + N_2 - 2}\right)\left(\frac{N_1 + N_2}{N_1 N_2}\right)}}$$

where ΣX_1 = sum of scores, group 1

ΣX_2 = sum of scores, group 2

ΣX_1^2 = sum of squares, group 1

ΣX_2^2 = sum of squares, group 2

N_1 = numbers in group 1

N_2 = numbers in group 2

Thus, in order to use t-test the following assumptions have to be met:

1. that the groups are independent and have been randomly sampled;
2. that the population variance are equal;
3. that the population distributions are normal.

6.8.2 Mann-Whitney test

In assessing the difference between two independent samples the Mann-Whitney U test provides a useful non-parametric alternative to the t-test for uncorrelated data when the assumptions of the t-test are not met.

$$Z = \frac{U - \frac{N_1 N_2}{2}}{\sqrt{\frac{N_1 N_2 (N_1 + N_2) + 1}{12}}}$$

Where

$$U = N_1 N_2 + \frac{N_1 (N_1 + 1)}{2} - R_1$$

Where

R_1 = the sum of ranks for group with n_1 subjects

The power efficiency of the Mann-Whitney U test relative to the parametric t test for independent samples is reported as 95.5% (Gibbons, 1976).

6.8.3 Pearson test

The Pearson product moment correlation was used to identify the strength of the relationships between variables concerned. It provides a value between "-1" and "1". The closer to "1" in either direction, the stronger the relationship is. A product moment value close to "0" in both directions signifies an extremely weak relationship. The positive or negative signs indicate the direction of the relationship.

Pearson test requires the experimental data to be measured on an interval scale and to meet the other assumptions for parametric tests of being normally distributed and showing homogeneity of variance.

$$r = \frac{\sum xy}{\sqrt{\left(\sum x^2\right)\left(\sum y^2\right)}}$$

Where

r = the product moment correlation coefficient

x = the deviation of any X value from the mean of all the X values

y = the deviation of any X value from the mean of all the Y values

6.8.4 Spearman test

The Spearman (Rho), also known as Rank Order Correlation, was used to identify the strength of the relationships between variables concerned when the parametric assumptions of the experimental data were not met.

$$r_s = 1 - \frac{6\sum d^2}{n\left(n-1\right)\left(n+1\right)}$$

Where

r_s = Spearman's correlation coefficient

d = the difference in rank between the items in a pair

n = the number of items

6.8.5 Factor Analysis

Factor analysis is a statistical technique that is used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables (SPSS). As a matter of course, in such cases the researcher collects information on variables likely to be indicators of the concepts in question and then tries to discover whether the relationships between these observed variables are consistent with their being measures of a single underlying variable, or whether some more complex structure has to be postulated.

In this research, factor analysis was used to generate four unobserved variables labelled *Economy*, *Quality*, *Satisfaction* and *Effectiveness* from a set of observed variables. This use was necessary to reduce the number of variables used in hypotheses one, two, three and the main hypothesis of the study respectively, and to make the hypotheses verification as simple as possible.

6.8.6 The Scoring System

To determine the weights of clients' criteria for selecting their designers and their contractors (see section 7.5.2 and 7.6.2) the following scoring system was used:

Weighting Score = [(% of 1st reason)(5)+(% of 2nd reason)(4)+(% of 3rd reason)(3)+(% of 4th reason)(2)+(% of 5th reason)(1)] / 100

To determine the ranking of the factors which influence client satisfaction the level S, D or N which identifies the balance in favour of satisfaction (S), dissatisfaction (D) or neutral (N) was given respectively for the value of (S+VS), (N) or (D+VD) which is the largest (see section 8.3).

To determine the ranking of the factors which influence client rating on quality the level G, B or F which identifies the balance in favour of good (G), poor (P) or fair (F) was given respectively for the value of (G+VG), (F) or (P+VP) which is the largest (see section 8.6.2).

6.9 LIMITATION OF THE RESEARCH

The nature of this research is cross-sectional study and this has imposed certain limitations upon a number of variables. These are:

1. *Designers and Contractors*: It was the intention of this research to gather

information about the designers and contractors involved in the projects but this could not be dealt with appropriately by this study because data about the use of designers and contractors was not stored efficiently. This fact had kept the client as the focus of this research. However, a number of designers and contractors were interviewed throughout the study to evaluate their views, but the analysis had to abandoned because the sample was small and to increase the number would have extended the time span of the research.

2. *Organisational structure*: Information about the organisational structure were not well documented and could not be easily recalled.
3. *Cost of the project*: Lack of an appropriate inflation rate for the construction industry meant that all of the calculated costs of the projects were used without any adjustments at current year rate.
4. *Environmental influences*: The effect of the environment and team relationship may be an important component of the overall evaluation of a project by those associated with it. These variables were very difficult to measure in this research and require a large scale nation-wide longitudinal study to be conducted.

CHAPTER SEVEN

7 DESCRIPTIVE DATA ANALYSIS

7.0 Introduction

The results of the field study are reported in chapter 7 and 8. Descriptive data collected from the SSH and PH projects are presented in this chapter followed by client satisfaction and housing quality in chapter 8.

As stated in chapter 6 the sample size is 95 case studies, from which 61 are SSH and 34 are PH. The descriptive data of these 95 cases is divided in six main sections.

1. The socio-economic characteristics of clients of both housing schemes.
2. The land characteristics of the housing projects.
3. Senior Staff Housing (SSH) and funding regulations related to SSH clients.
4. Information relating to design phase of the project.
5. Information relating to construction phase of the project.
6. Disputes that occurred during the execution of the project.

7.1 Socio-economic Characteristics of Clients

By socio-economic characteristics of the clients it is meant their age, income, education level, construction experience and similar attributes.

7.1.1 Age of client

The age of clients who took part in this study ranged from 26 years old to 75 years old for PH, and from 29 years old to 55 years old for SSH. The mean age was 38.9 (s.d. = 10.67) for PH clients and 36.2 (s.d. = 4.91) for SSH clients.

The ranking analysis as seen in figure (7.1) shows that nearly three-quarters of the SSH clients (72.0%) were in the age range of 31 to 40 years old, which is an economically active age-group, while one half of the PH clients (50.0%) are in this age range. PH clients are more evenly distributed over the age groups. This explains the comparatively high s.d. for PH.

Figure (7.1): Age of clients

It can be seen that PH clients are as much as double the number of SSH clients for the age group 30 years old or less. This was a reflection of the fact that an SSH client has to go through a long procedure for obtaining land from the Lands Department, obtaining the SSH loan from the Bank, to executing the project.

At the other end of the age scale, 17.6% of the PH clients are over 45 years old, while only 3.3% of the SSH clients are over this age.

7.1.2 Educational Level

Clients interviewed were asked what educational level they have obtained. The results are illustrated in figure (7.2). As can be seen from the figure a

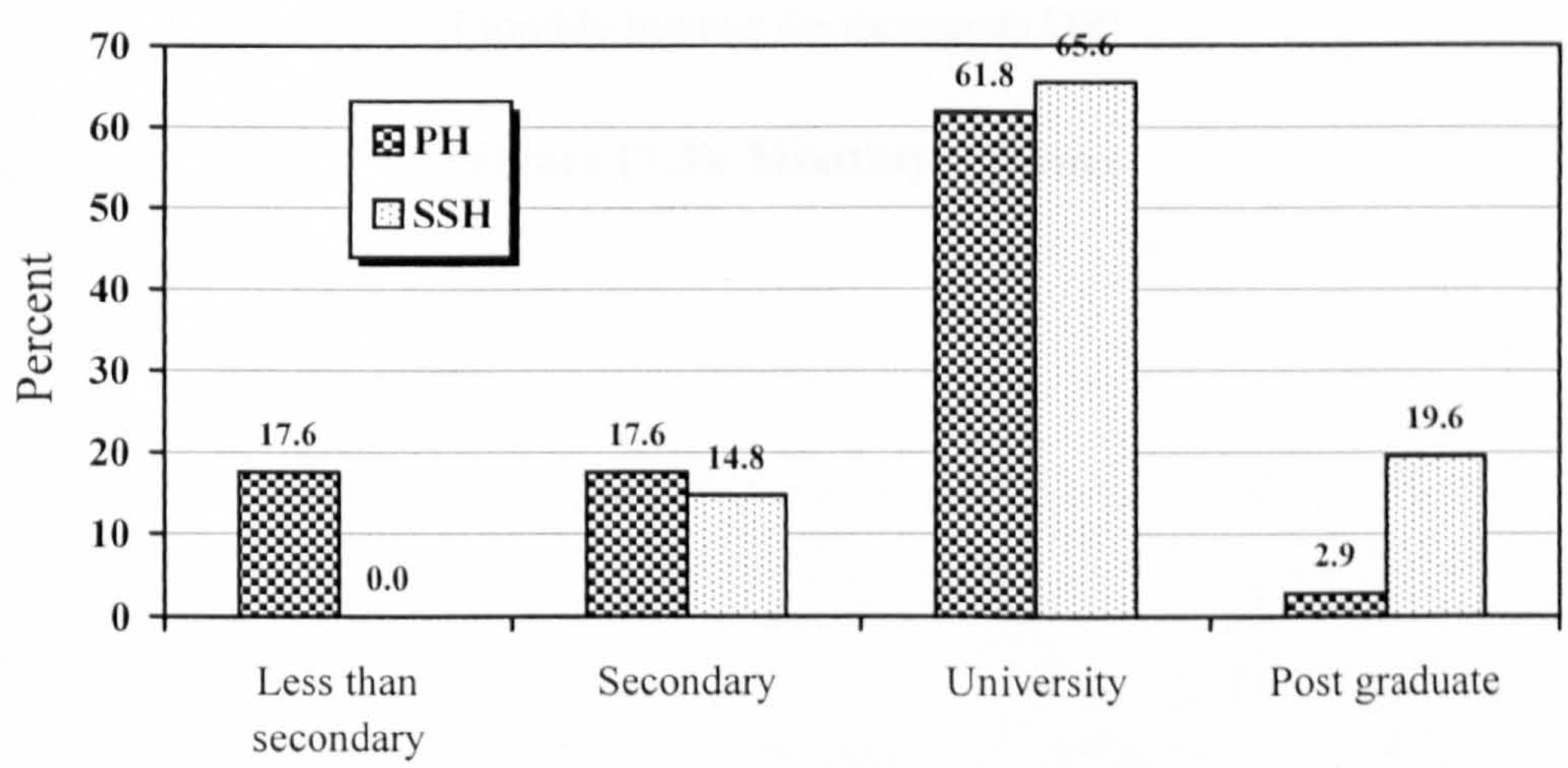


Figure (7.2): Education level

substantial proportion (58.0%) of the all clients in the two housing schemes is university educated. There are no SSH clients whose level of education is less than secondary school while 17.6% of PH clients have not progressed beyond this level. Another 17.6% of the PH clients are secondary level educated compared with 14.8% of the SSH clients. One fifth of the sample of the SSH clients (19.6%) are post graduates, while only one case of a PH client (2.9%) identified.

7.1.3 Monthly Income

One of the most commonly used indicators of a socio-economic characteristics of a population is client's income. The monthly income of the population is illustrated in figure (7.3). The ranking analysis shows that there is a more even distribution among the PH clients than there is with the SSH clients.

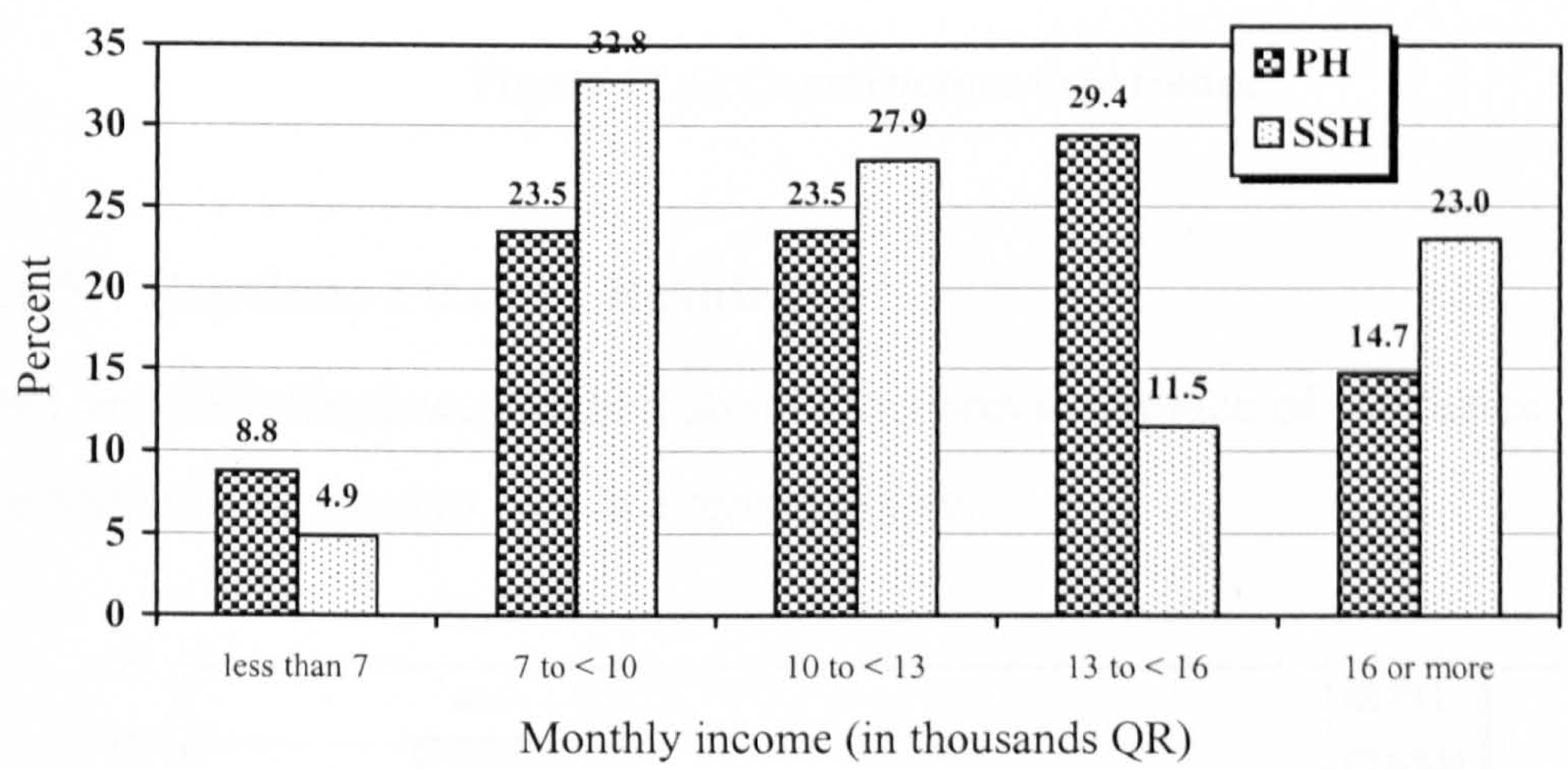


Figure (7.3): Monthly income

7.1.4 Construction Experience

Figure (7.4) shows the previous experience with construction works for the sample of the SSH and PH clients. A general feature of the projects under study is that the majority (70.5%) of the clients surveyed had no construction experience before building their houses.

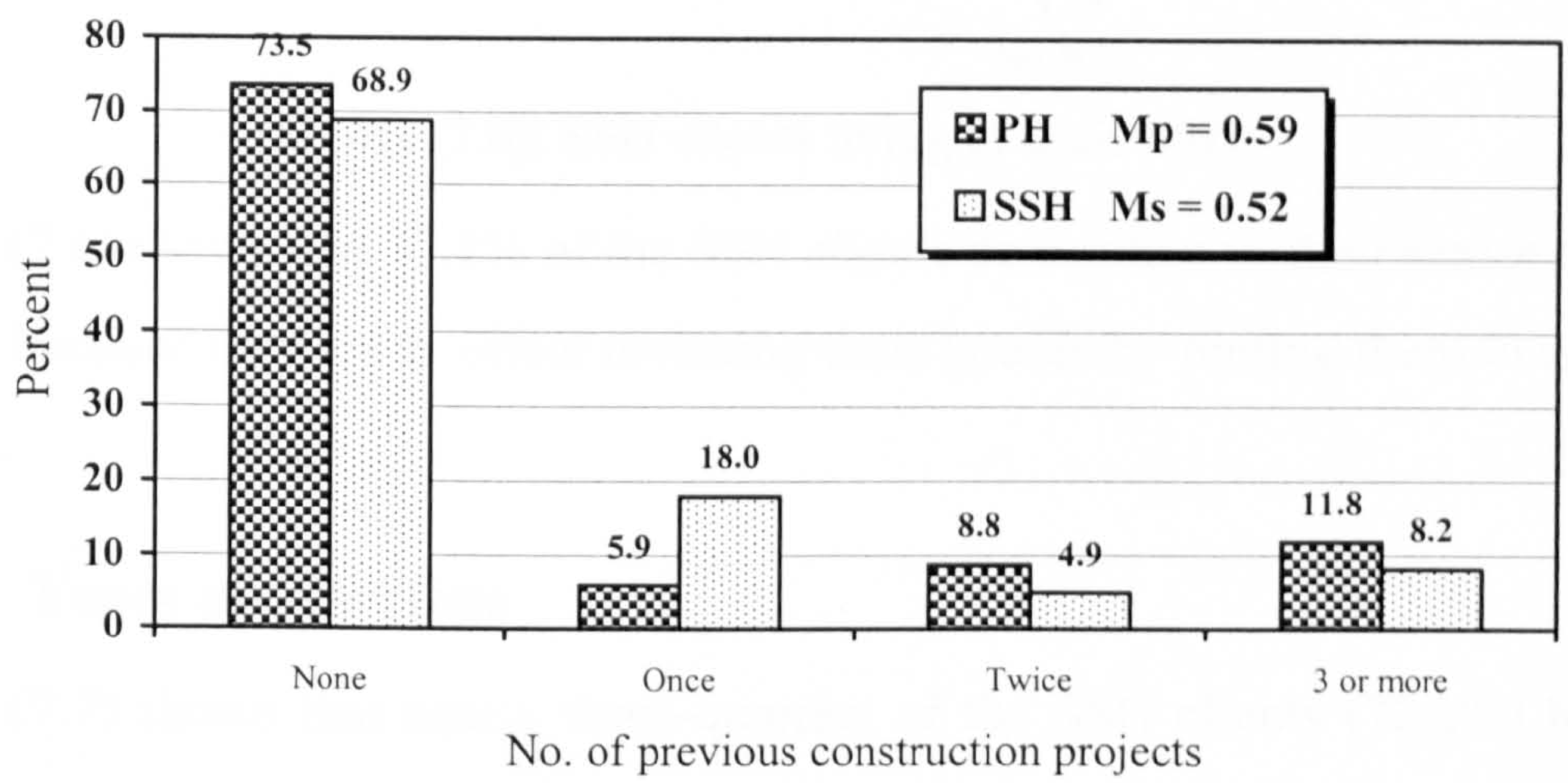


Figure (7.4):Construction experience

7.1.5 Previous Place of Residence

SSH and PH clients were asked about their previous place of residence. Most of the SSH clients used to live in a rented house.

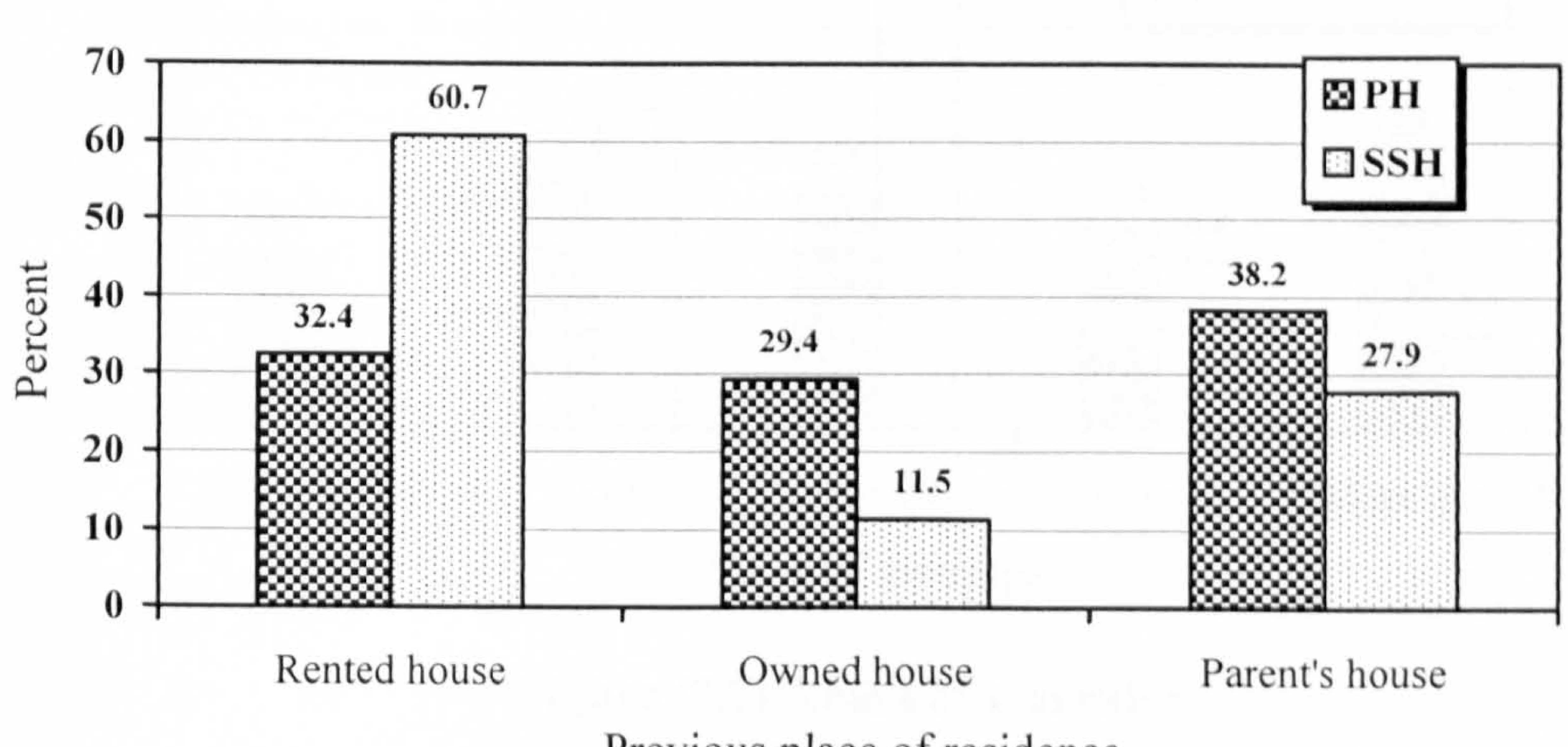


Figure (7.5):Previous place of residence

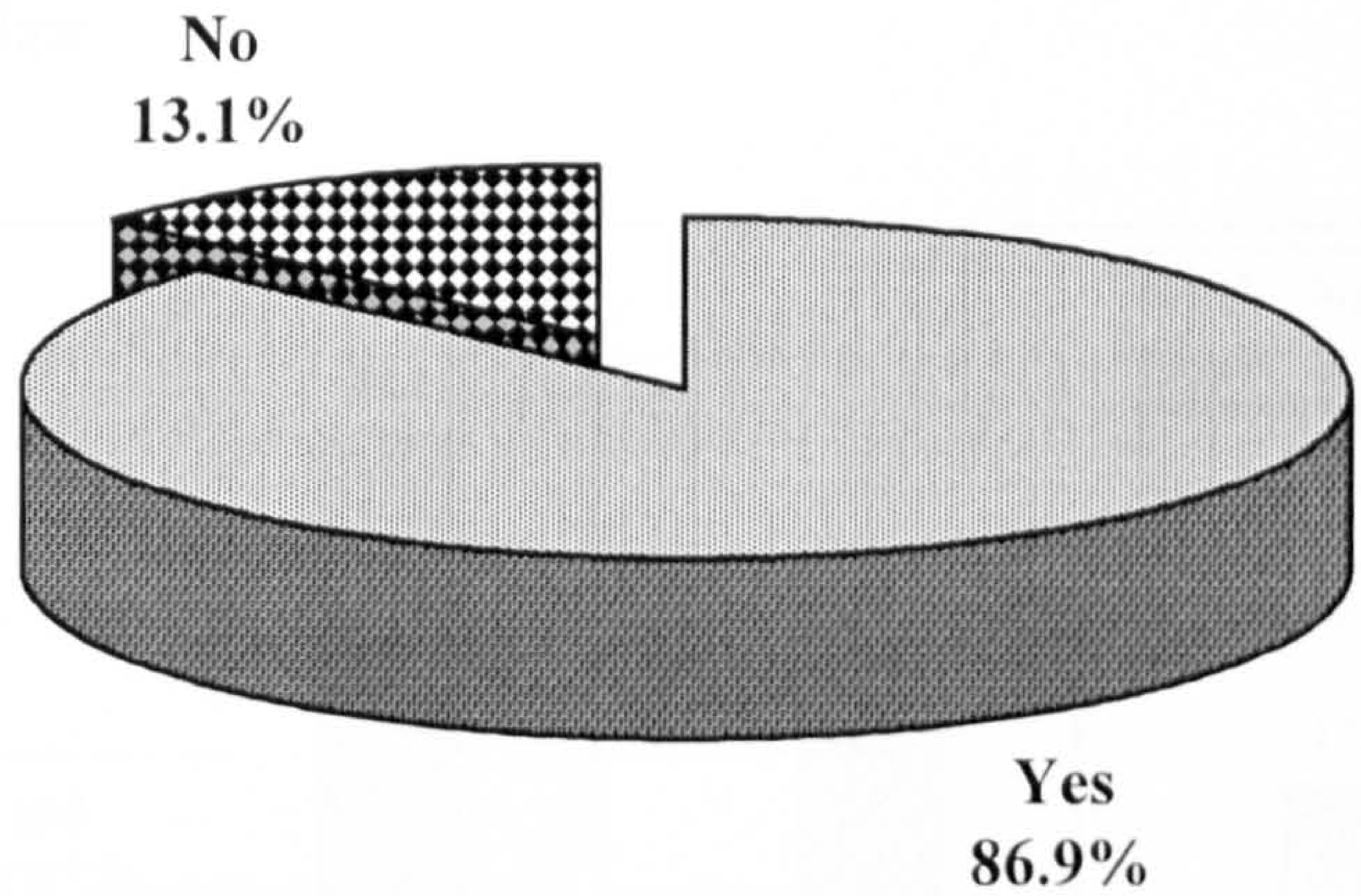


Figure (7.6): SSH clients living in their SSH

Figure (7.6) shows that 13.1% of the SSH clients do not live in their senior staff houses because they are in effect investing their houses by renting them to other people.

7.1.6 Years of Marriage

Figure (7.7) shows that nearly three-quarters of the SSH clients (72.2%) have been married for less than ten years. Notwithstanding that there are more PH clients who are not married than SSH clients, the mean of the years of marriage for PH is higher than it is for SSH clients by about four and a half years.

Figure (7.7):Years of marraige

7.1.7 Family Size

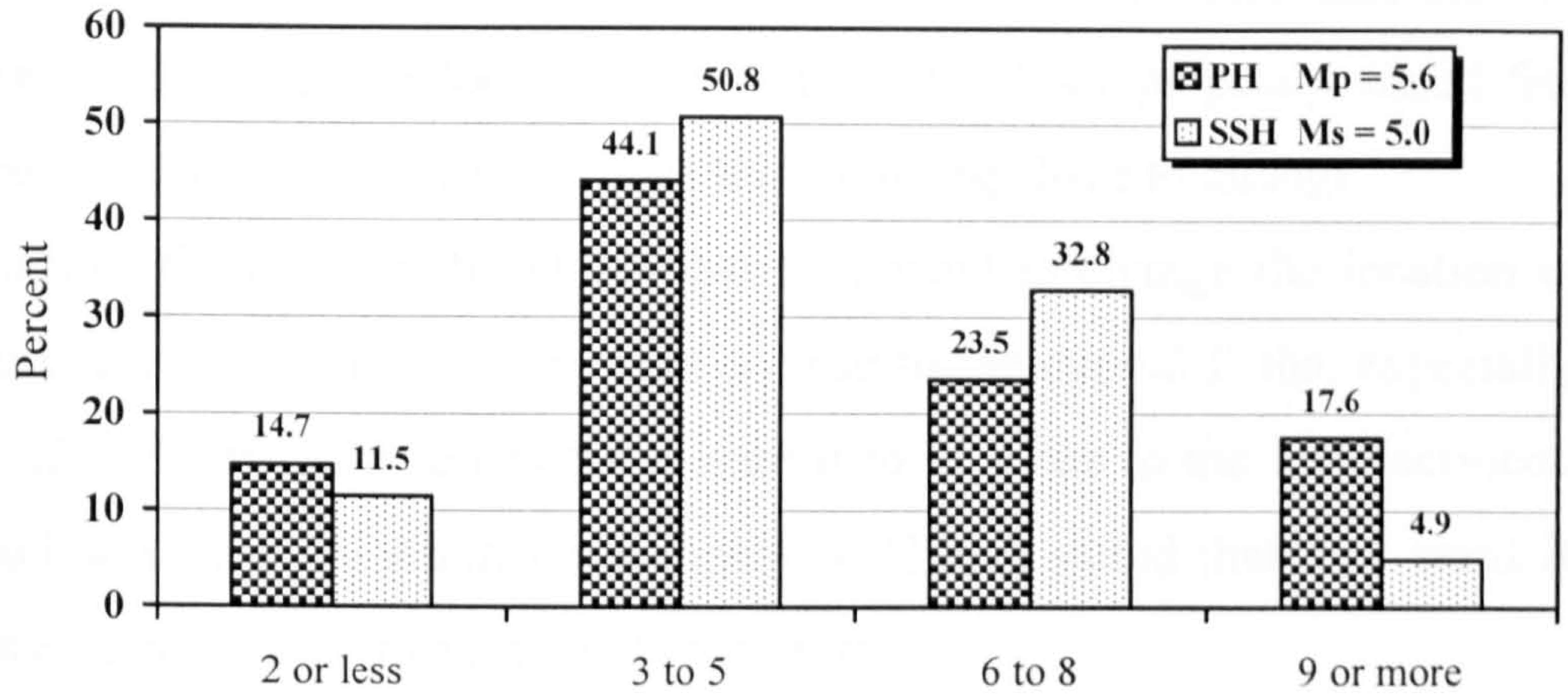


Figure (7.8):Family size

Figure (7.8) illustrates the family size of the clients at the outset of their projects. The figure shows that PH clients have a larger family size than SSH clients. Hence, the demand for a larger house as soon as possible by PH clients is much higher than that for SSH clients.

7.1.8 Major Changes in Future House

Clients were asked what are the major changes they would make, if they have the chance to build again. Figure (7.9) shows that more than half of the SSH clients (52.5%) will spend less, while about third of the PH clients (35.3%) will do so. Most of the SSH clients (47.5%) who chose that they will change the size of a future house, stated that they would do so in order to reduce the cost of the project. On the other hand, the PH clients (47.1%) who selected this category were divided into halves between reducing the size and enlarging it by increasing the size of bedrooms.

Both groups who selected the future changes in the layout of the house (31.4%) stated that they would provide a better layout for the bedrooms. Some of them want to have a private bathroom for every bedroom, and others will build more bedrooms than their existing houses.

A substantial proportion of the 26.6% of the respondents who selected the form of the house as a major change for the future house, stated that they want to have an Islamic, or a local, architecture style. Another group stated that they want to have another form because human beings love to change.

18.0% of the both groups stated that they want to change the location of their future houses. Some of them want it close to the capital Doha, especially from the SSH clients, and some others want it to be close to the local services, such as schools, medical centres and mosques. Others stated that they want it to be away from the major roads and bad odours.

Most of the people who selected other changes for their future houses (7.8%) want to use other procurement methods than the one they selected for the existing house. Most of them would use management contracting instead of the traditional method. One SSH client would choose "*a well respected contractor who will fulfil his duties*."

From the above results it can be said that a large minority of the clients, from both housing schemes, did not have a clear vision of their needs. This fact impacted upon the client's demands and expectations and has affected client's decisions regarding the size of the house, the layout and the form of the building, and indeed the final cost of the project.

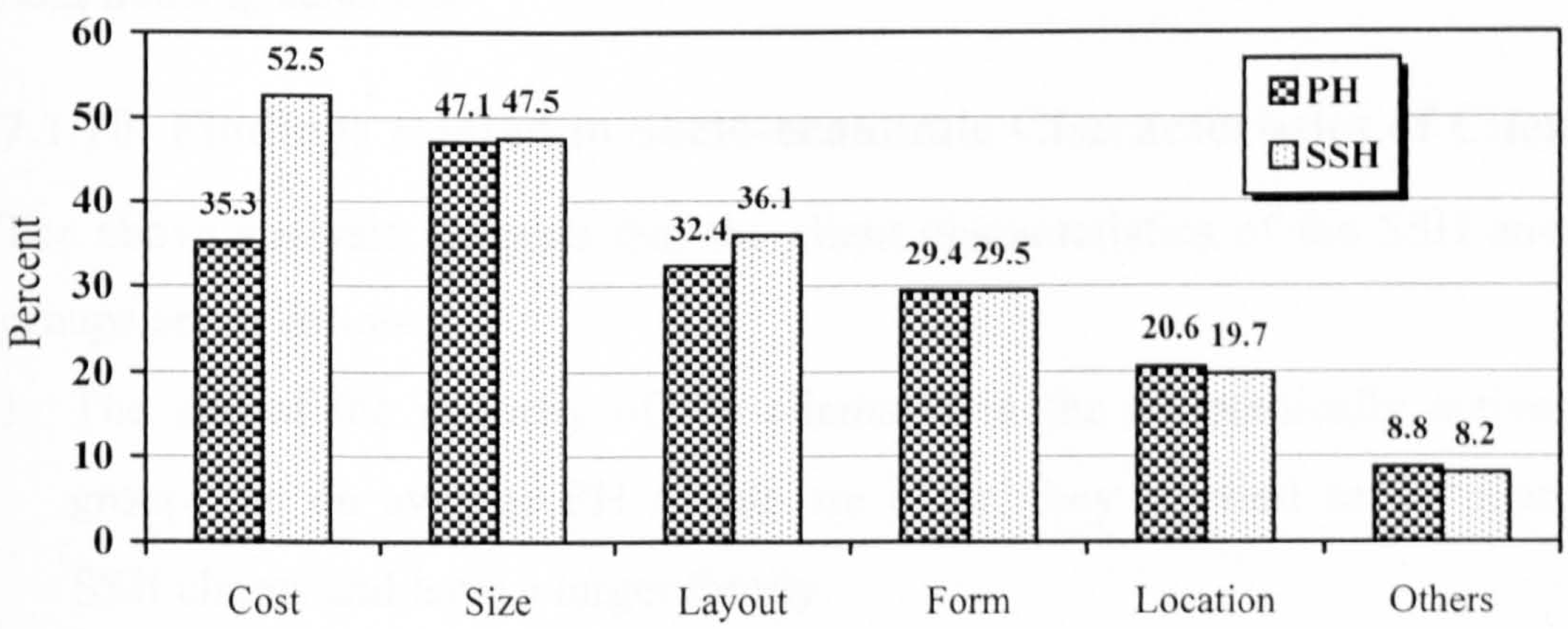


Figure (7.9): Major changes in future house

7.1.9 Importance of Cost, Time and Quality

The respondents were asked to weight the importance of cost, time and quality at the outset of the project from the client's point of view. Figure (7.10) illustrates that general distribution is much the same. The figure also shows that

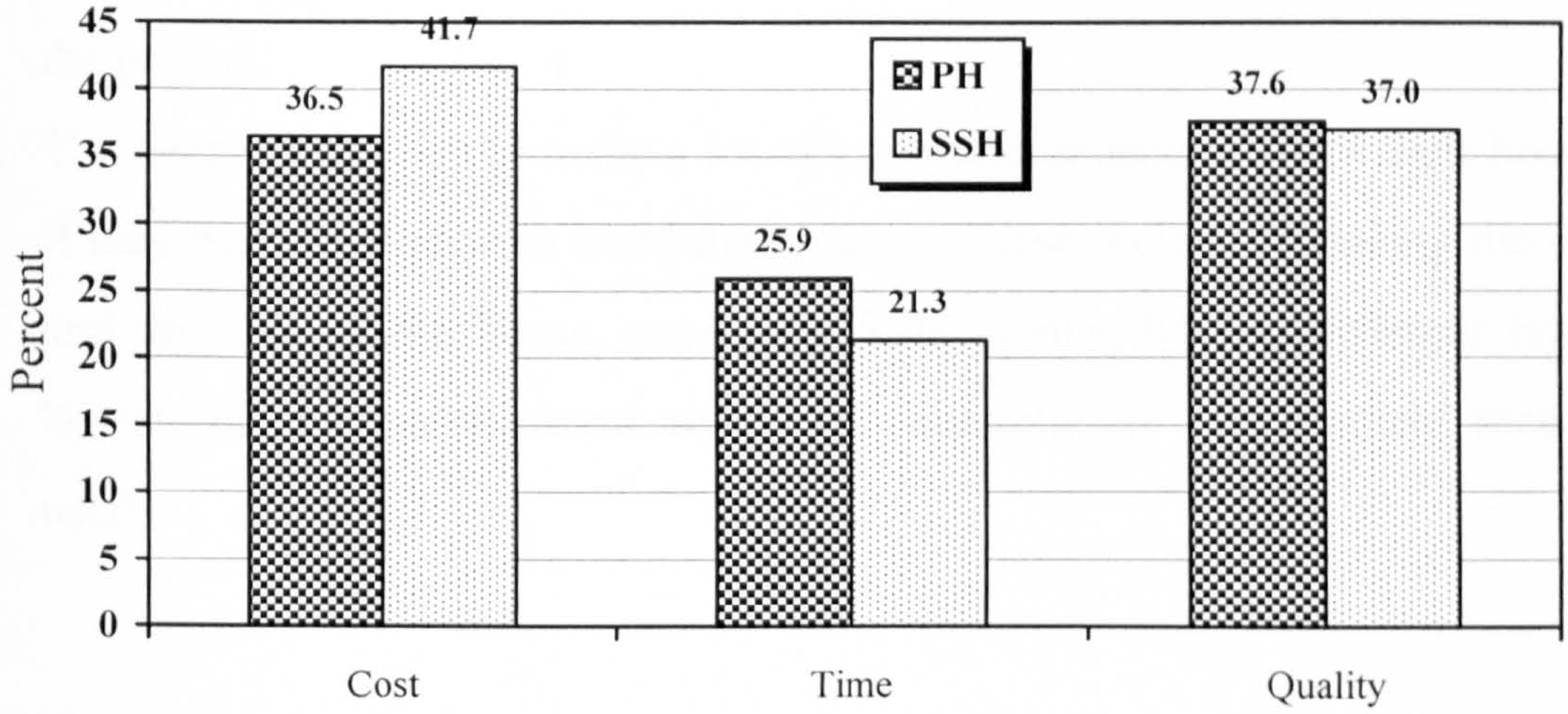


Figure (7.10): Importance of cost, time & quality

both groups of clients put more weight on the cost of the project than on time, while the percentage identifying the importance of quality from the two groups is similar.

The culture of Qatar does not give a great importance to time. This fact has clearly influenced the relative lack of importance of time given by clients from both housing schemes.

7.1.10 Findings related to Socio-economic Characteristics of Clients

The above analysis suggests that the client characteristics of the SSH and PH groups are as follows:

1. The age of the majority of the clients is in the economically active age group, but on average PH clients are older, they married earlier than the SSH clients and have a larger family.
2. The majority of the clients are university educated, and up to one fifth of the SSH respondents were holding post graduate degrees.

3. The majority of the clients had never built a house before.
4. A large minority of the clients, from both housing schemes, did not have a clear vision of their needs. This fact impacted upon the client's demands and expectations and has affected client's decisions regarding the size of the house, the layout and the form of the building, and indeed the final cost of the project.
5. The clients will wish to make a lot of important decisions about their houses if they had the chance to build them again. These include: reducing the size and the cost of the house, especially SSH clients, having different house layout, Islamic architectural style and changing the procurement method used.

7.2 Land characteristics

7.2.1 Obtaining the Land

The Government of Qatar grants its citizens land for building their houses once in their lives. Figure (7.11) shows that nearly half of the sample of SSH clients got their land as a grant from the government with a mean area of 1230.7 m^2, while the other half bought their land with a mean area of 1435.3 m^2 and had been compensated by the government. This latter approach accelerates the SSH loan procedure, as well as, giving the SSH clients more choice about the location of the land and its size. Only 1 client of the sample of SSH clients bought his land privately and did not get government compensation. Most of the PH clients (82.4%) bought their land privately with no government compensation, while the government had compensated 14.7% of the PH clients who decided to build their houses without applying for the SSH loan. No government grant was given to any of the PH sample and only 1 client had his land from another source (family land).

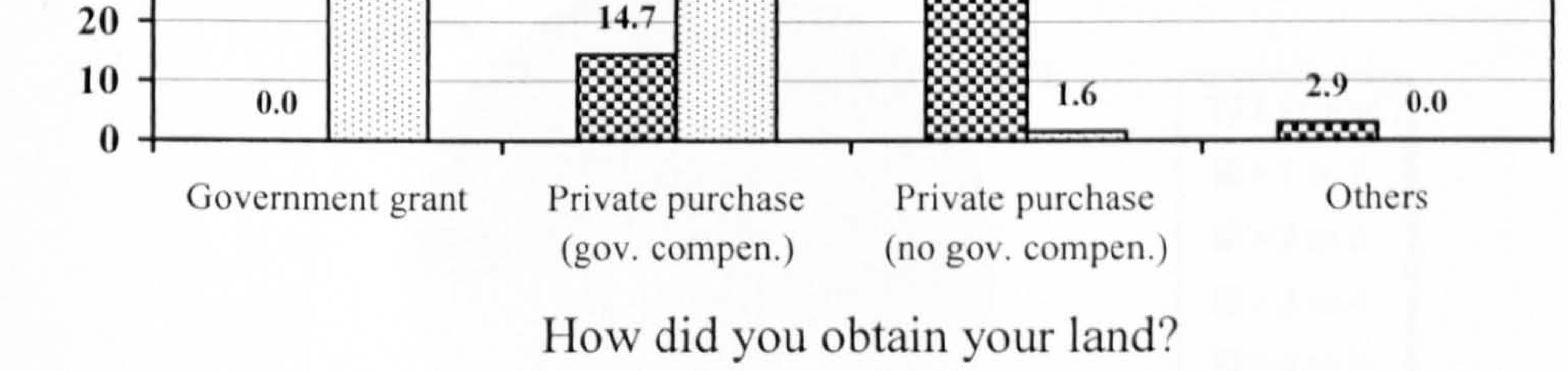


Figure (7.11):Obtaining the land

7.2.2 Applying to the Land Department

Figure (7.12) shows that none of the PH clients have applied for land from the Lands Department for building the houses under investigation, while the majority of the SSH clients did apply.

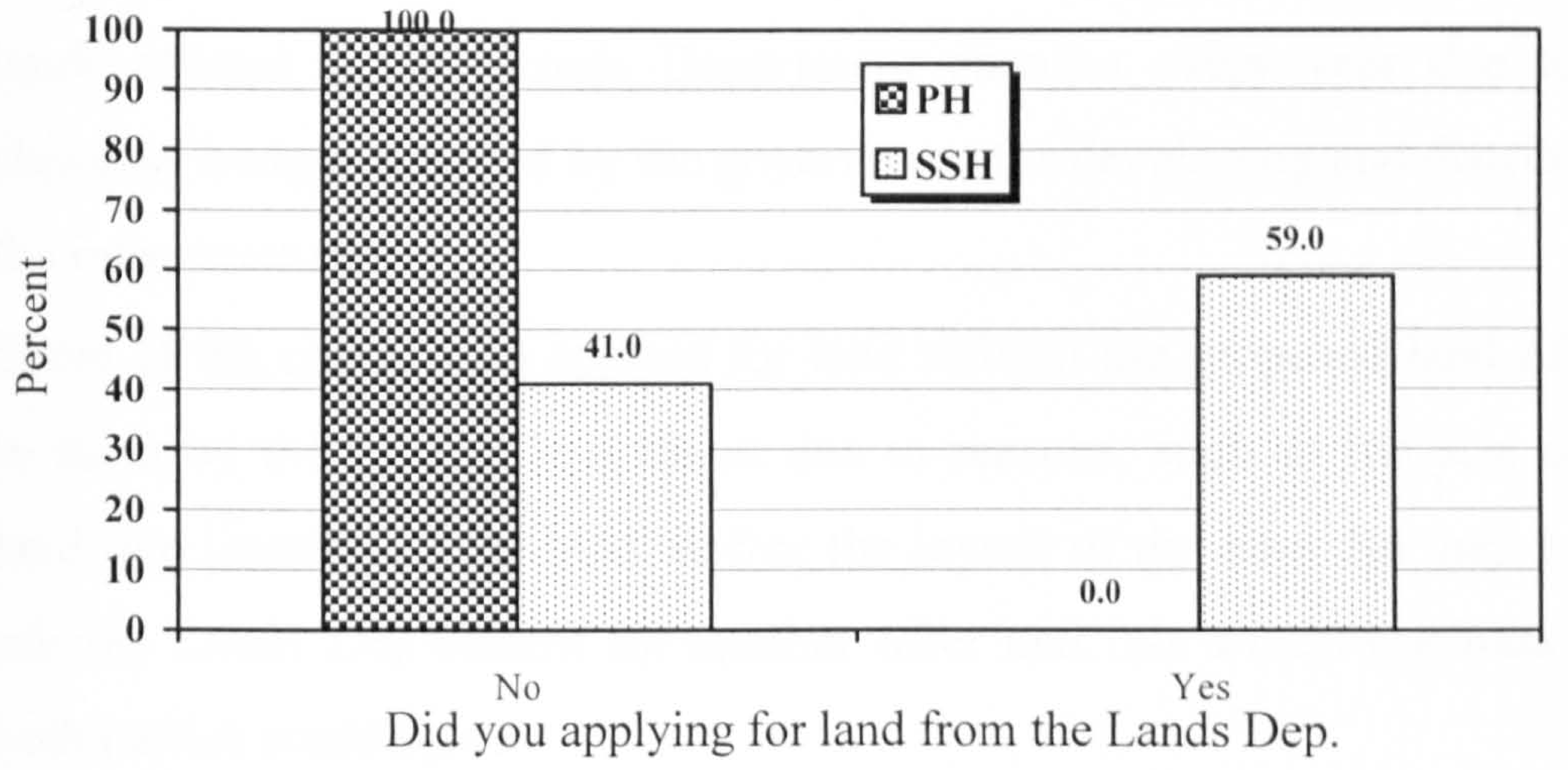


Figure (7.12):Applying for the Lands Department

Figure (7.13) shows how long the SSH clients who had applied to the Lands Department waited before obtaining their land. It took between 1 and 2 years for one quarter of the SSH clients (25.7%) to obtain their land. A similar proportion of the SSH clients took more than 5 years. One fifth of the applicants (20.0%) took between 3 to 4 years, 14.3% took between 2 to 3 years, 11.4%

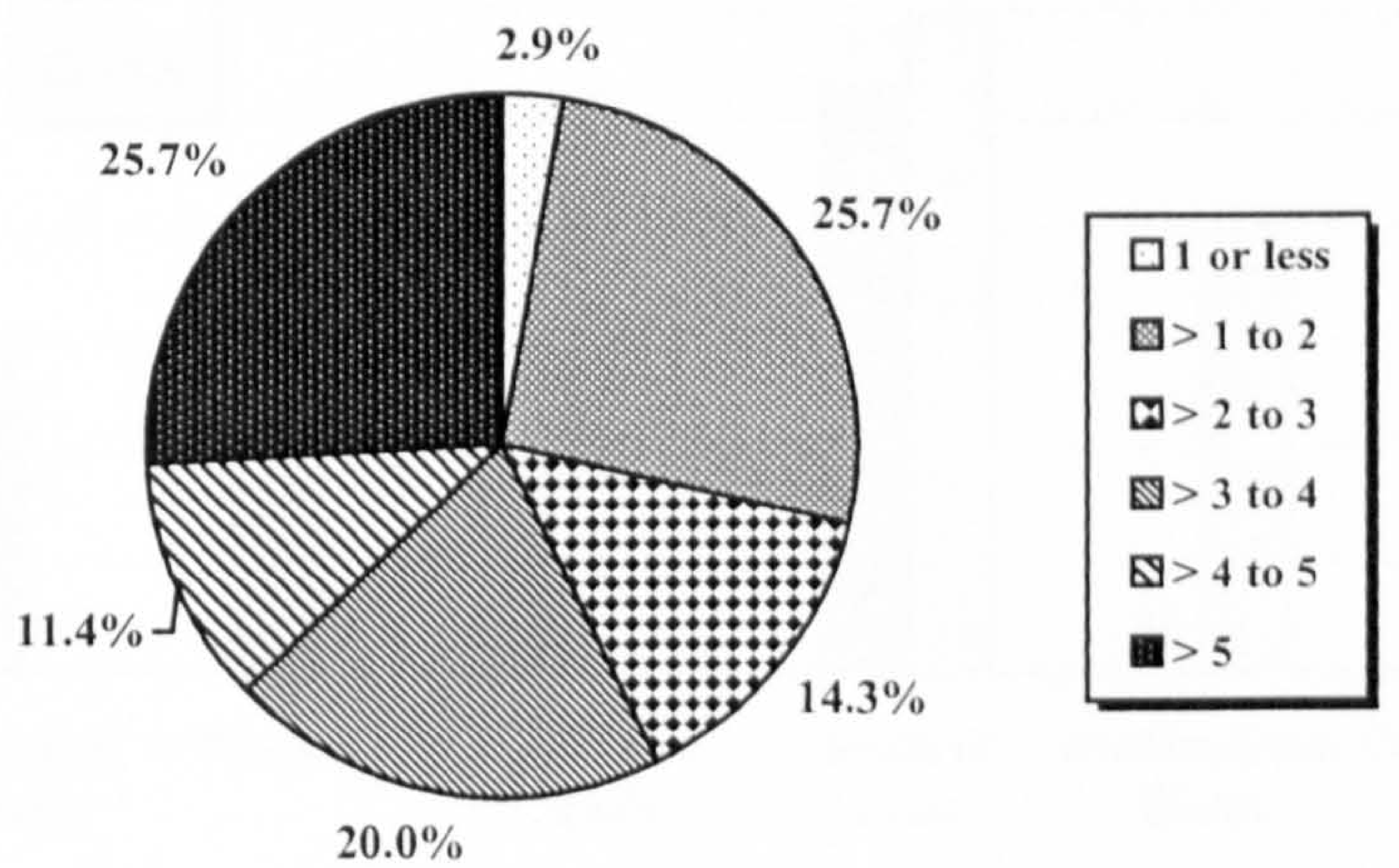


Figure (7.13): Duration (in years) for obtaining land from the Lands Dep. for SSH clients

took between 4 to 5 years and only 2.9% took one year or less to obtain land. The mean duration for obtaining land from the government was 3.9 years.

This difference of time for obtaining land from the Lands Department can be explained by the following reasons:

- As the number of infrastructure lands are limited, the number of developed lands offered by the Lands Department changes every year due to the changing budget assigned by the government for developing and distributing the infrastructure.
- Some of the clients who applied for land refused the proposed land offered to them by the Lands Department due to reasons, such as the size of the land, the location of the land, and/or the layout of the land. So they had to ask the Lands Department for another offer and this would continue until both parties could agree.

7.2.3 Location of Land

Figure (7.14) shows the location of houses that are under investigation. The Centre of Doha has no SSH because the government does not grant land in this region. On the other hand, the Modern Doha District is a region that the government allocates only to SSH projects.

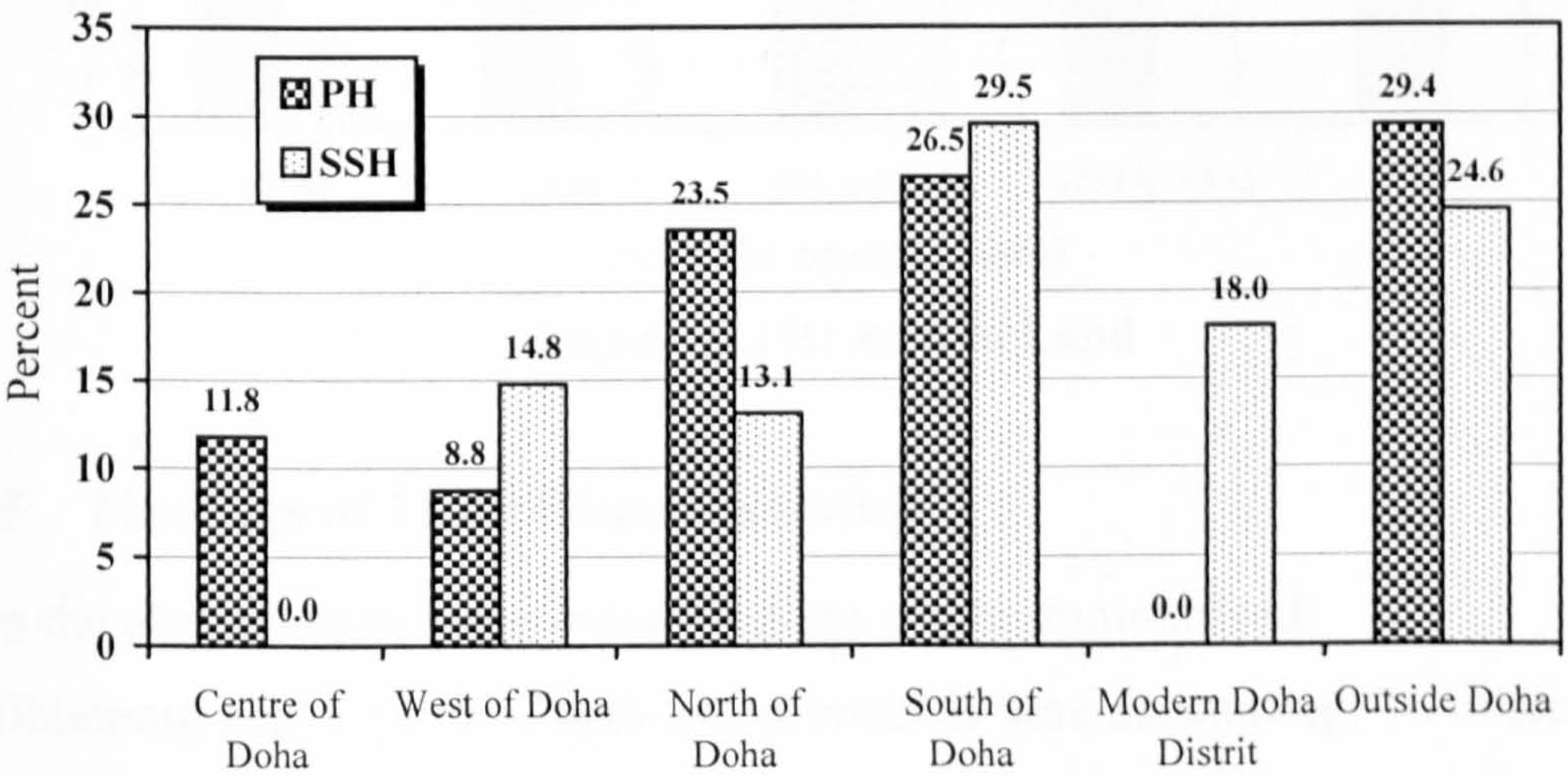


Figure (7.14): Region of Land

7.2.4 Area of Land

The standard land area determined by the Land department is 900 m^2 (10,000 ft^2). When allocating SSH lands the Lands Department tries, as much as possible, to grant land equal to or more than the standard area. Figure (7.15) shows the areas of land in the sample.

Figure (7.16) illustrates the relationship between the size of the lands studied (for both SSH and PH) and its location. Most of land where their area is less than 900 m^2 are located in the south region of Doha (5 out of 7). On the other hand, most of the Modern Doha Districts lay in the region between 1201 and 1500 m^2. The standard land area in this district is 1225 m^2. On average, the largest lands are from the west region of Doha, while the smallest are from the centre part of Doha. That is because land in this part of the capital is very expensive.

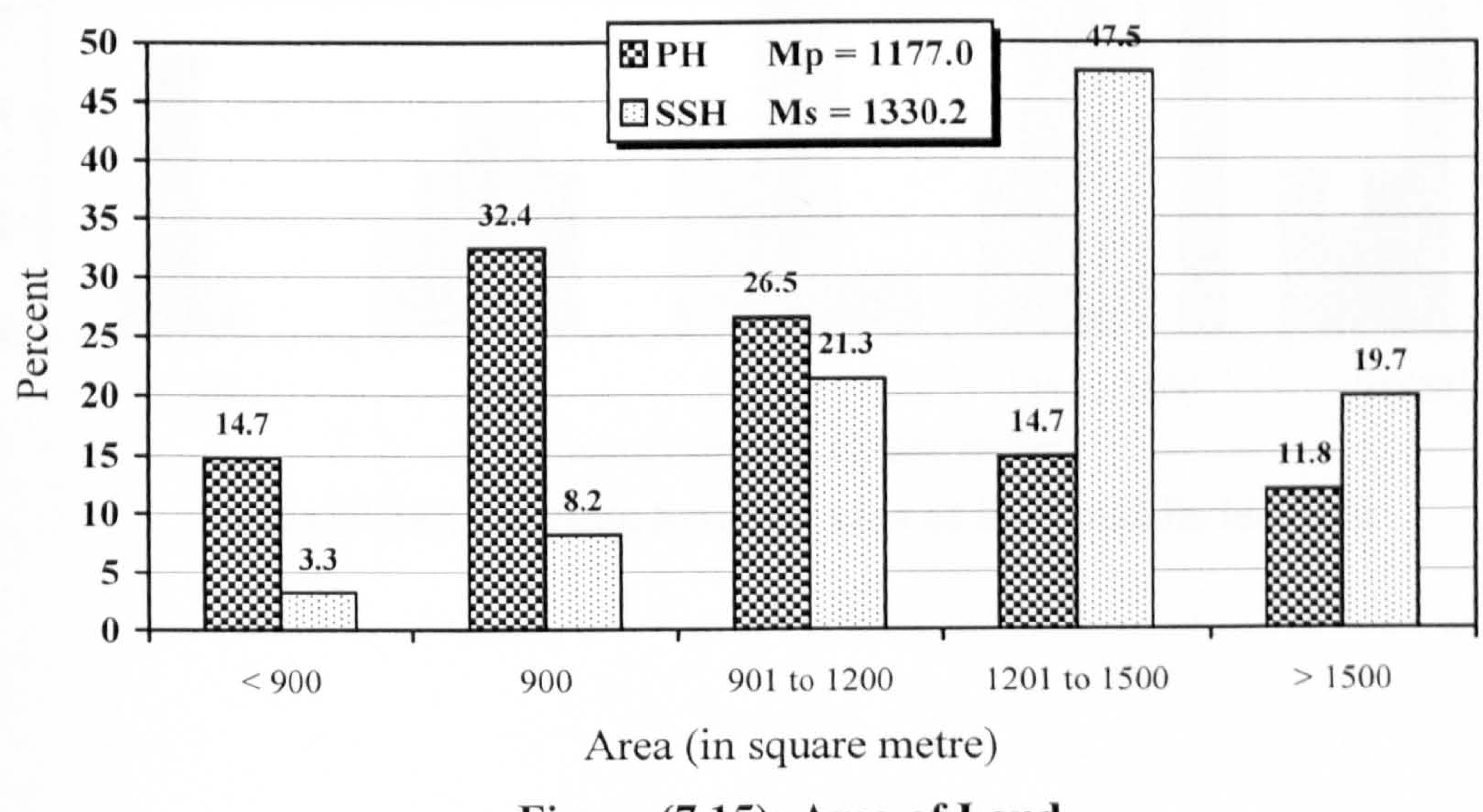


Figure (7.15): Area of Land

7.2.5 Findings of Land Characteristics

From the above results some initial findings can be summarised:

1. Obtaining land from the Lands Department is time consuming. To overcome this problem SSH clients tend to accelerate the acquisition of their land by

buying them privately and apply for the SSH loan directly and at the same time apply for compensation for the cost of the land from the government.

2. This approach also gives the SSH clients more choice about the location of their land and its size.
3. SSH clients are willing to sacrifice money in order to obtain the land that satisfies their requirements, as the amount of land compensation is, in general, less than the actual cost of the land.

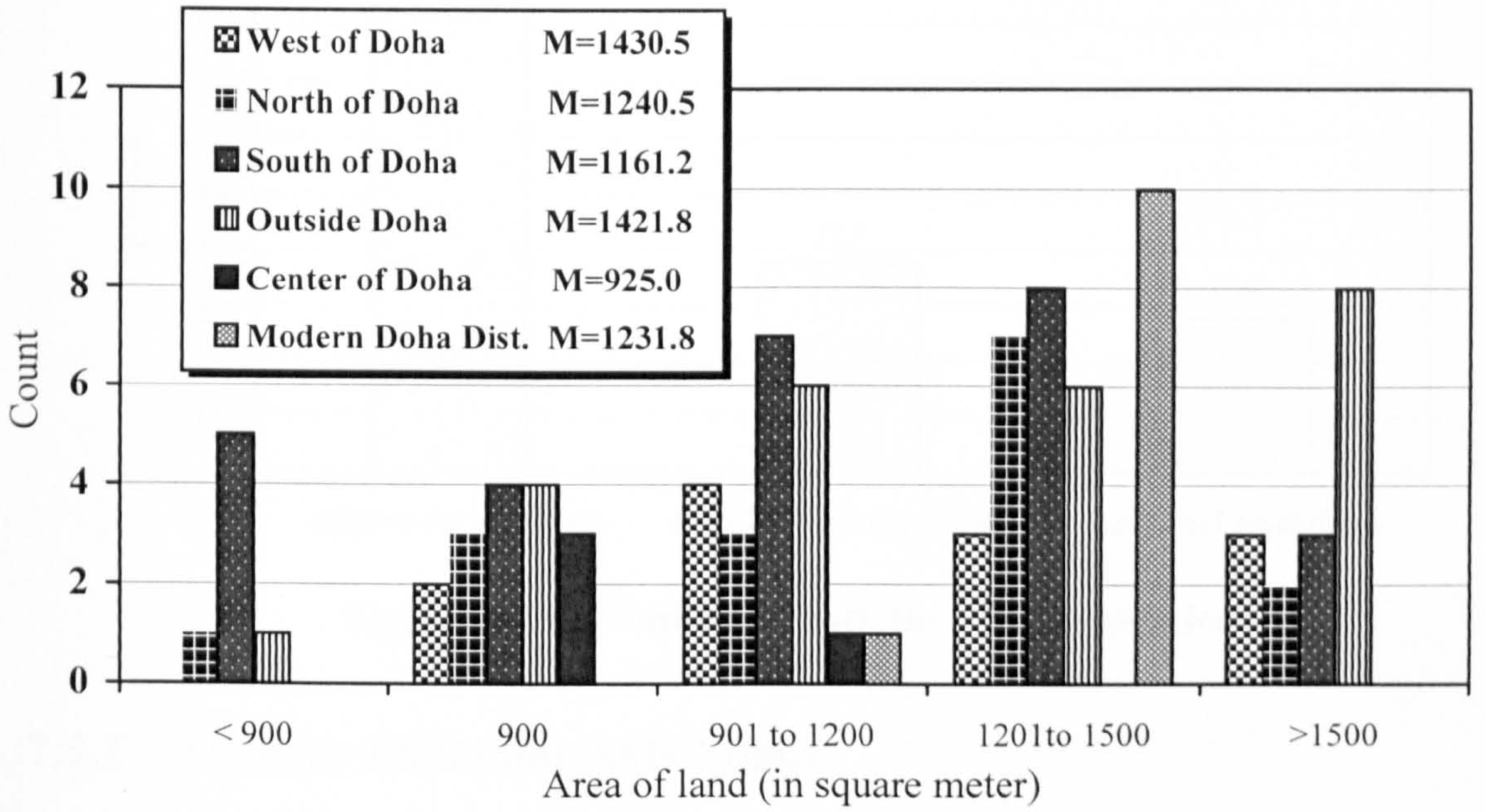


Figure (7.16): Relation between area of land and its location

7.3 Senior Staff Regulations and Funding Procedures

7.3.1 Familiarity with the SSH regulations

Figure (7.17) shows that all of the SSH clients have applied for funds from the bank. Only 37.7% had heard about the SSH regulations (decree No. 7 of 1977), and only 27.9% of SSH clients in the sample had read these regulations.

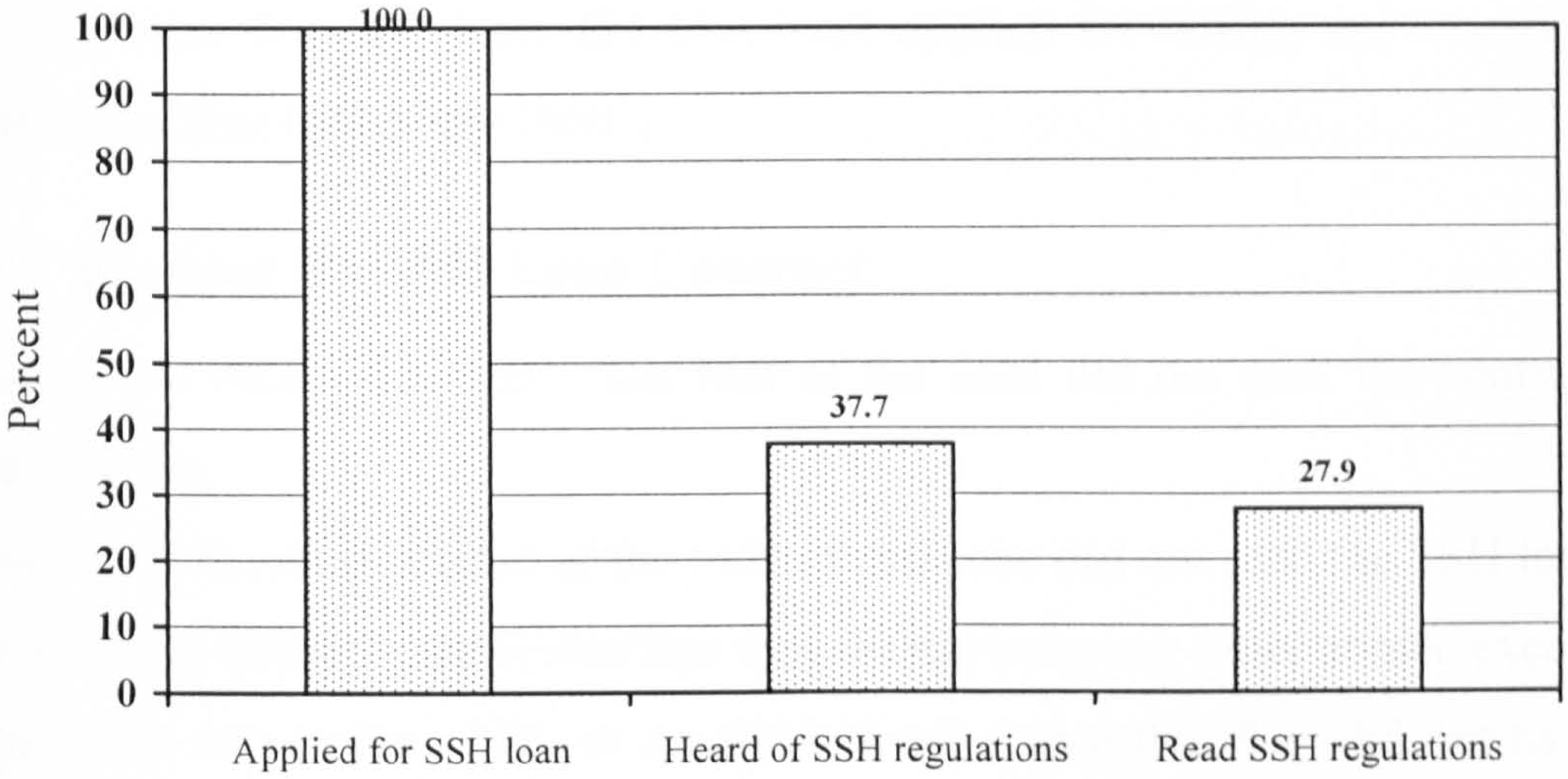


Figure (7.17): Familiarity with the SSH Regulations

7.3.2 Time for Obtaining SSH Loans

Figure (7.18) shows the time that it took for the SSH clients to obtain the SSH

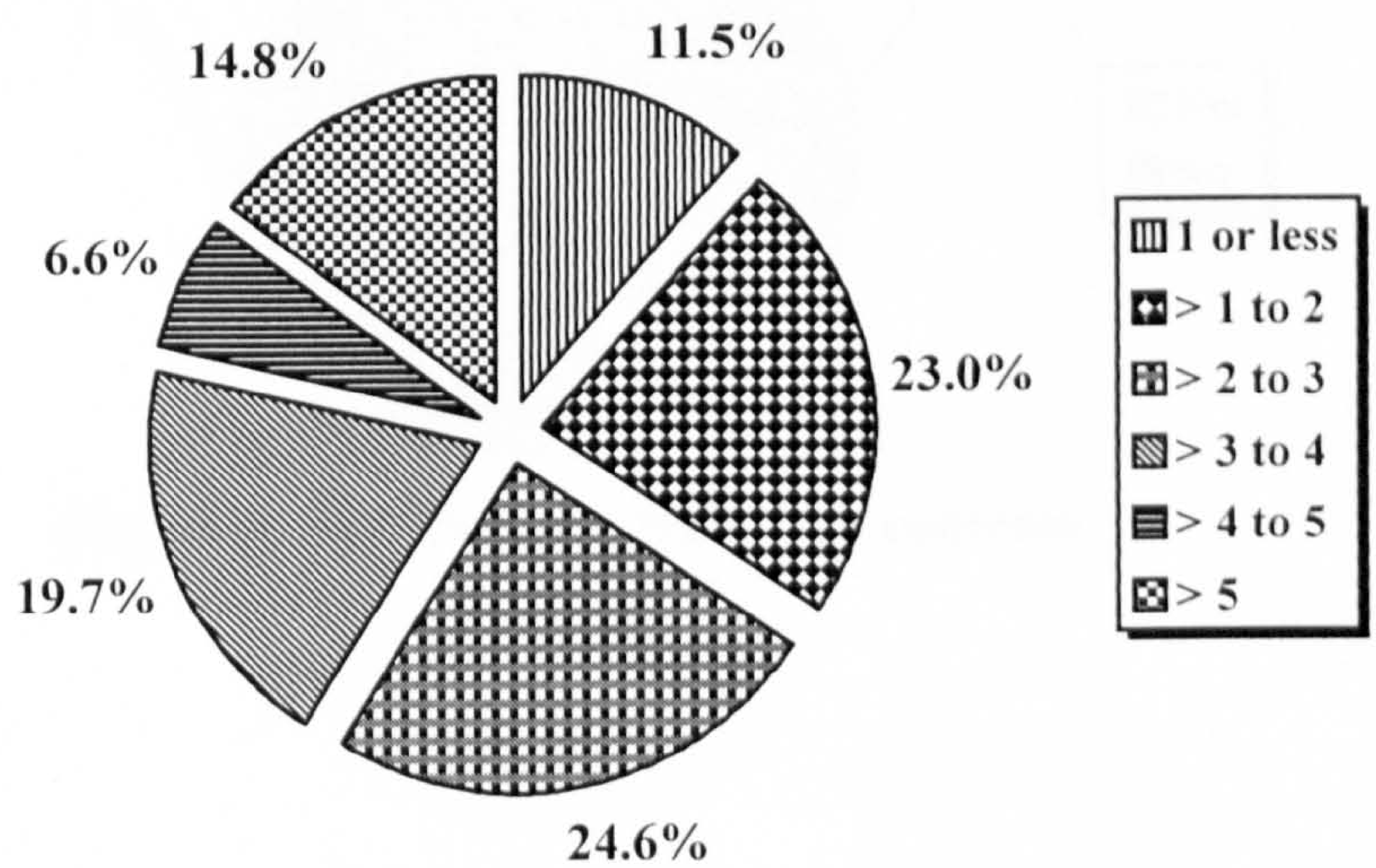


Figure (7.18): Time for obtaining SSH loan (in years)

loan. About a quarter of the sample size (23.0%) took between 2 to 3 years. Another quarter (24.6%) took between 3 to 4 years. One fifth of the sample (19.7%) took between 4 to 5 years. 14.8% took more than 5 years, 11.5% took 1 year or less. Finally, 6.6% took between 5 to 6 years. The mean time for obtaining the SSH loan was 3.24 years.

The large difference in duration for obtaining the SSH loan is due to the economic situation in Qatar. In fact, all of the projects that took more than four years to obtain the SSH loan, (21.4%) were applied for during the recession period of the first half of the 1980's.

7.3.3 Reading the SSH Loan Contract

Figure (7.19) shows that more than half of the SSH did not read the contract before signing.

Figure (7.20) shows that most of the SSH clients who did not read the SSH loan contract stated that the reason was that they do not have any other choice except to sign it, so why bother. 15% of the SSH clients stated that they did not have time to read it, 12% said it was difficult for them to understand the legal phrases of the contract, and the same percentage had other reasons.

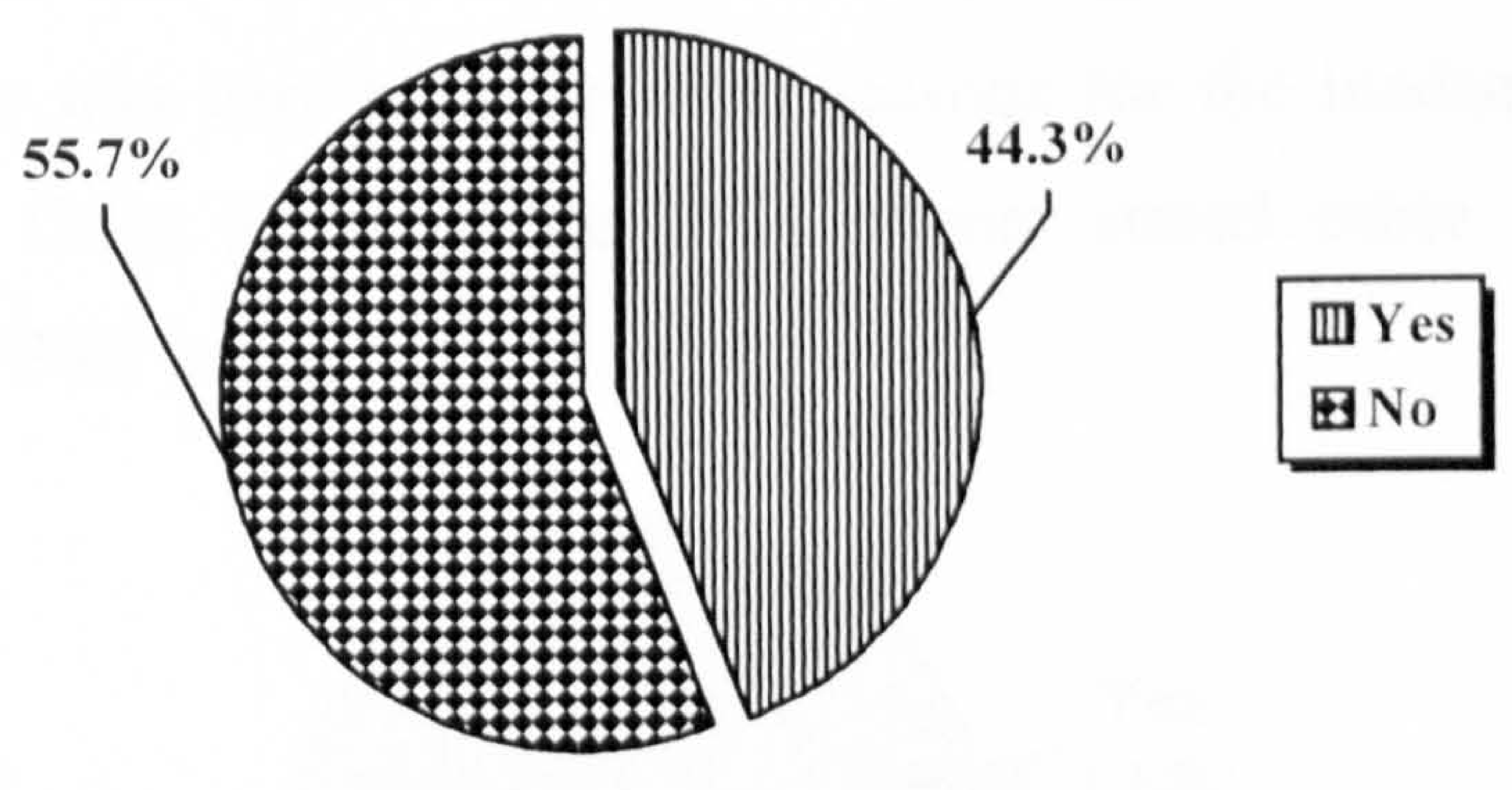


Figure (7.19): Read the SSH loan contract

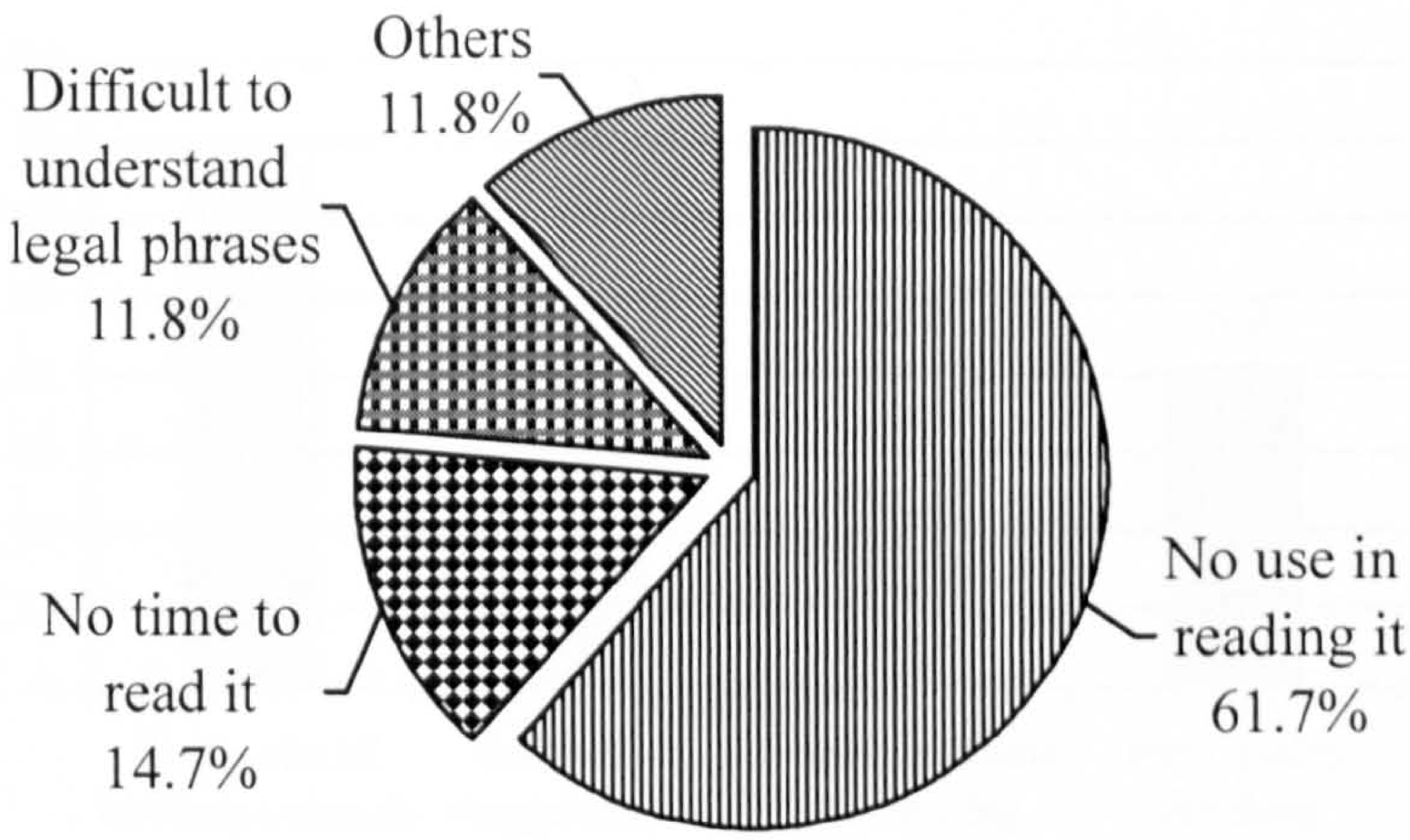


Figure (7.20): Reason for not reading the SSH loan contract

7.3.4 Adequacy of the SSH loan contract

Figure (7.21) shows that 98.4% of the SSH clients stated that the amount of the SSH loan (Q.R. 600,000) was not adequate to build their houses. Only one case of the whole SSH sample (1.6%) stated that the amount of the loan was enough to build the house.

Figure (7.22) shows that 70% of the SSH clients stated that the reason for the inadequacy of the SSH loan was the rising cost of building materials. It also shows that 41% of the SSH clients stated that the contractor's exaggeration of their net profit, the size of the houses were very big, and the quality of the finishing materials was very high are other reasons for the inadequacy of the amount of loan. Only 3.3% of the SSH clients stated other reasons for inadequacy of the SSH loan.

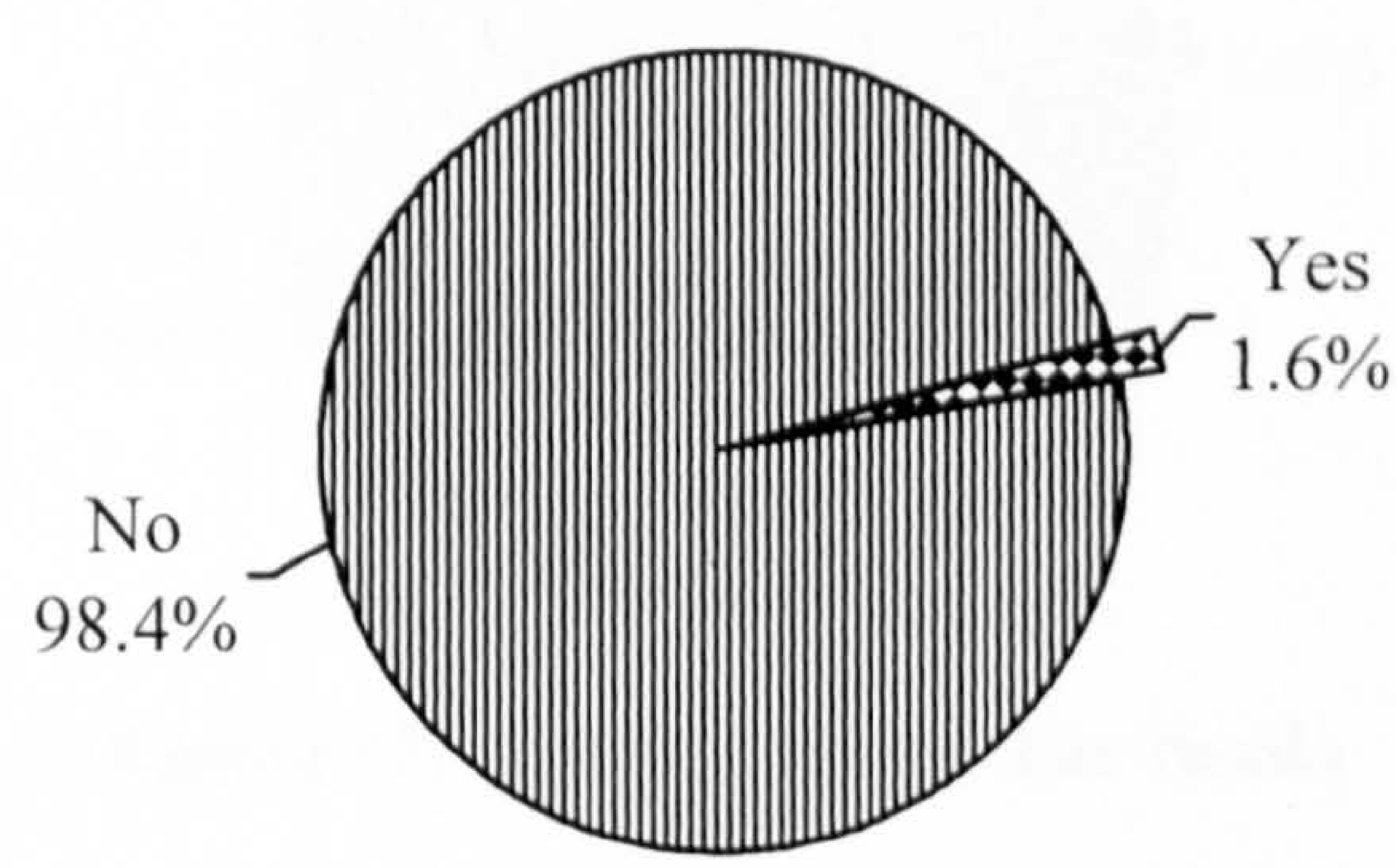


Figure (7.21): Adequacy of the amount of the SSH loan

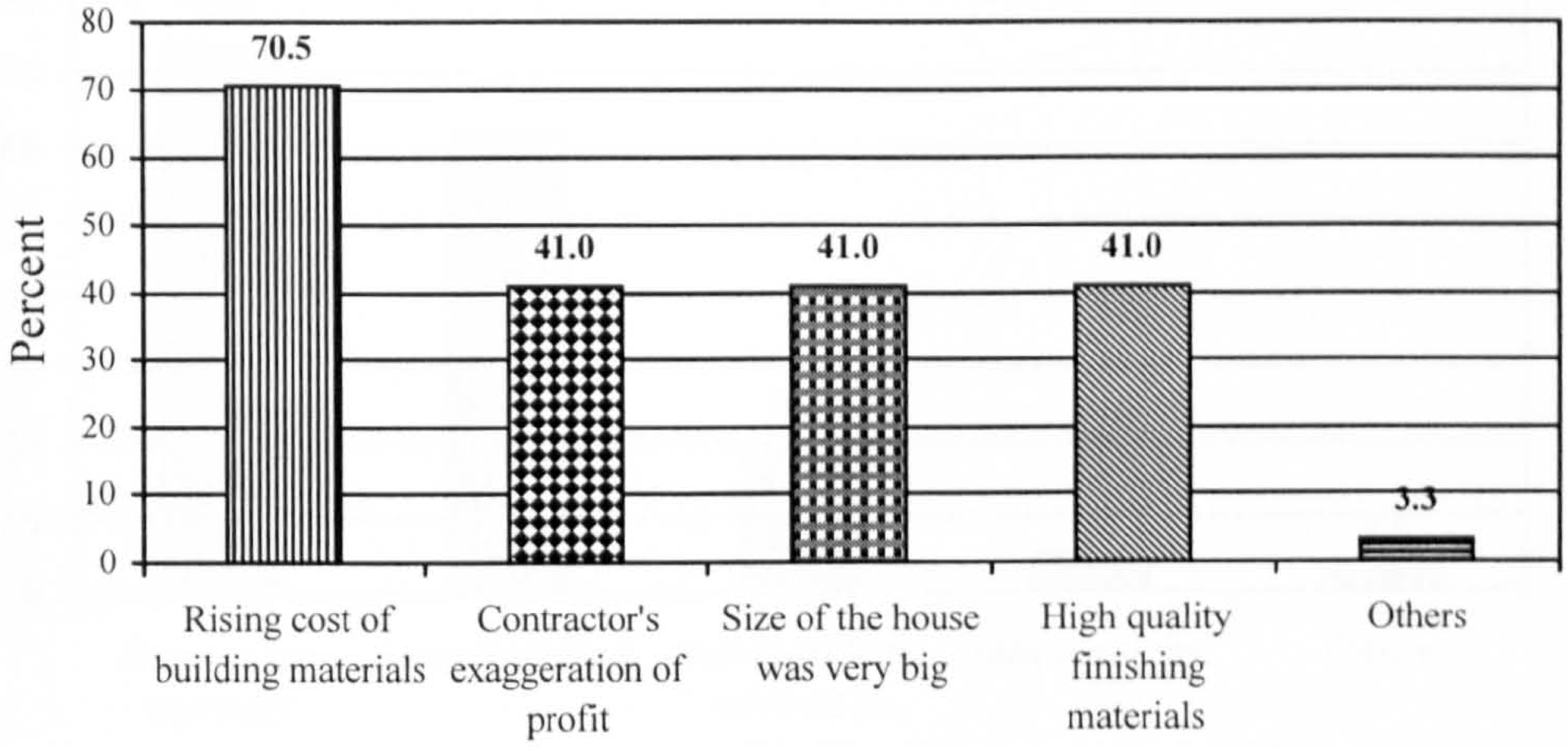


Figure (7.22): Reason for higher cost than amount of SSH loan

7.3.5 Sources of other funds

Figure (7.23) shows that 98.4% of the SSH clients obtained other sources of funds beside the SSH loan. In figure (7.24) these other sources are identified. Most of the SSH clients stated that they have raised more money to cover the cost of their projects from their own savings and from other bank loans. 19.7% stated that they had borrowed money from relatives or friends, 4.9% had gifts or charities, and 3.3% stated that they have raised money from other sources than that of the above.

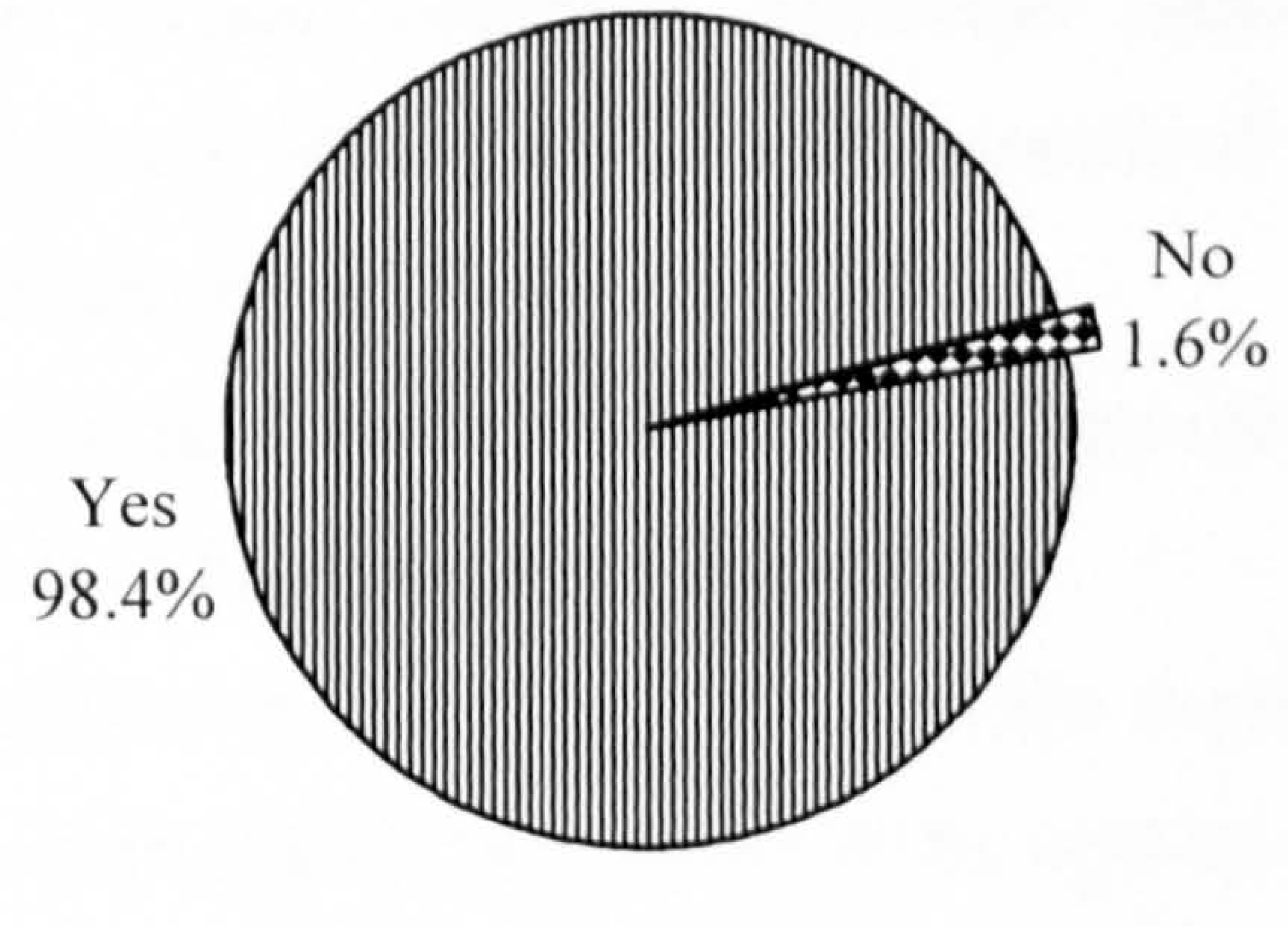


Figure (7.23):Obtaining other funds

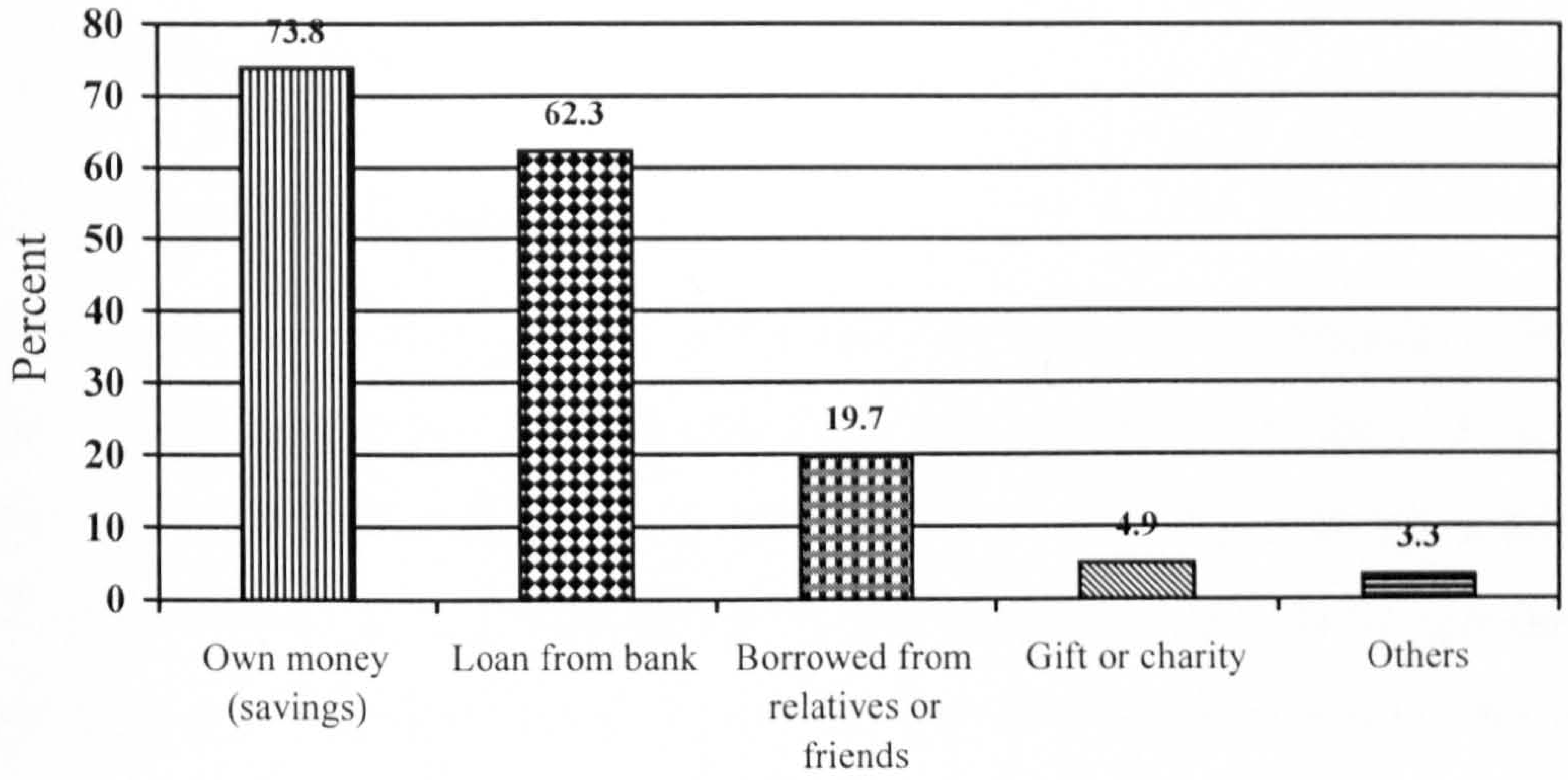


Figure (7.24):Sources of other funds

7.3.6 Findings from Senior Staff Regulations and Funding Procedures

From the above results some initial findings can be summarised:

1. Most of the SSH clients had not read the SSH regulations prior to wanting to build. Many have not even heard of them.
2. The time for obtaining the SSH loan is affected by the economic situation of the country.
3. The amount of SSH loan at present (Q.R. 600,000) is not enough for building houses that fulfil the needs of the SSH clients. Furthermore, the finding of SSH clients' obtaining additional loans from other sources indicates that they are willing to raise the amount of recover instalments if they had a larger amount of loan.
4. The cost of building a house has increased through the years, while the amount of SSH loan has been fixed since 1982.
5. SSH clients are keen to build their house to the highest standards with the highest quality, even if they have to cover the cost by further borrowing and accepting higher psychological pressures.

7.4 Design Phase

7.4.1 Selecting the Designer

Figure (7.25) shows that most of the clients selected their designers through friends' recommendations. 23.5% of the PH clients stated that they chose their designers through past experience, while 18% of the SSH clients stated the same reason. 5.9% of the PH clients stated that they had other reasons for choosing their designers, while 16.4% of the SSH clients stated the same reason. Most of the SSH clients who chose this stated that they have got their drawings from the Modern Doha District Office (Senior Staff Housing Project).

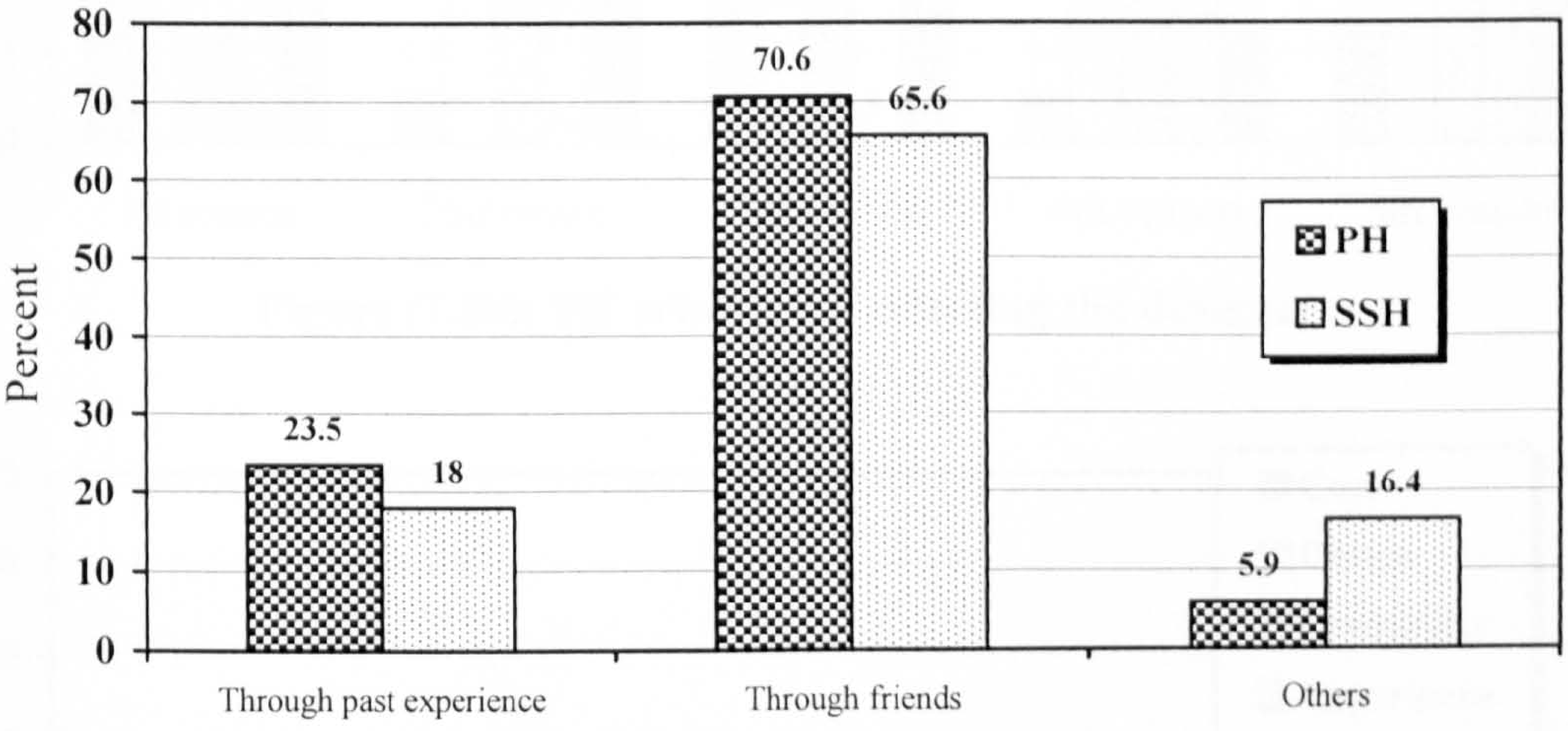


Figure (7.25): Way of selecting the designer

7.4.2 Criteria for Selecting the Designer

By looking at figures (7.26)[1] and (7.27) one can find that the criteria for selecting the designer is more evenly distributed with the SSH clients than with the PH clients.

---

[1] Notice that for figure (7.26) and (7.27) the totals for every category and for every rank may not equal to 100%.

Although the cost of the design was the primary reason for selecting the designer for both SSH and PH clients, SSH clients give a balance weight between cost and design as the first reason (26.2% and 24.6%

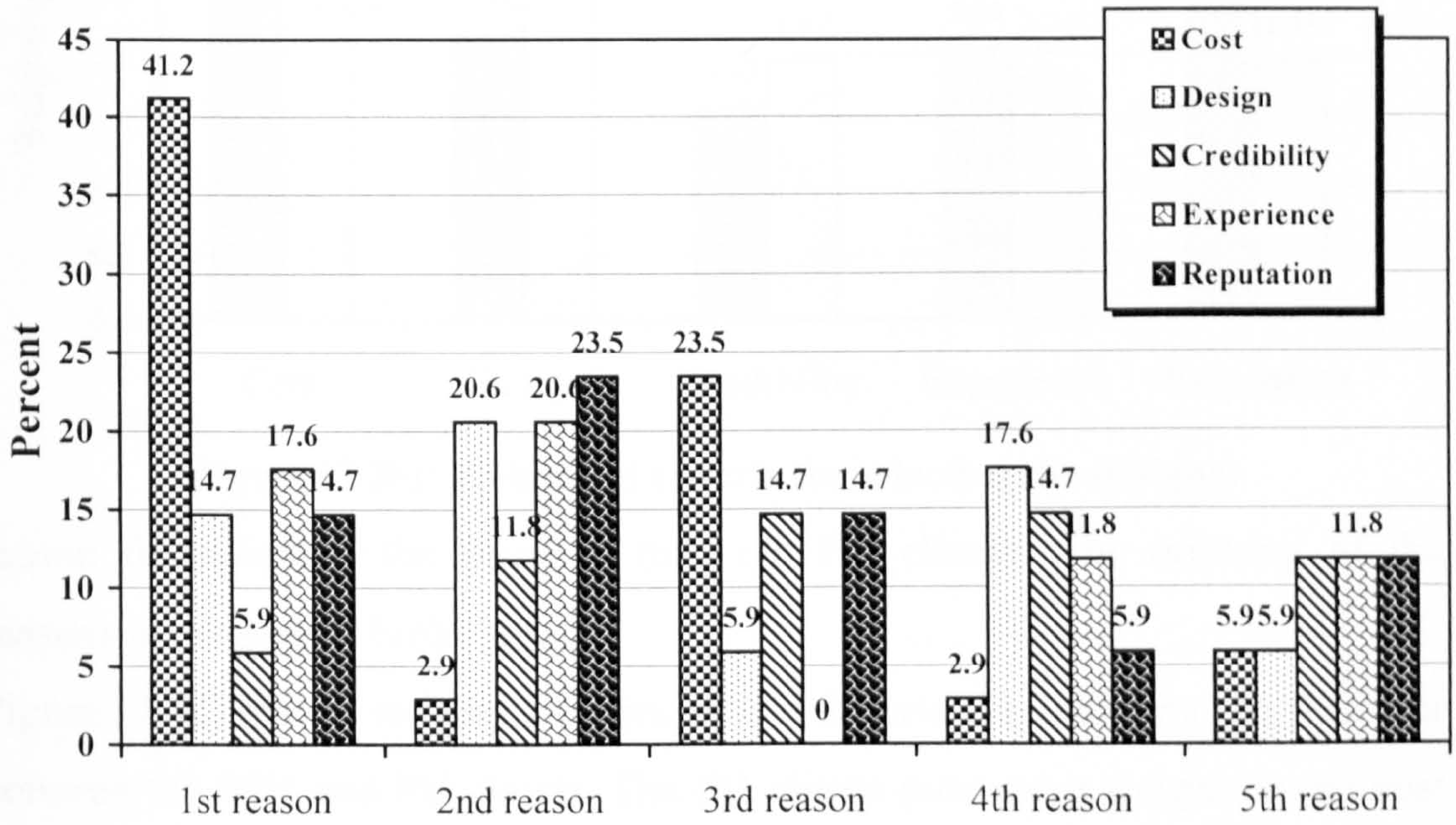


Figure (7.26): PH criteria for selecting the designer

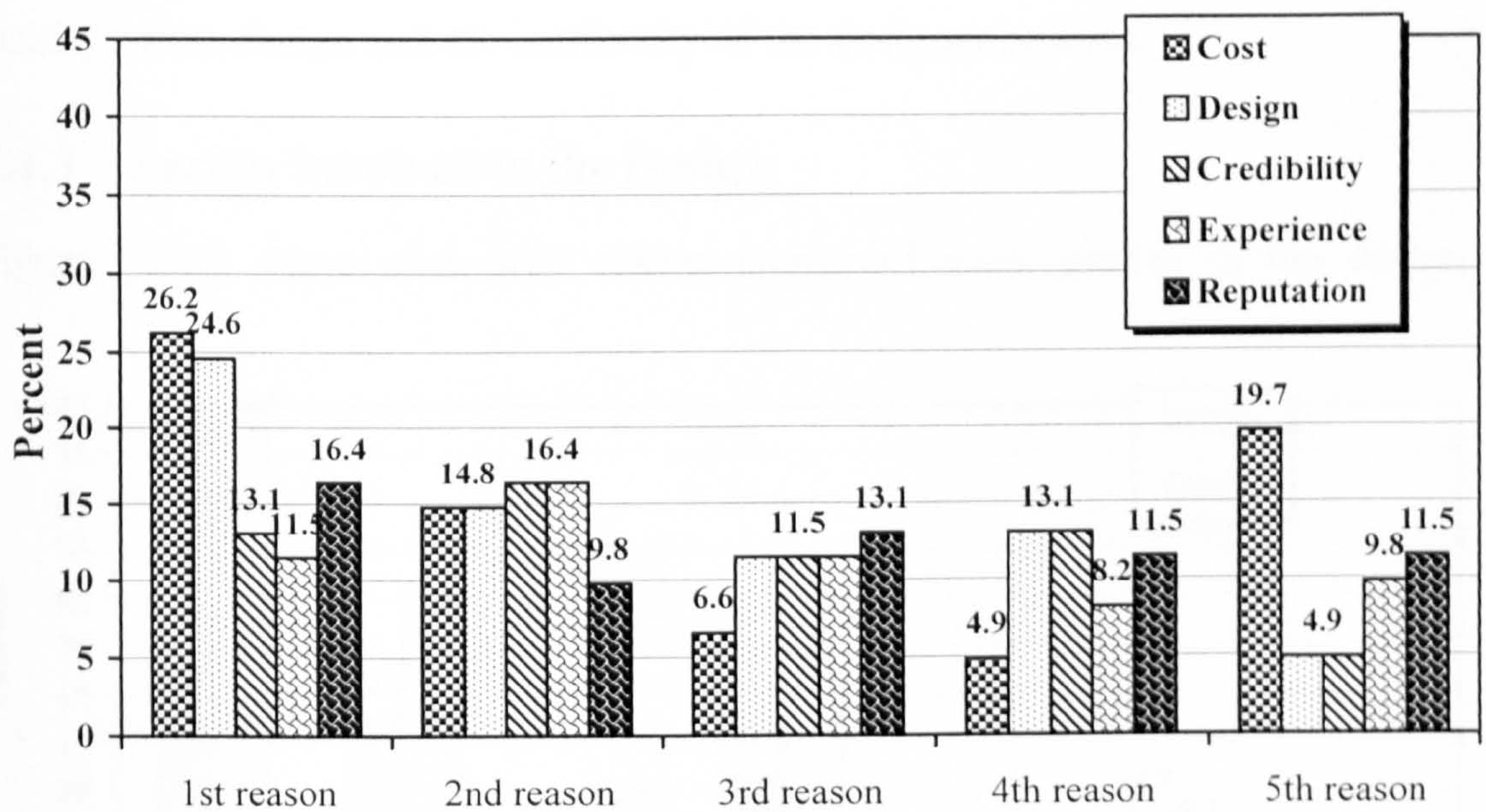


Figure (7.27): SSH criteria for selecting the designer

respectively). For the quality of the design, the credibility and the reputation of the designer a greater number of SSH clients stated these criteria as the first

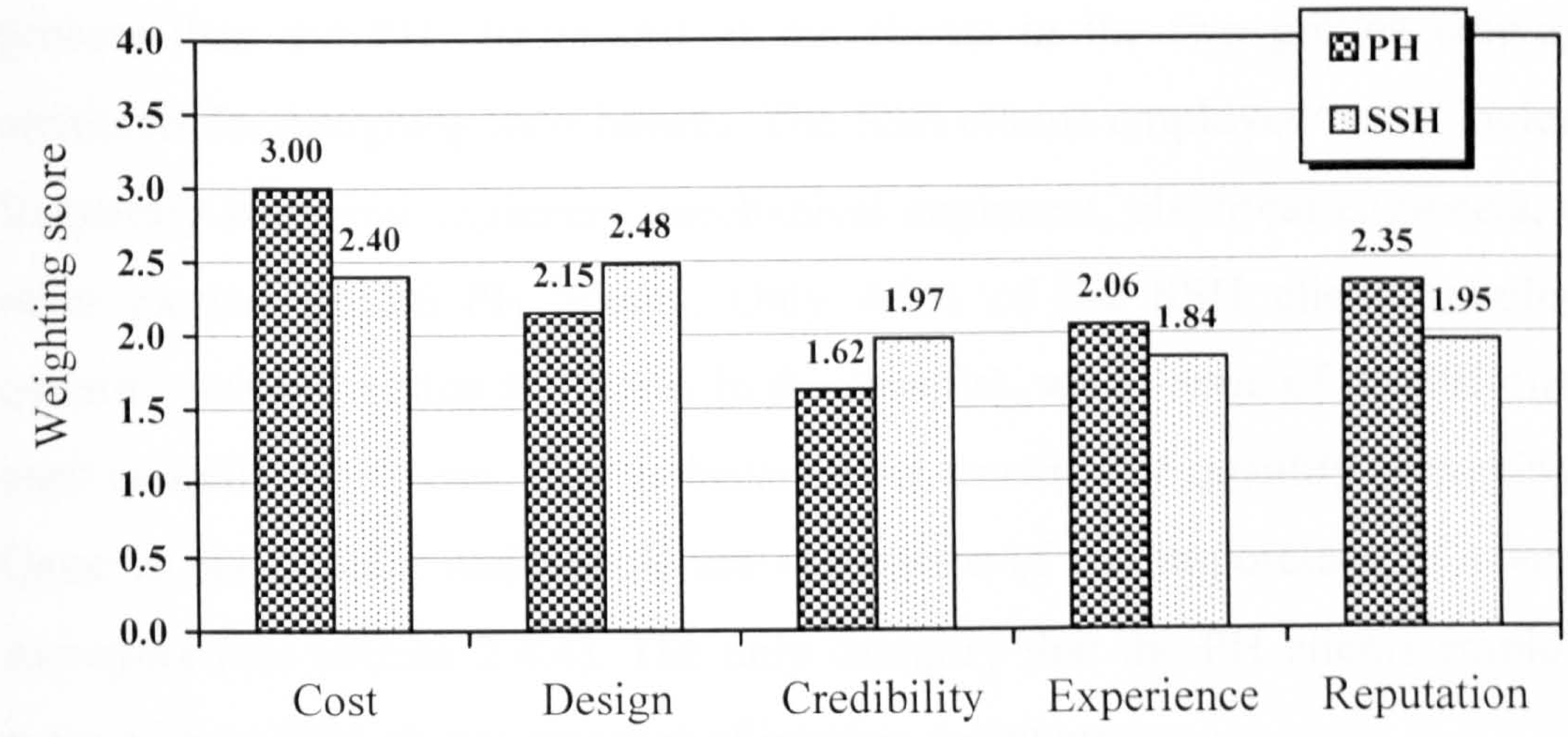


Figure (7.28): Weights of criteria for selecting the designer

reason for selecting the designer than did PH clients. The ordering of the reasons are shown in both figures.

Figure (7.28) shows weighted scores of the criteria for selecting the designer between the SSH and PH clients. The PH clients puts more weight on the cost of the design, experience and the reputation of the designer than do SSH clients when they select the designers of their houses. The opposite is true for the quality of the design and the credibility of the designer criteria.

7.4.3 Parties Involved in the Design

Figure (7.29) shows that SSH clients employed more parties in the design

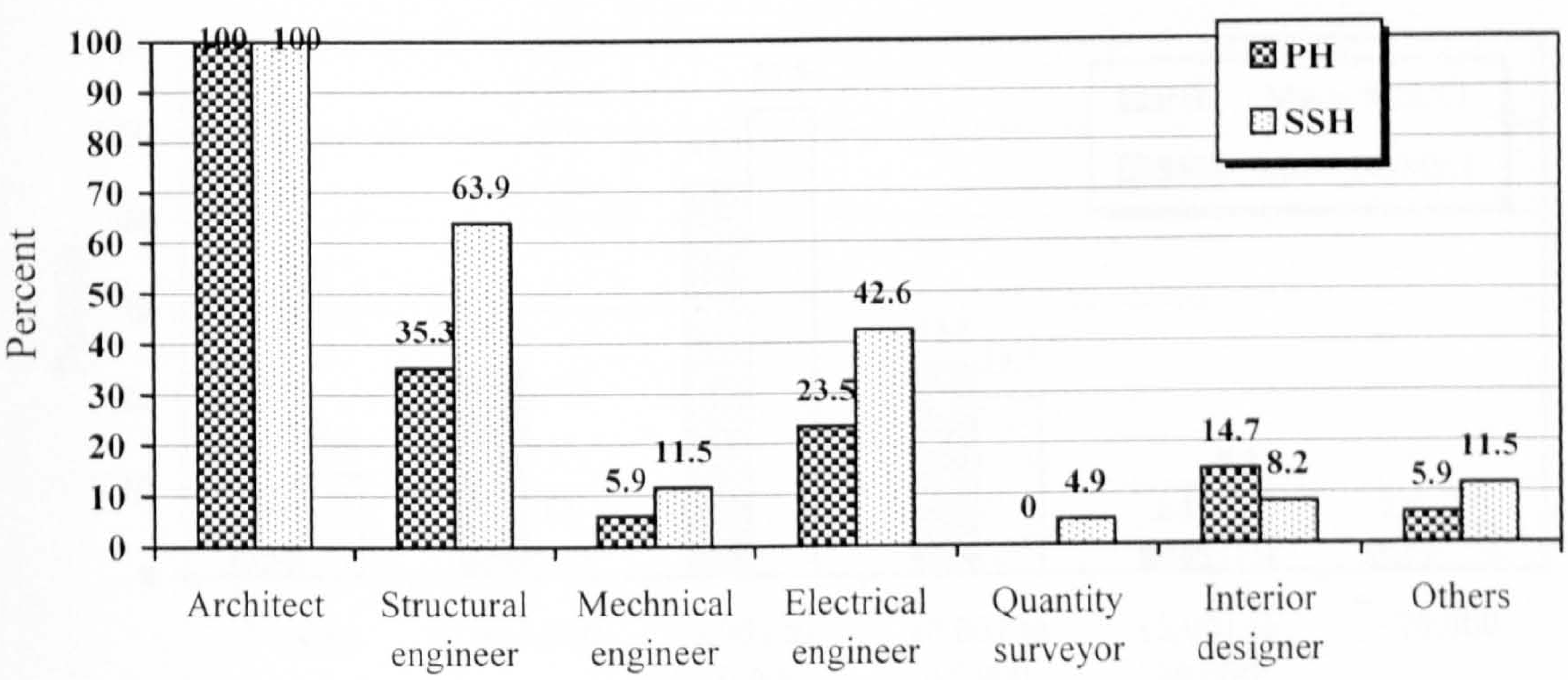


Figure (7.29): Parties involved in the design

process than did PH clients. All of the clients in the two groups employed architects for designing their houses. The SSH clients employed nearly twice as frequently structural engineers, mechanical engineers, electrical engineers, and other parties, as did PH clients. Only 4.9% of the SSH clients employed quantity surveyors (that is 3 cases in the sample), while none of the PH clients used quantity surveyors. That is because the practice of quantity surveying in Qatar is not popular and people are not aware of the importance of quantity surveyors (see section 2.4.4). The only category that the PH clients employed more of than SSH clients was that of interior designers.

7.4.4 Cost of Design

Figure (7.30) shows that the largest percentage of design cost fell between Q.R. 5,001 and Q.R. 10,000. More than half of the SSH clients (52.5%) and 44.1% of the PH clients fall into this category. About one quarter of the PH clients (23.5%) and one fifth of the SSH clients (19.7%) spent between Q.R. 10,001 and Q.R. 15,000. The same percentage of the PH clients spent between Q.R. 1 and 5,000, while only 3.3% of the SSH clients (two cases of the sample) did. 8.2% of the SSH clients spent between Q.R. 15,001 and 20,000, while only 2.9% of the PH clients (one case of the sample) did. This latter fact is also applicable for spending over Q.R. 20,000 and no cost at all. For the SSH clients

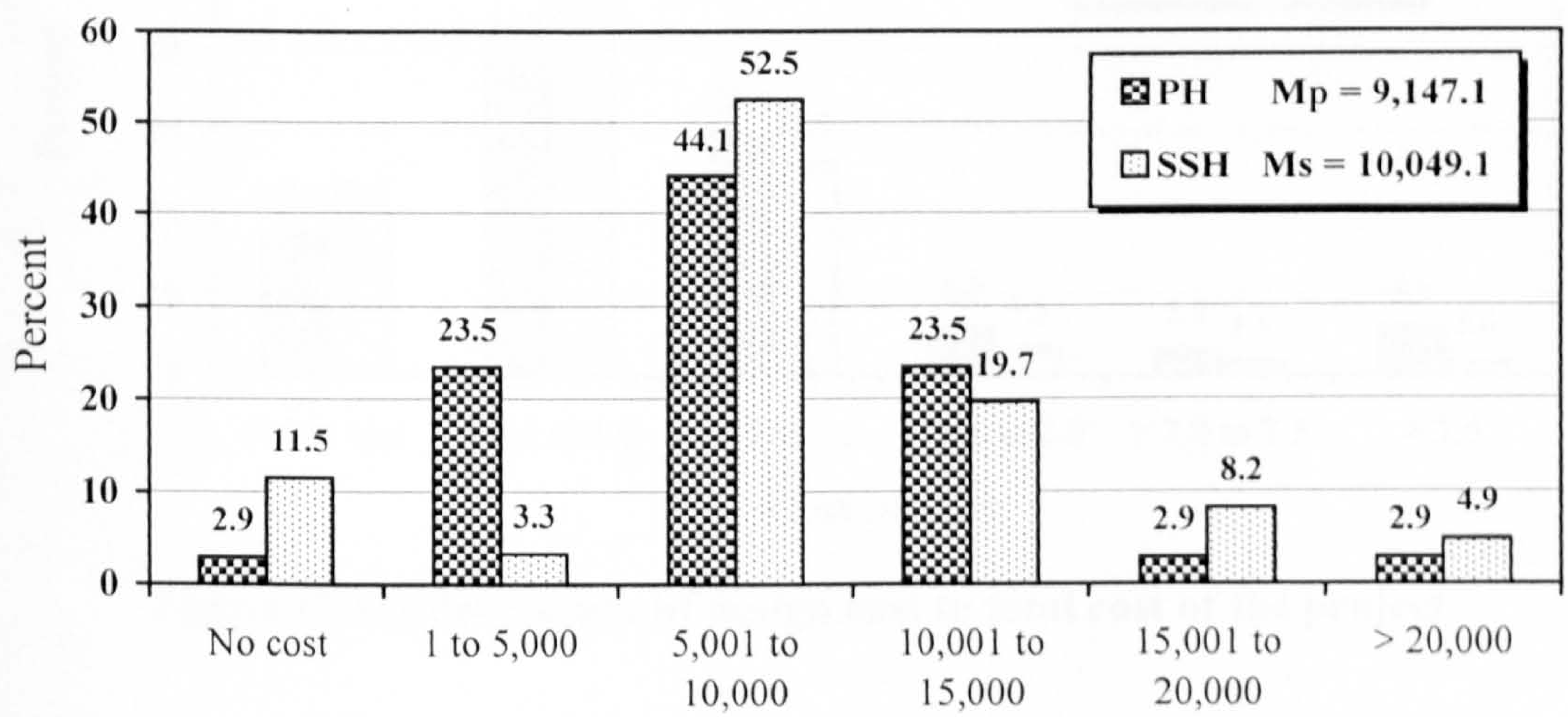


Figure (7.30): Cost of design (in Q.R.)

4.9% of them spent more than Q.R. 20,000 for their design, while more than one tenth of the sample (11.5%) did not spend anything. This is mainly due to the fact that these clients are in the Modern Doha District which means that they have the choice of selecting one of the designs produced by the Senior Staff Housing Project. Although this free service is available for the SSH clients whose land is located in the Modern Doha District, more than one third (36.4%) of this category in the sample did not make use of this service, as they thought by going to private designers they will achieve better design.

Figure (7.31) illustrates percentage of design cost to the total cost of the SSH and PH projects. Most of the projects from both groups spent between 0.5% to 1.5% of the total cost of the projects to the design. While only 14.7% form PH and 6.6% from SSH spent more than1.5% of the total cost on design. Out of the 18.0% who spent 0.5%, 11.5% of the SSH clients used the benefit of designing their houses free of charge since their houses are located in Doha Modern District. These figures are considered to be very low to the appropriate cost of design, which is usually not less than 2.5% of the final cost of typical housing project.

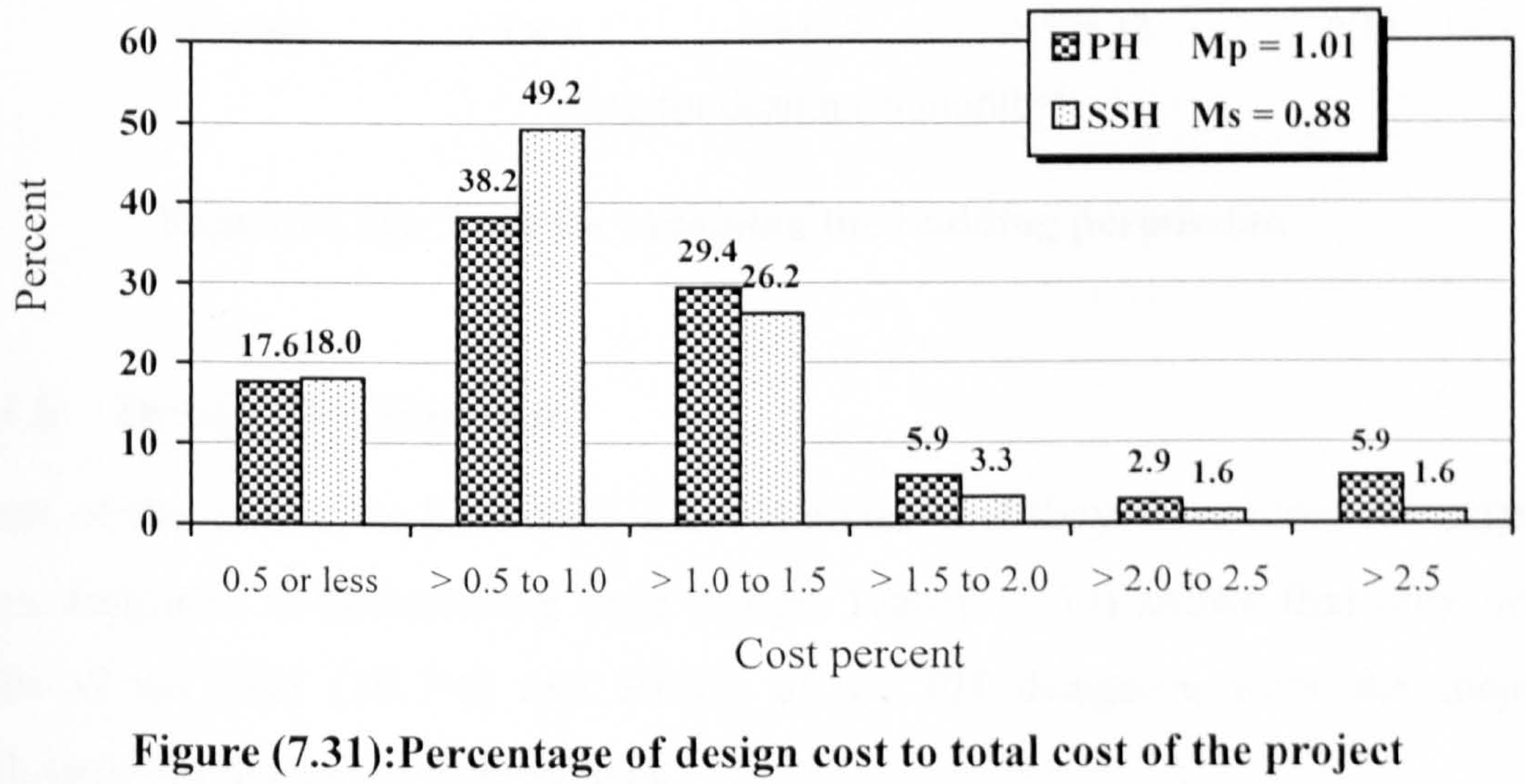


Figure (7.31):Percentage of design cost to total cost of the project

7.4.5 Time for Obtaining the Building Permission

Figure (7.32) illustrates the time that it took to obtain building permission from the Planning Department. One third of the PH projects (32.4%) took three months or less, compared with one fifth of the SSH projects (19.7%). The largest percentages for both of the groups were between three to six months. Half of the PH projects (50.0%) and two thirds of the SSH projects (68.9%) fall in this category. 8.8% of the PH projects took between nine to twelve months, while only one case of the SSH projects (1.6%) did. 3.3% of the SSH projects (two cases) took more than twelve months to obtain building permission while no PH projects fall under this category. Overall PH projects took less time to obtain building permission than did the SSH projects.

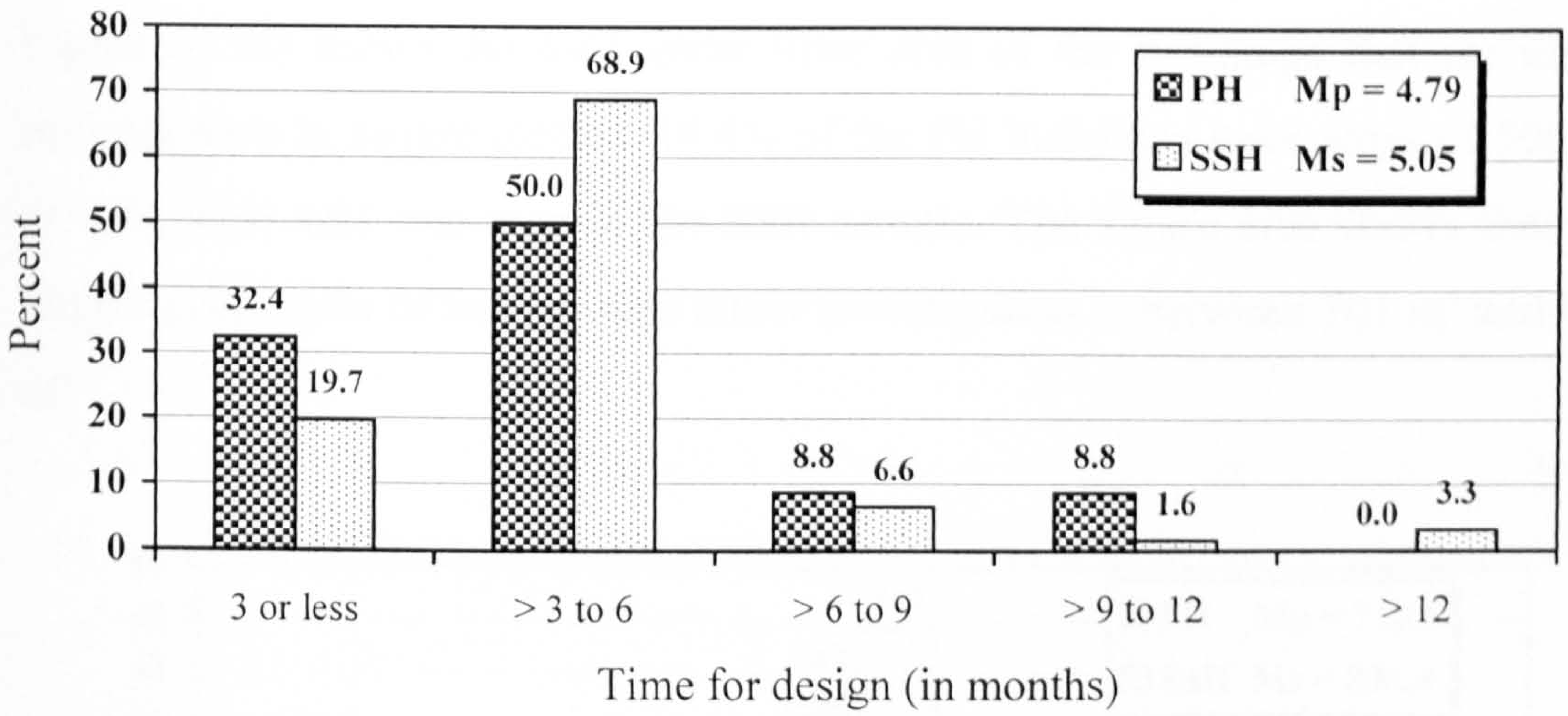


Figure (7.32): Time for obtaining the building permission

7.4.6 Design Domination

Most of the clients for both SSH and PH stated that they were more dominant than designers in determining their design. Figure (7.33) shows that only one fifth of the SSH (19.7%) and 29.4% of the PH designers were the major influence for designing their houses.

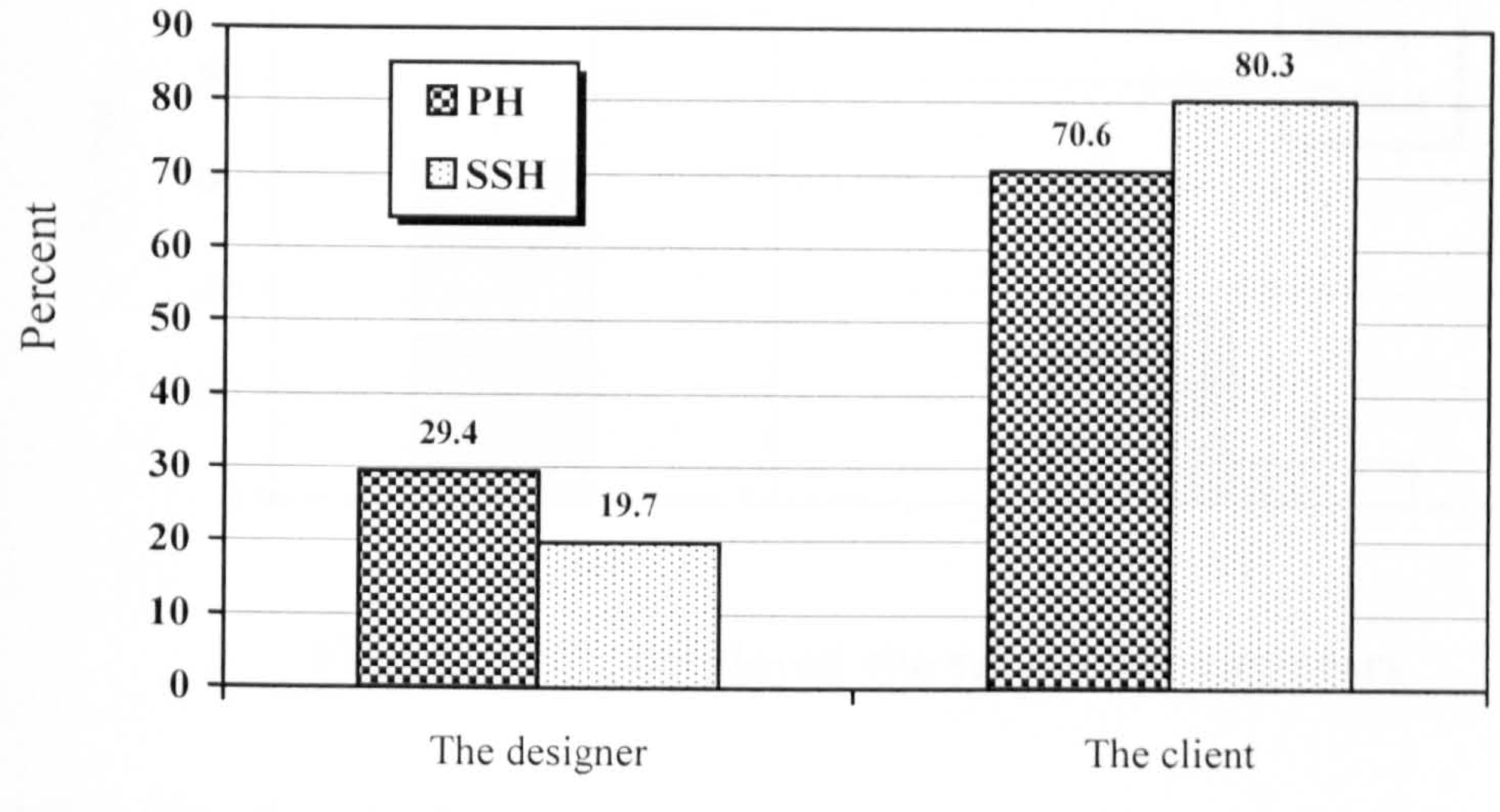


Figure (7.33): Domination of design

7.4.7 Total Gross Floor Area of the Building

Figure (7.34) shows the total gross floor area of the buildings that are under investigation in square metres. 29.4% of the PH buildings have areas of 500 m^2 or less, with only one case in the SSH sample. The figure also shows that the largest proportion of both groups under investigation is between 701 m^2 and 900 m^2.

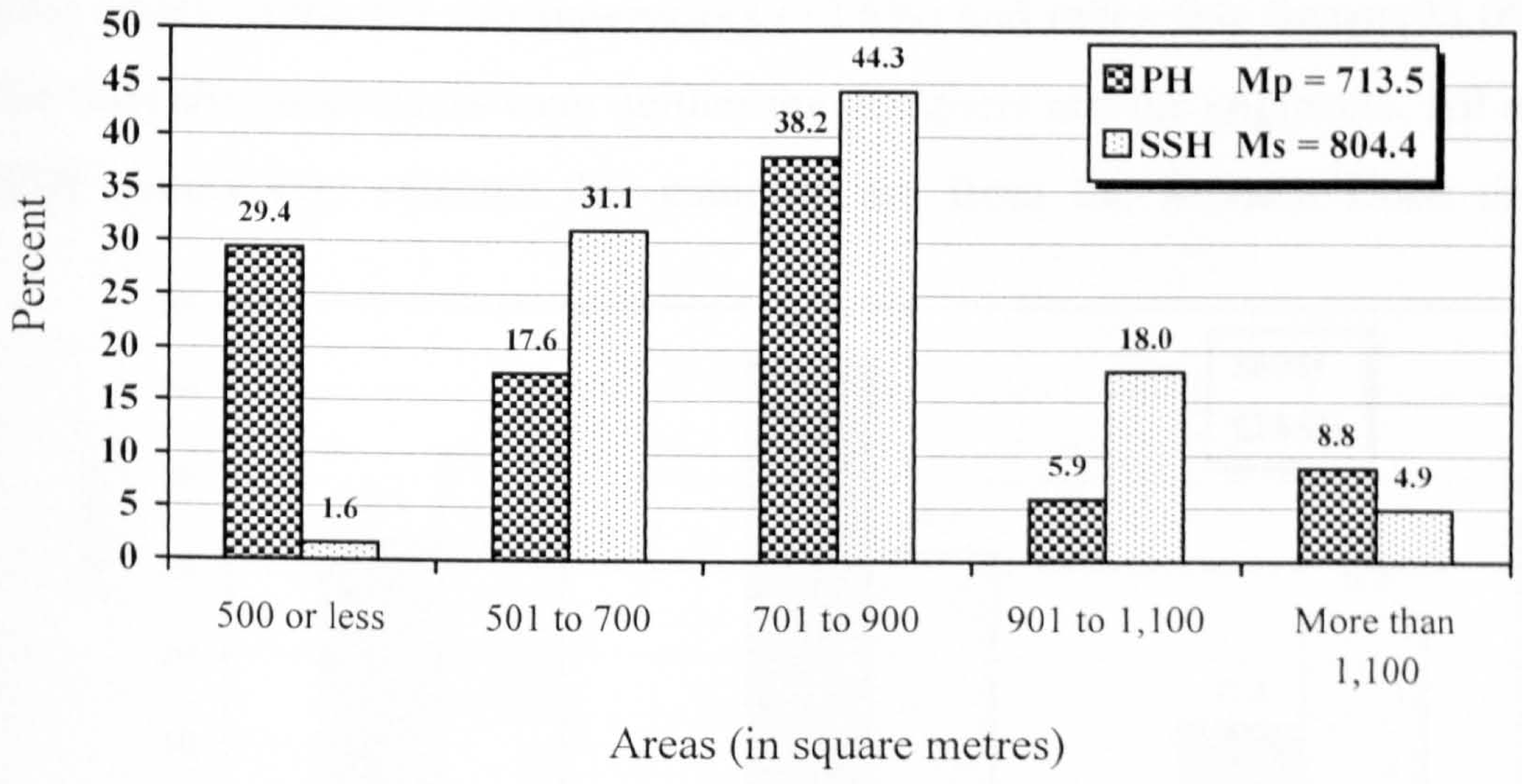


Figure (7.34):Total gross floor area of the building

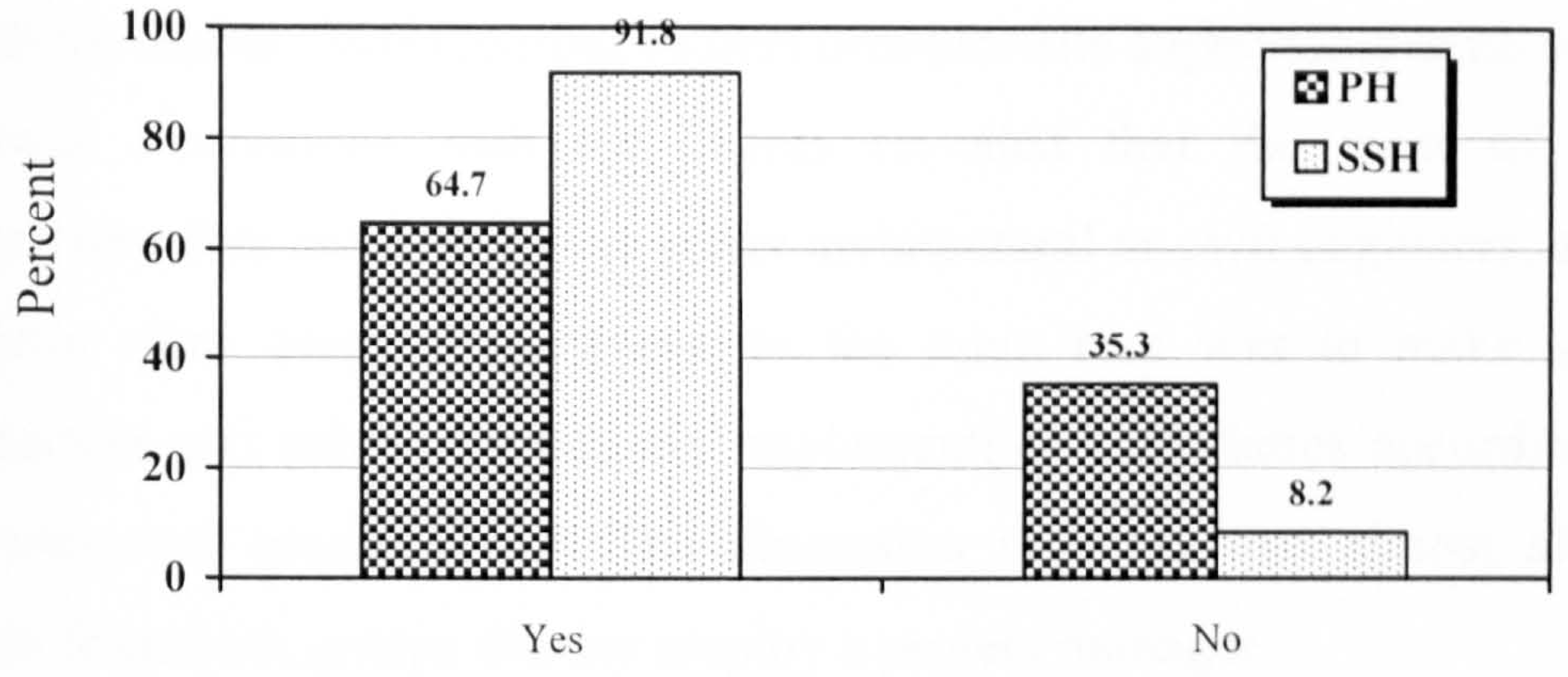


Figure (7.35): Employed site supervisor engineers

7.4.8 Site Supervisor

Figure (7.35) shows whether the clients of SSH and PH had employed site supervisors during the construction of their projects. 91.8% of the SSH clients employed site supervisors, compared with about two thirds of the PH clients (64.7%).

Figure (7.36) shows that 42.9% of the SSH clients and one third of the PH clients, of those who employed site supervisor engineers, employed the same designer as their site supervisor. One third of the SSH site supervisors (32.1%) and more than half of the PH site supervisors (54.2%) were not the designer. One eighth of the PH site supervisors (12.5%) and twice this figure (25.0%) of the SSH site supervisors were neither the designers nor the engineers. All of the SSH clients who selected this category are from the Modern Doha district

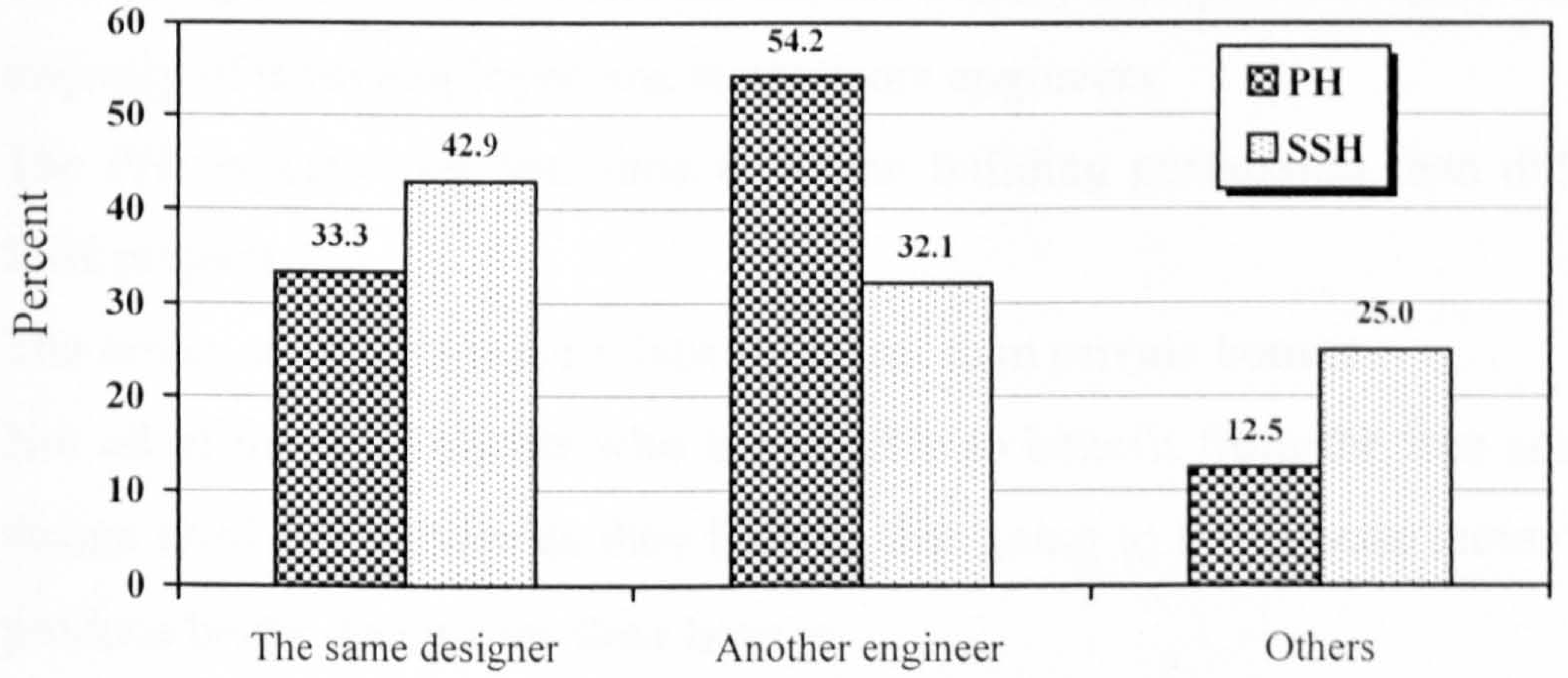


Figure (7.36): Who was the site supervisor engineer?

which the Senior Staff Housing Project provides site supervisors at no cost. Informal discussions with the clients revealed that the most of the site supervisors they employed were either architectural or civil engineers, and none of them were quantity surveyors, as the main task was to make sure that contractors and subcontractors are implementing their duties according to the drawings and specifications. The discussion revealed that almost all of the clients from both groups did not employ a project manager.

7.4.9 Findings Related to the Design Phase

From the above analysis some initial findings can be summarised as follows:

1. The PH clients were keener to design their houses with less cost than the SSH clients, but were nevertheless keener to have a good design.
2. In order to have good designs, SSH clients employ more consultants during the design phase.
3. Both groups, SSH and PH clients, do not give much consideration to the role of the quantity surveyor during the design phase of the project, as a result of the general unawareness in the construction industry of the role of quantity surveyors.
4. Percentage cost of design to the total cost of the project in most of the PH and SSH projects was between 0.5% to 1.5%. This is considered very low as proper design cost should be at least 2.5% of the final cost of the project.
5. Both groups, SSH and PH clients, did not employ a project manager, but the majority of them employed site supervisors engineers.
6. The PH projects took less time to obtain building permission than did the SSH projects.
7. The senior staff houses are relatively larger than private houses.
8. Not all of the SSH clients who are eligible to benefit from the free cost of design used this service as they believe that going to the private sector will produce better designs for their houses.

7.5 Construction Phase

7.5.1 Procurement Methods

Figure (7.37) shows the procurement methods that PH and SSH clients adopted for building their houses. PH clients chose different procurement approaches to those of SSH clients. SSH clients used the traditional procurement method more than any other procurement approach. In fact, two thirds of the SSH clients (65.6%) chose this method of procurement. In contrast, one third of the PH clients (35.3%) chose this approach. 31.1% of the SSH clients chose management contracting procurement method, a third of the PH clients (32.4%) did the same. One quarter of the PH clients (26.5%) adopted construction management as their procurement method, while only 3.3% of the SSH clients chose this method. Finally, 5.9% of the PH clients used the design and build procurement method, while none of the SSH used this approach.

Although the SSH regulations prevent the SSH clients from using construction management or design and build procurement routes, 3.3% of them had violated this by selecting construction management as their procurement method for building their houses.

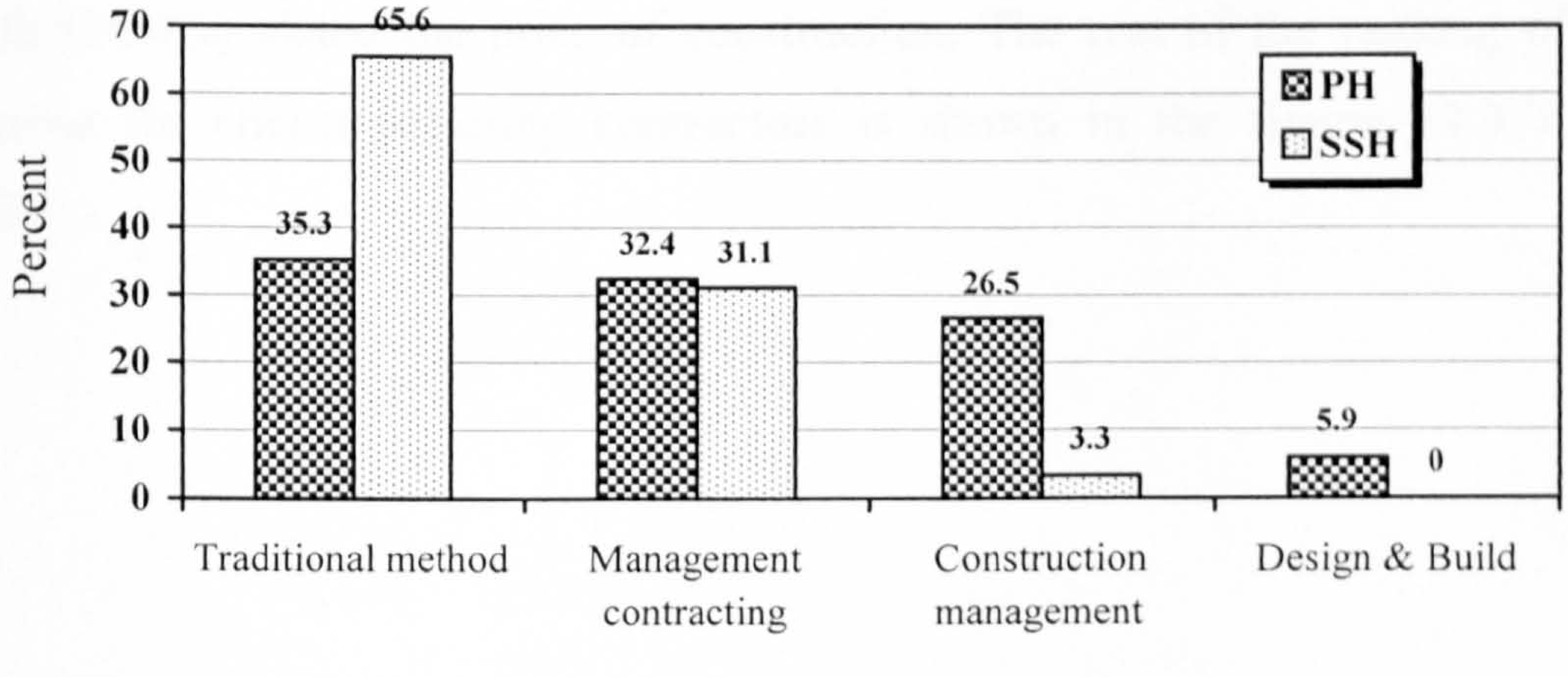


Figure (7.37): Procurement Methods

7.5.2 Criteria for Selecting the Contractor

By looking at figures (7.38)[1], (7.39) and (7.40) one can find that the criteria for selecting the contractor is more evenly distributed with PH clients than it is with SSH clients.

One third of the PH clients (32.4%) stated that the quotation price of constructing their houses given by the contractors was the first reason for selecting them. The same proportion of the PH clients stated that the contractor's previous experience was the first reason. One sixth of PH clients stated that the contractor's reputation was the first reason, 15% of them gave other criteria as the first reason.

In contrast, most of the SSH clients (55.7%) stated that the price of constructing their houses given by the contractor was the first reason for selecting them, while one quarter of the clients (24.6%) stated that the contractor's reputation was the primary reason.

One fifth of the PH clients (20.6%) stated that the second reason for selecting the contractor was the price of construction. The same percentage also applies to contractor's experience and reputation. On the other hand, 39.1% of the SSH clients stated that the contractor's reputation was the second reason for selection, 27.9% of the SSH clients stated the contractor's experience and one sixth (16.4%) stated the price of construction. The rest of the ranking of the reasons for clients selecting contractors is shown in the figures (7.37) and (7.38).

[1] Notice that for figure (7.38) and (7.39) the totals for every category and for every rank may not equal to 100%.

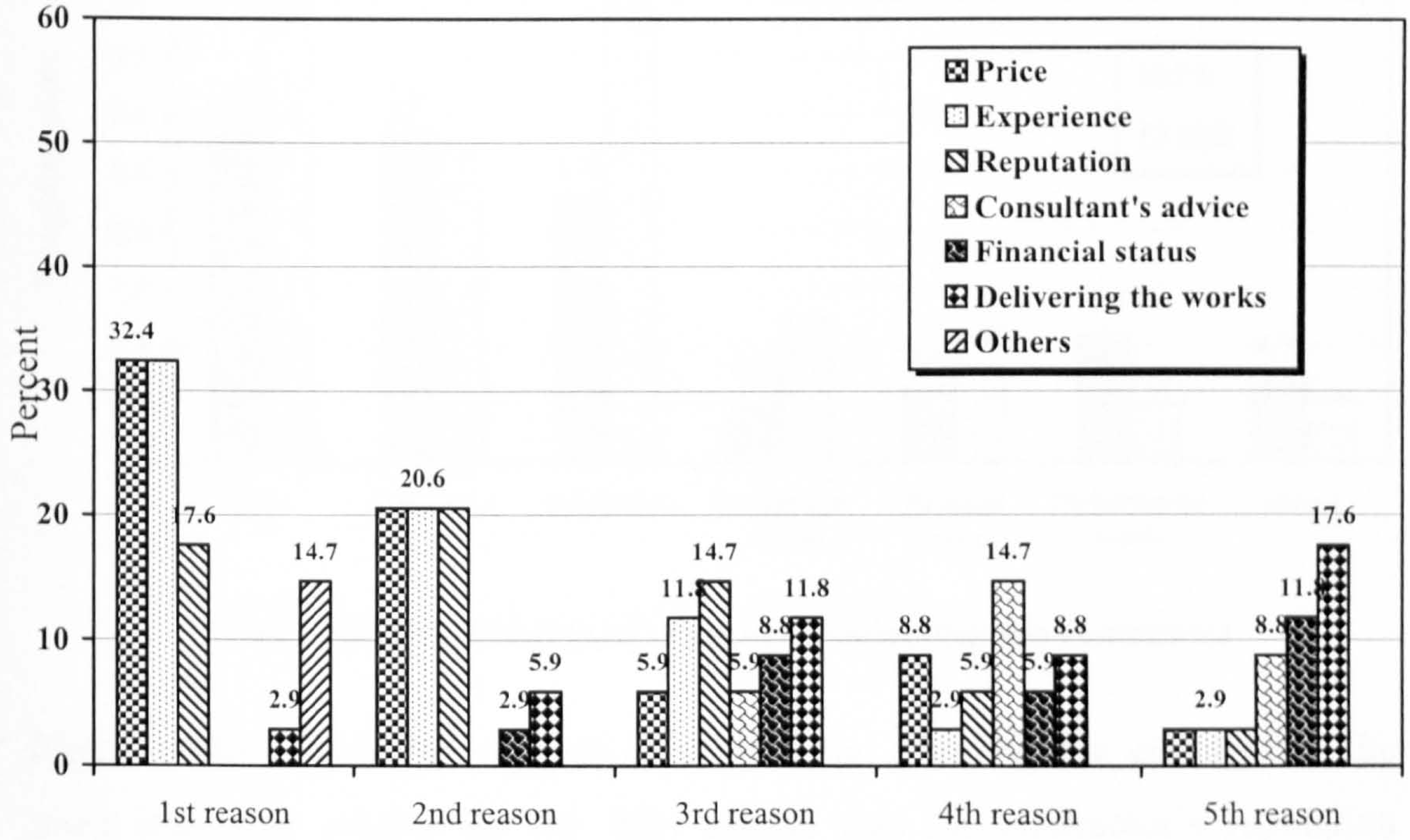


Figure (7.38): PH clients' criteria for selecting their contractor

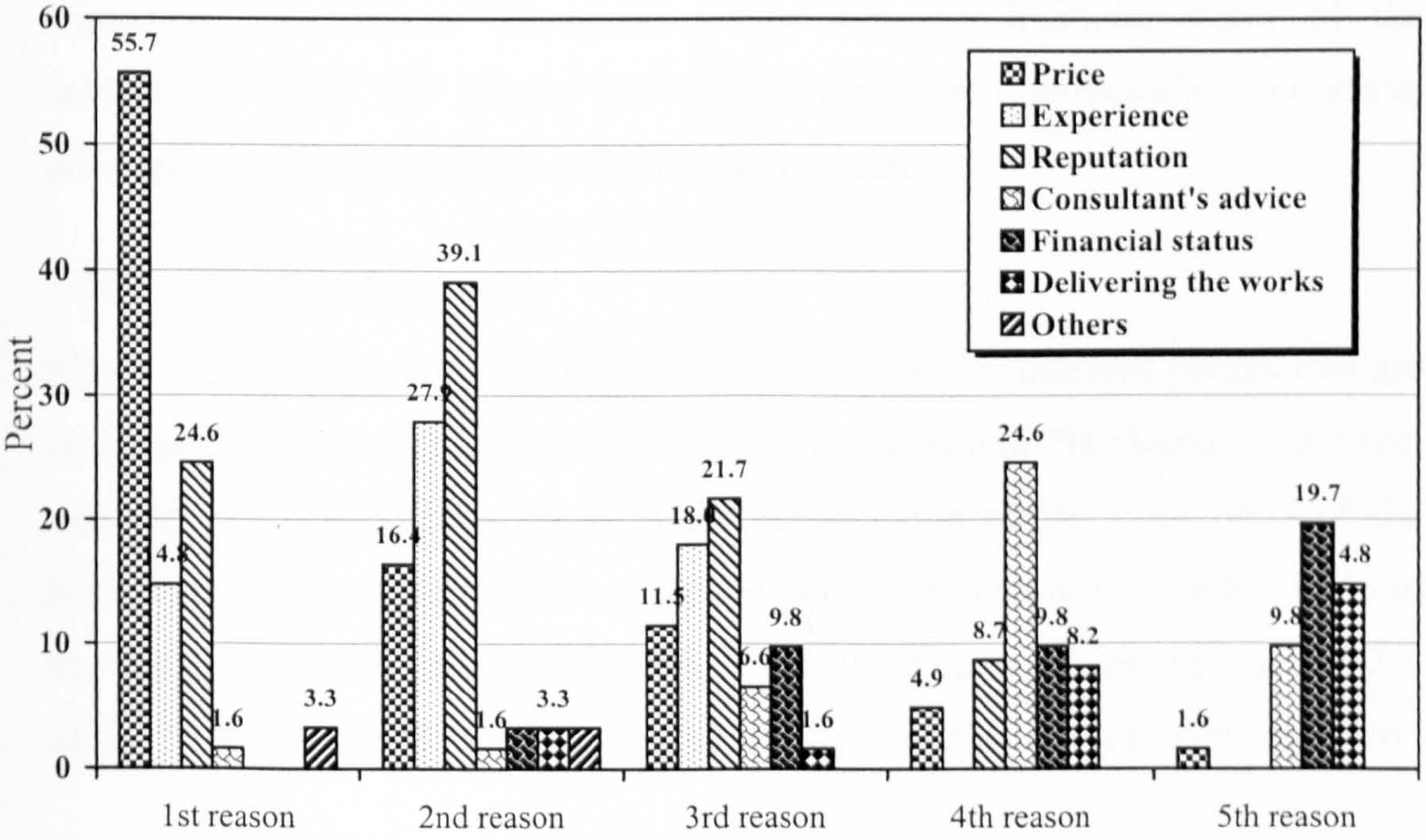


Figure (7.39): SSH clients' criteria for selecting their contractor

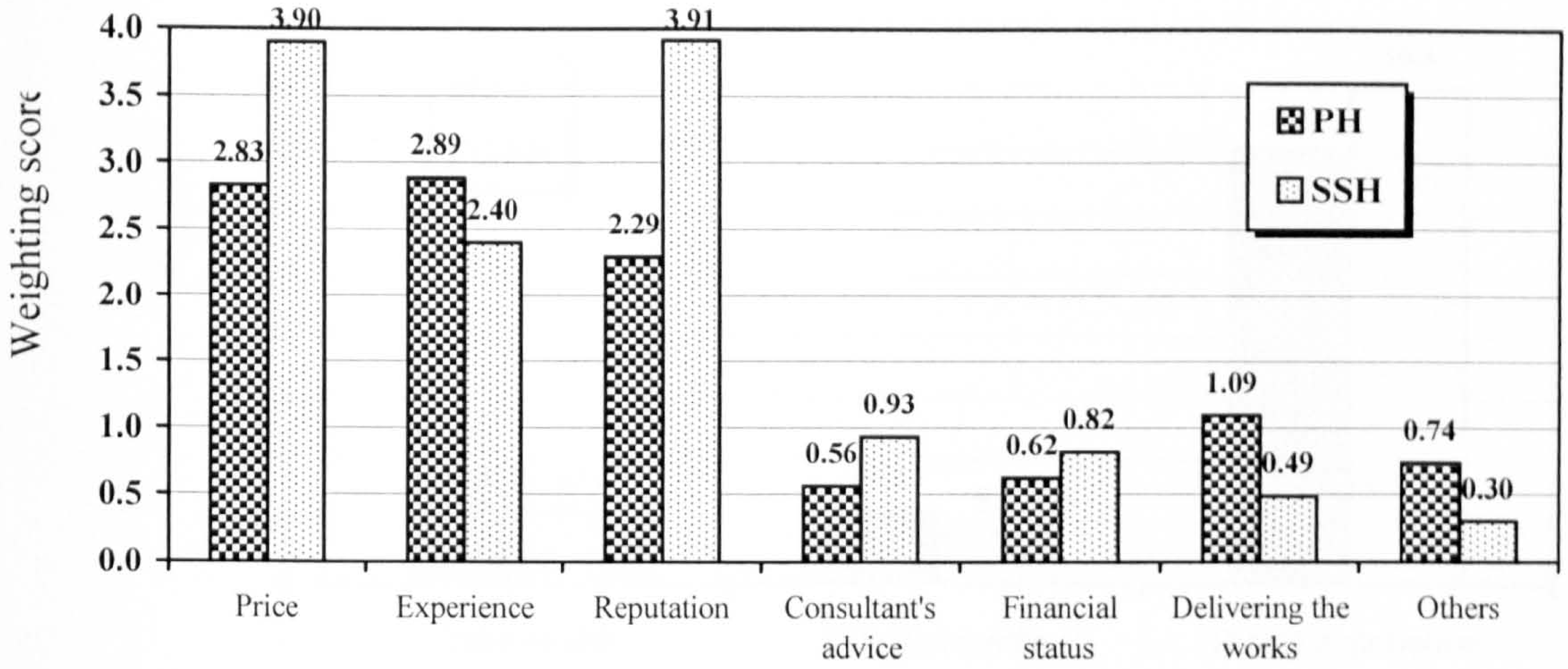


Figure (7.40): Weights of criteria for selecting the contractor

Figure (7.40) shows the weights of criteria for selecting the contractor. The most important criteria for the SSH clients was the contractor's reputation (3.91) and the price of construction (3.90), while for PH clients the contractor's experience (2.89) and the price of construction (2.83).

The figure also shows that SSH clients put more weight on the criteria of price, contractor's reputation, consultant advice and the financial status of the contractor. While PH clients put more weight on contractor's experience, delivering the works on time and for other reasons.

7.5.3 Tender Approach

Figure (7.41) shows the approaches for appointing the different parties that are involved in the construction phase. Most of the SSH and PH clients used direct negotiation for appointing those in the construction phase. Four fifths of the SSH clients (80.3%) and 70.6% of the PH clients chose this approach. 11.5% of the SSH clients and 17.6% of the PH clients used open tender approach. 8.2% of the SSH clients and 11.8% of the PH clients used a selected tender approach.

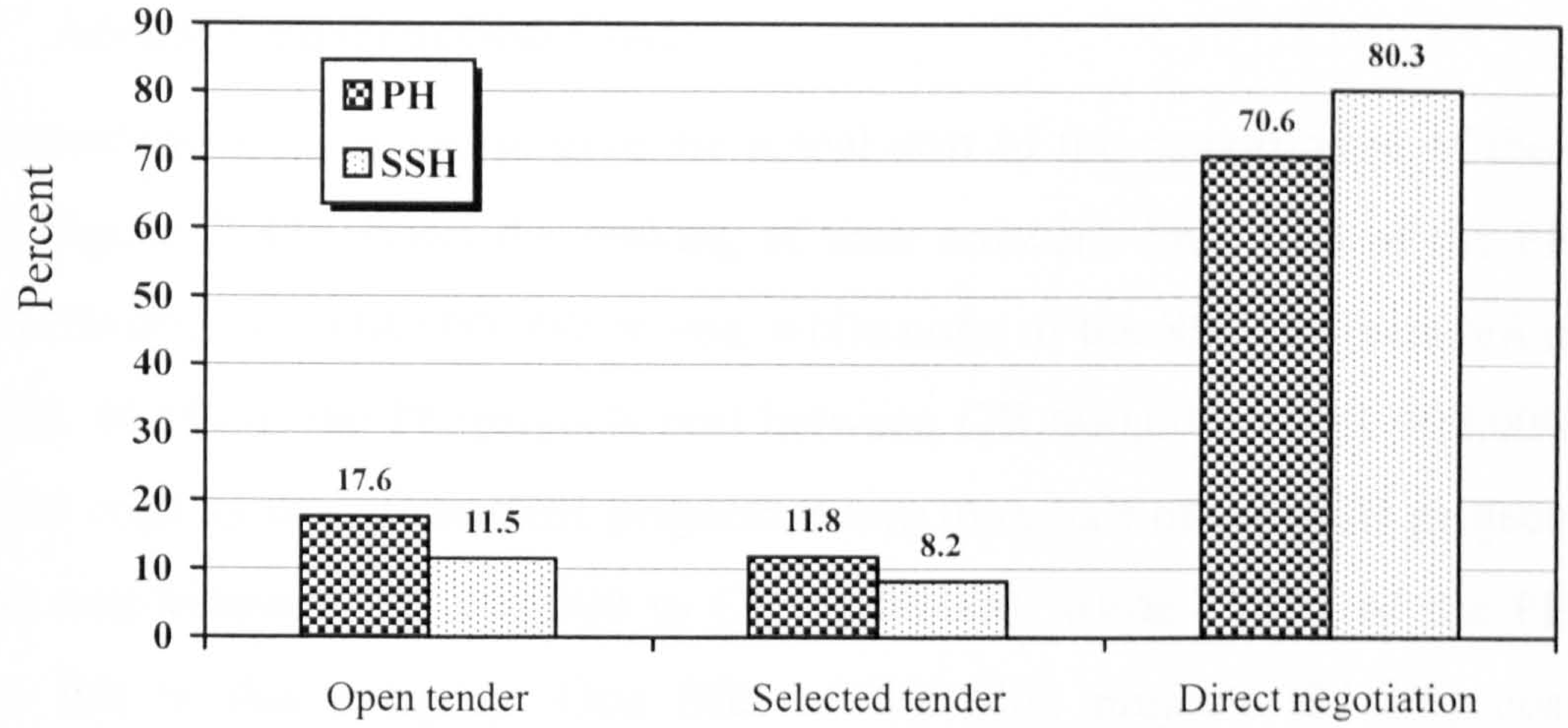


Figure (7.41): Approaches for appointing parties involved in the construction phase

7.5.4 Time Between Signing the Contract and Beginning of Works on Site

Figure (7.42) shows the duration (in months) between signing the contract of construction and beginning the works on site. 47.1% of the PH projects and 37.7% of the SSH projects took less than a month. Another 47.1% of the PH projects and 49.2% of the SSH projects took between one and two months. 5.9% of the PH projects and 13.1% of the SSH projects took two months or more between signing the contract and starting of works on site.

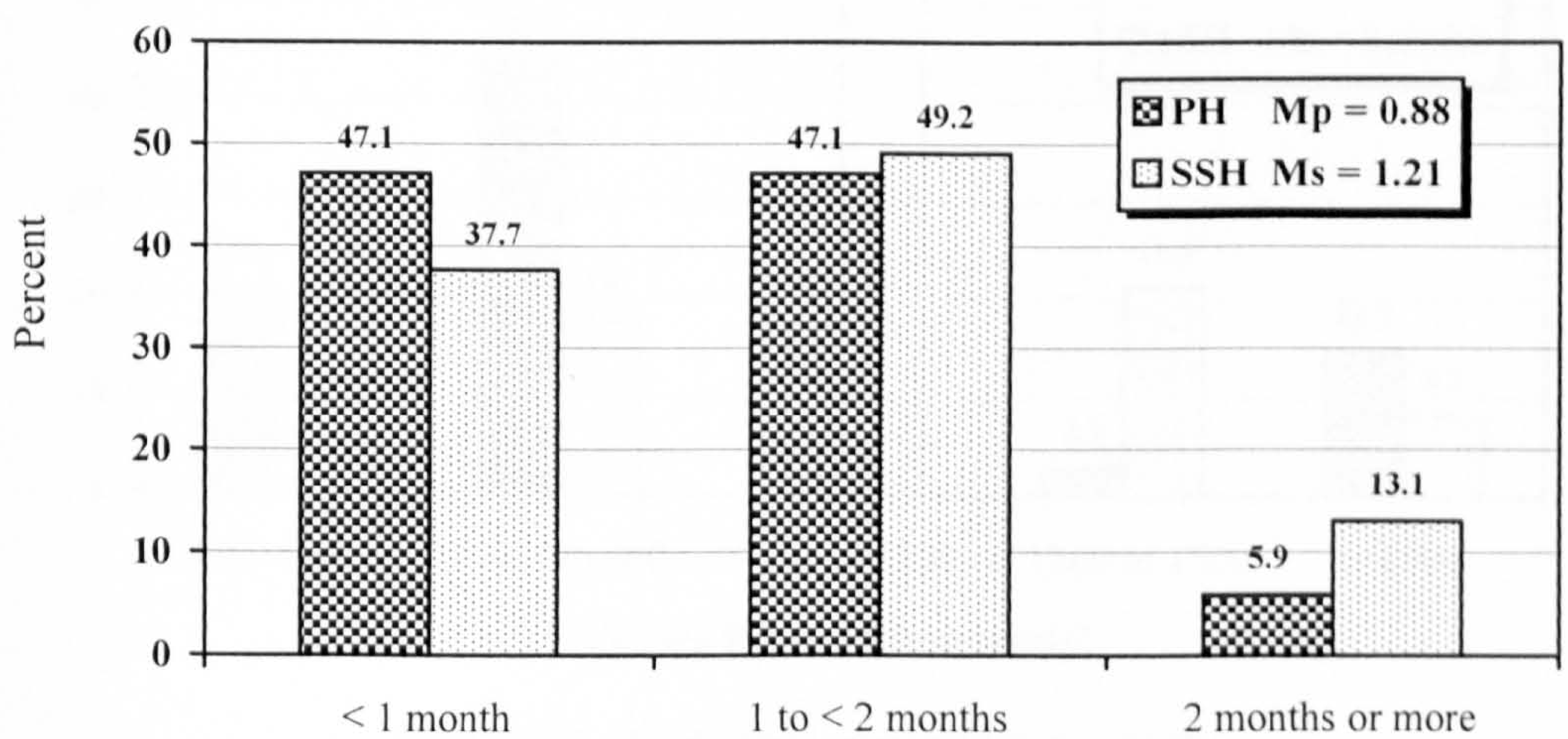


Figure (7.42): Duration between signing the contract and begining of works on site

7.5.5 Actual Construction Cost

The respondents were asked to give the actual cost of the construction of their houses. Figure (7.43) shows the ranking of their answers. One fifth of the PH projects (20.6%) cost QR 600,000 or less, while none of the SSH projects fell in this band. 44.1% of the PH projects cost between QR 600,000 to QR 900,000, compared with 18.0% of the SSH projects. More than half of the SSH projects (52.5%) cost between QR 900,000 to QR 1,200,000, while 17.6% of the PH projects fall in this category. One fifth of the SSH projects (21.3%) cost between QR 1,200,000 to QR 1,500,000, only one case of the PH sample (2.9%) did. Finally, 14.7% of the PH projects and 8.2% of the SSH cost more than QR 1,500,000.

From the figure one can realise that the standard deviation of the actual cost of construction for the PH projects is larger than it is for the SSH projects. The s.d. for the SSH projects is QR 285.2, while it is QR 458.7 for the PH projects. Also, one can see that the amount of the SSH loan (QR 600,000) does not fulfil the needs of the SSH clients. In fact, the amount of the SSH loan is nearly half the mean of the SSH projects (QR 1,138.330).

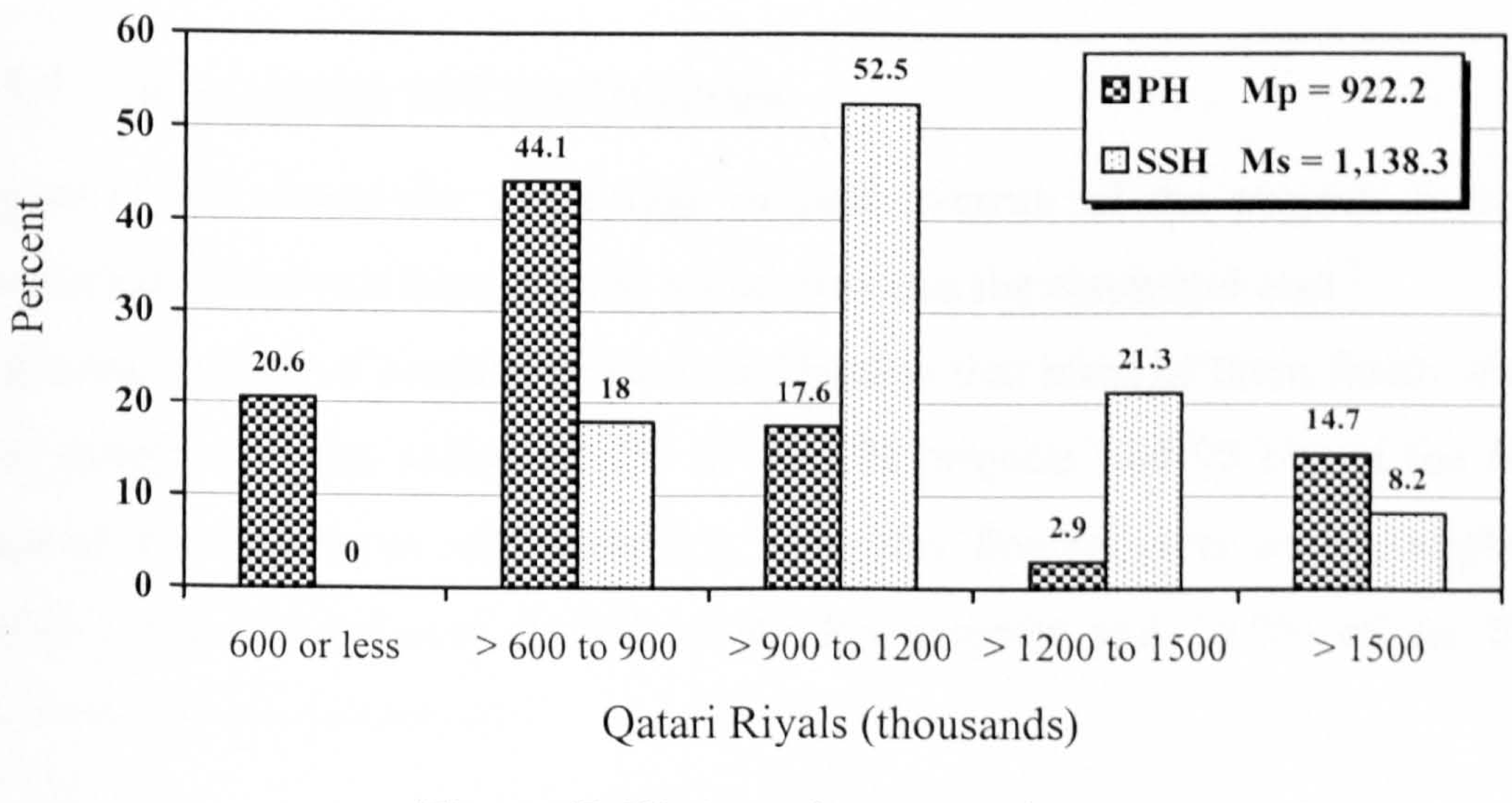


Figure (7.43):Actual construction cost

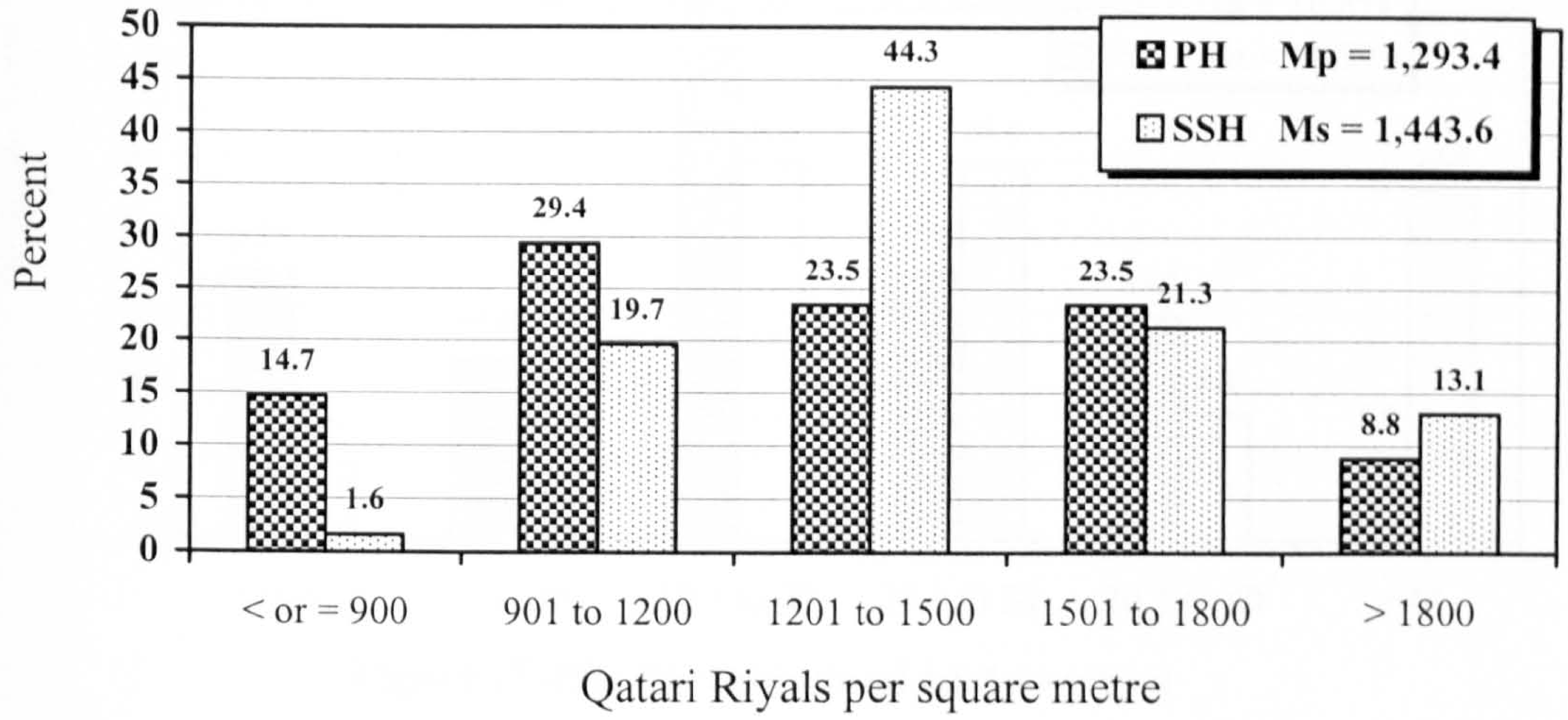


Figure (7.44): Unit cost of construction

7.5.6 Unit Cost

Figure (7.44) shows unit cost of the construction in Qatari Riyals per square metre is more evenly distributed in PH projects than with SSH projects. In fact, 44.3% of the SSH projects cost between 1201 and 1500 QR/m^2, while about half as many PH projects (23.5%) fall into this category. On the other hand, 14.7% of the PH projects and 1.6% of the SSH projects cost less or equal to 900 QR./m^2. The means of the unit cost are also shown.

7.5.7 Percentage of Cost Overrun

Figure (7.45) shows the percentage of cost overrun of the project. It is the percentage difference between the actual cost and the estimated cost.[1]

A general feature of housing projects in Qatar is that most of them finish with a cost overrun. In this study, 82.4% of the PH projects and 95.1% of the SSH showed a cost overrun and therefore, relatively few projects were completed within the estimated cost. 11.8% of the PH projects and 14.8% of the SSH

[1] The estimated cost of the construction of the house is the same as the agreed cost with the contractor when signing the contract before the execution of construction on site for the traditional methods.

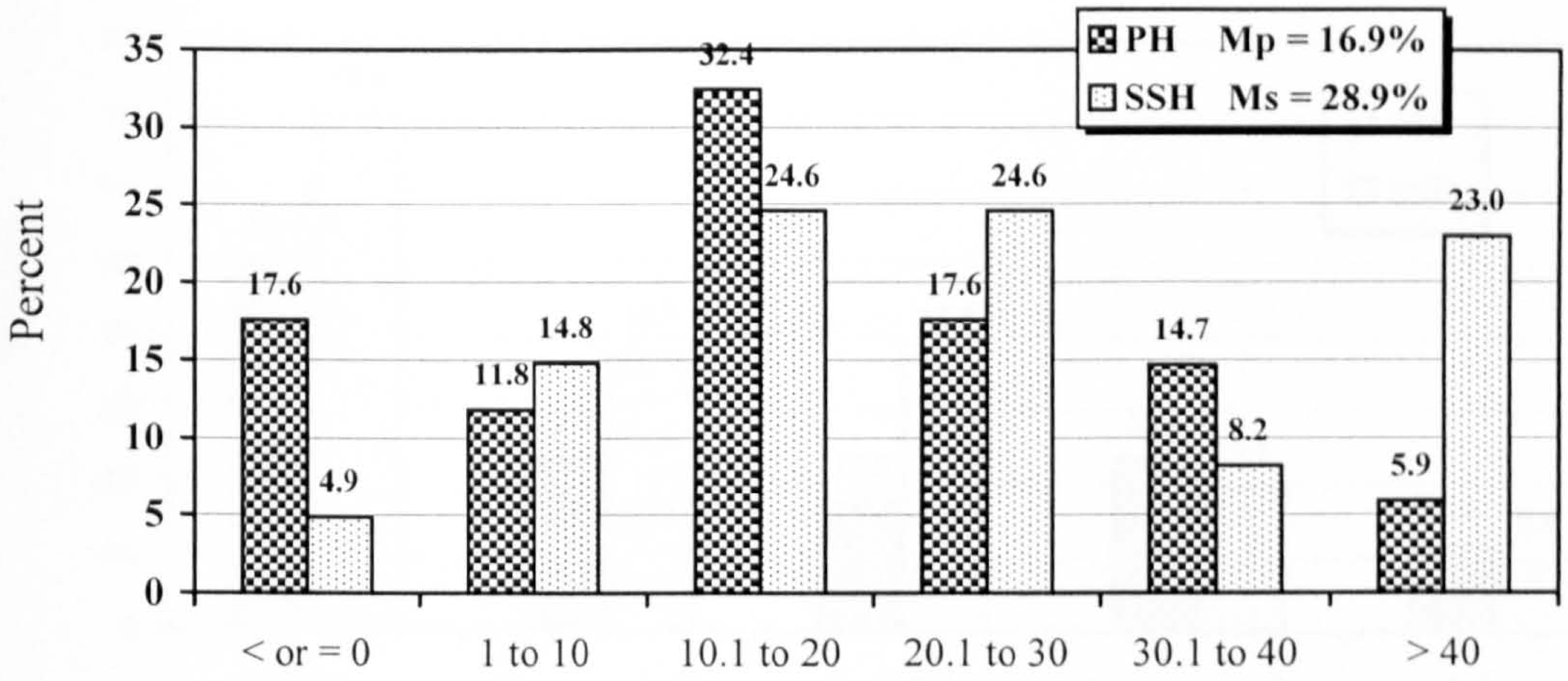


Figure (7.45): Percentage of cost overrun

projects ended with 1 to 10 percent cost overrun. One third of the PH projects (32.4%) and one quarter of the SSH projects (24.6%) had 10.1 to 20 percent cost overrun. Another quarter of the SSH projects (24.6%) had 20.1 to 30 percent cost overrun, while 17.6% of the PH projects fall in this category. 14.7% of the PH projects and 8.2% of the SSH projects ended with a cost overrun between 30.1 to 40.0 per cent. Finally, about one quarter of the SSH projects (23.0%) had over 40 per cent over-cost, while this was only 5.9% of the PH projects. The mean cost overrun for the SSH projects is 28.8%, and 16.9% for the PH projects.

Respondents were asked to state the reason(s) for cost overrun, from their point of view, of their housing projects and are shown next page in figure (7.46). 70.5% of the SSH clients stated that additions to the agreed works was one reason for cost overrun of the project, while half of the PH clients stated the same reason. 37.7% of the SSH clients and about one quarter of the PH clients (23.5%) said that changes in the specifications of the design was another reason. Again, 37.7% of the SSH clients and 17.6% of the PH clients said cost increases in building materials was another reason. Variation order was another reason for one fifth of the SSH clients (19.7%), while about one quarter of the PH clients (23.5%) gave the same reason. Finally, 9.8% of the SSH clients and

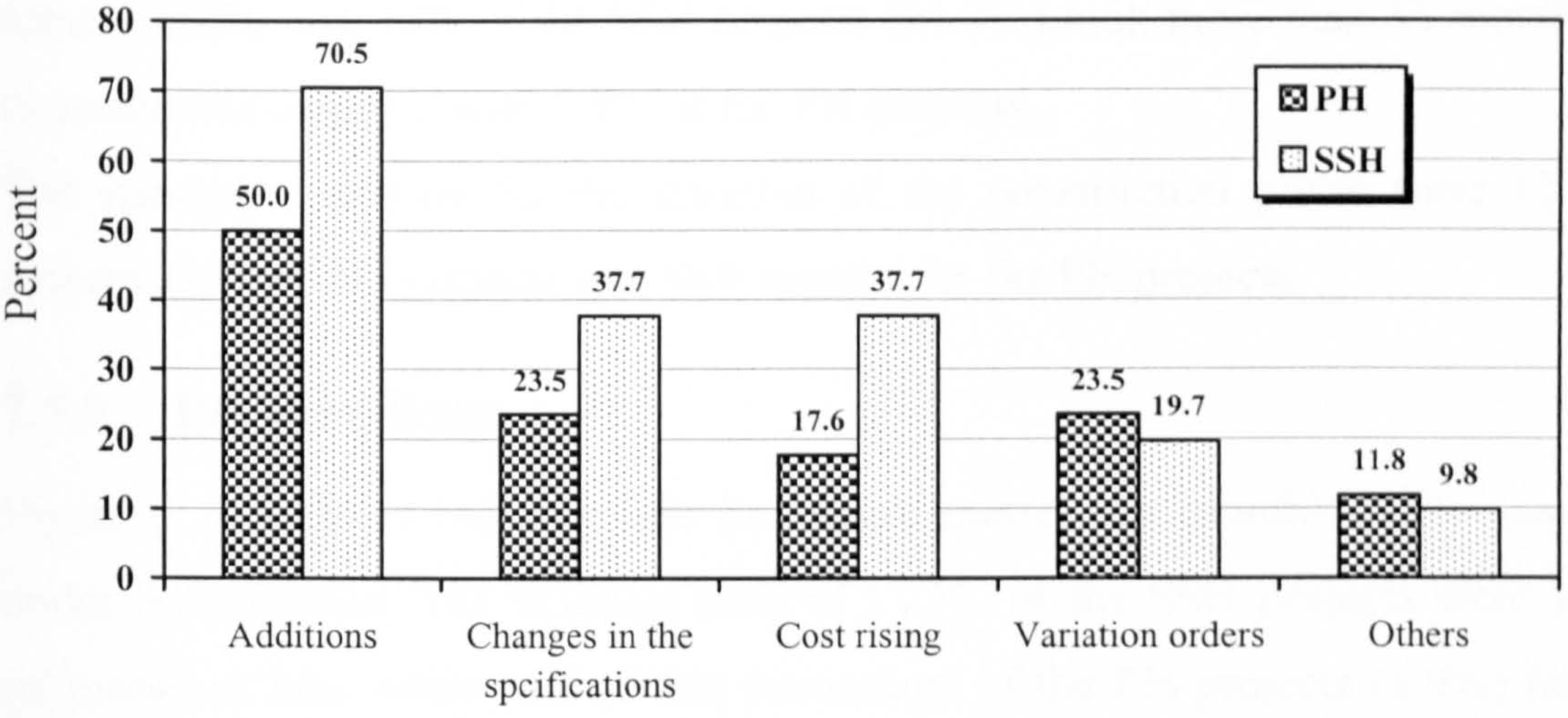


Figure (7.46):Reasons for cost overrun

11.8% of the PH clients stated other reasons than the above for the cost overrun of construction.

7.5.8 Duration of the Construction Phase

Figure (7.47) shows duration of the construction phase (in months) for the cases under investigation. More than one third of the PH projects (35.3%) took 12 months or less to construct while none of the SSH projects were completed in this time. 38.2% and 29.5% of the PH and SSH projects respectively took between 12 to 24 months to execute. One half of the SSH projects took between 24 to 36 months to execute, while one fifth of the PH projects (20.6%) did the

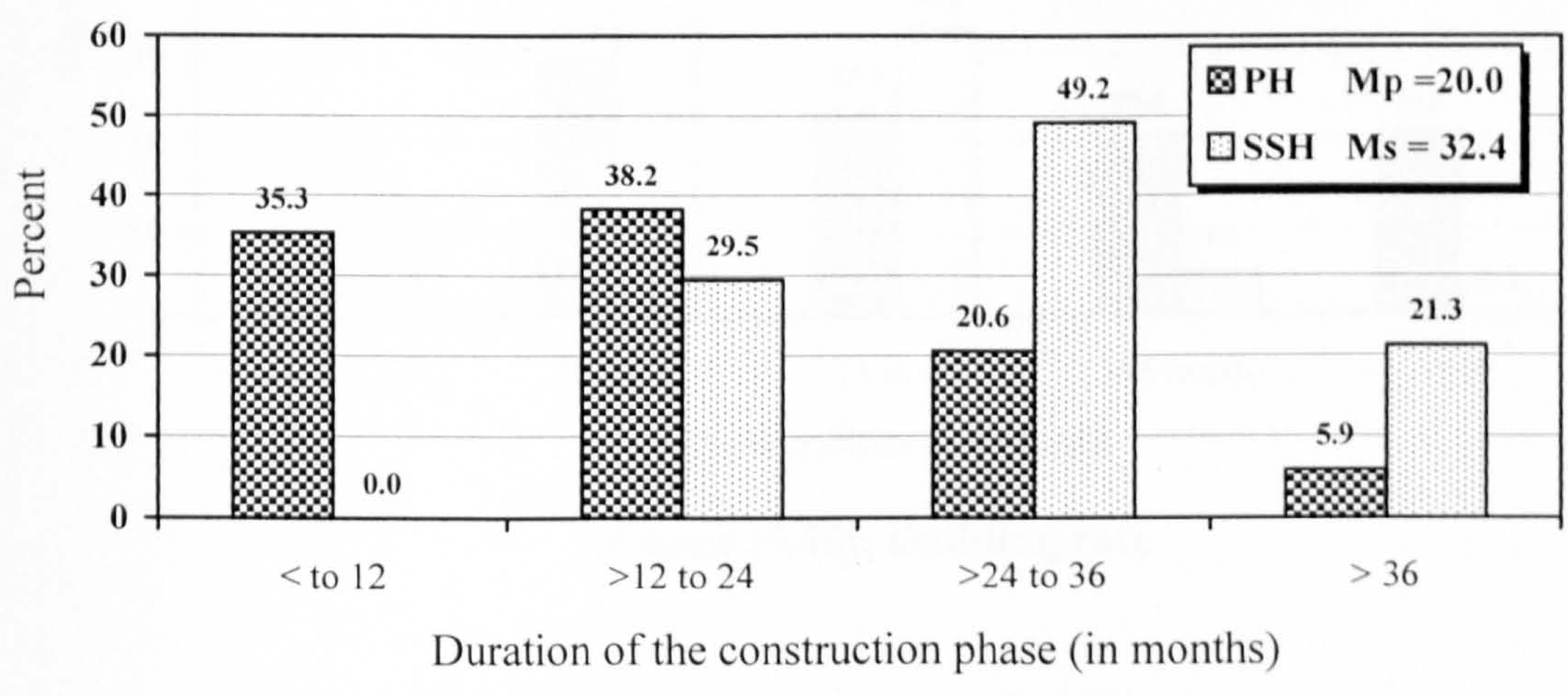


Figure (7.47): Duration of the construction phase

same. Finally, one fifth of the SSH projects (21.3%) took more than 36 months to construct compared with 5.9% of the PH projects.

The standard deviation for the duration of the construction phase were 12.1 months for the SSH projects and 10.9 months for the PH projects.

7.5.9 Building Rate

Figure (7.48) shows building rate (in square metres per month) of the cases under investigation. The building rates of 11.5% of the SSH projects were 15 m^2/month or less, while half of this percentage of the PH projects (5.9%) had the same building rate. Half of the SSH projects (50.8%) and 29.4% of the PH projects had building rates between 16 to 30 m^2/month. One third of the SSH projects (32.8%) and one quarter of the PH projects (23.5%) had building rates between 31 and 45 m^2/month. One fifth of the PH projects (20.6%) had building rates between 46 to 60 m^2/month, while 4.9% of the SSH projects had the same building rate. Finally, another fifth of the PH projects had building rates more than 60 m^2/month, while none of the SSH projects fall under this category.

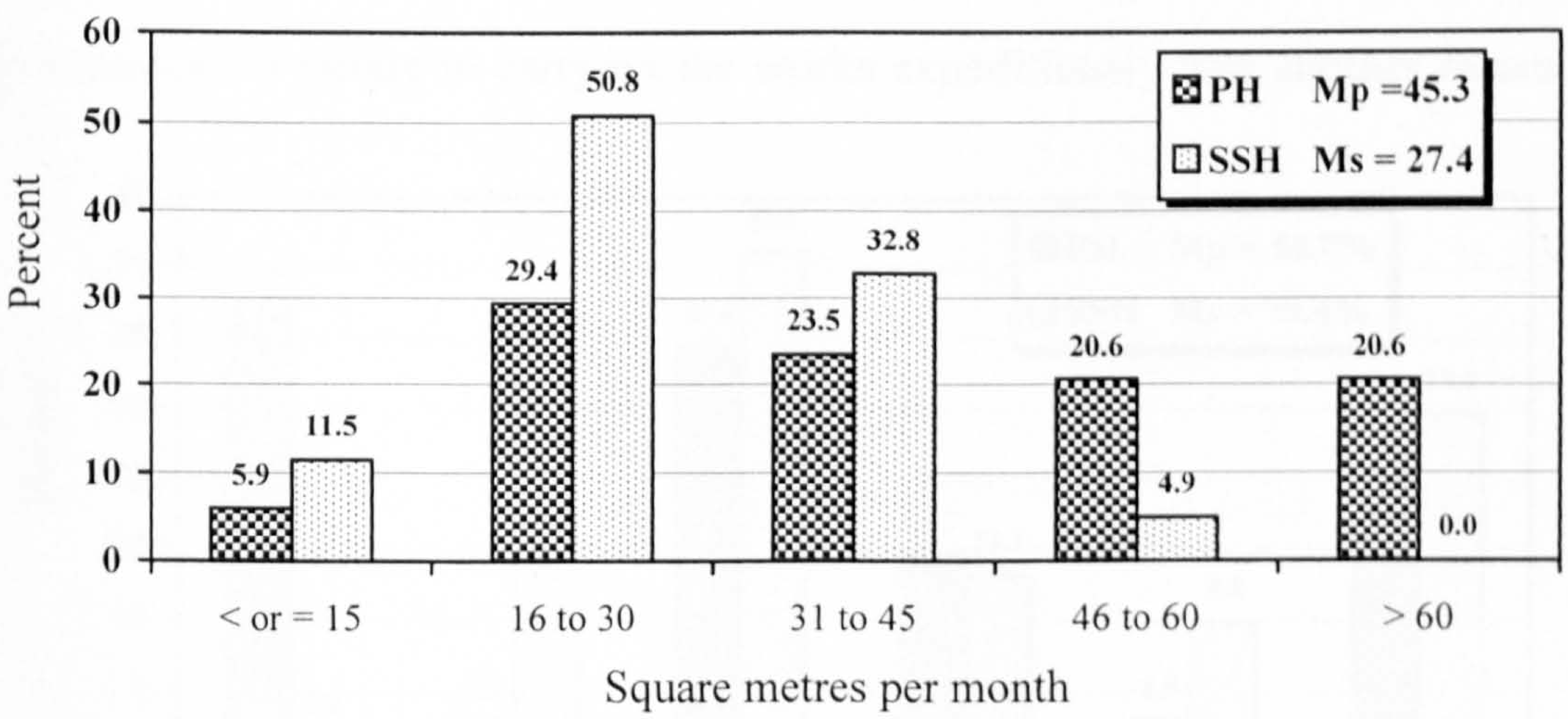


Figure (7.48): Building rate

7.5.10 Percentage of time Overrun

Figure (7.49) shows the percentage of time overrun of the projects under investigation. It is the percentage difference between the actual time and the estimated time.

The same feature of overrun experienced with cost applies to time overrun. Two thirds of the PH projects (67.6%) and all of the SSH projects, except one, ended with a time overrun. 2.9% of the PH projects (one case) and 14.8% of the SSH projects had 1 to 25 percent overrun. 29.4% of the PH projects and 36.1% of the SSH projects had 26 to 50 percent over-time. 14.7% of the PH projects and 13.1% of the SSH projects had 51 to 75 percent over-time. 2.9% of the PH projects and 9.8% of the SSH projects had 76 to 100 percent over-time. Finally, 17.6% of the PH projects and one quarter of the SSH projects (24.6%) had over 100 percent over-time.

Respondents were asked to state the reason(s) for time overrun of their housing projects and are next page in figure (7.50). 37.7% of the SSH clients stated that additions to the agreed works was a reason for time overrun of the construction phase, while about one third of the PH clients (32.4%) stated the same reason. 62.3% of the SSH clients and about one third of the PH clients (32.4%) said that the contractor's failure to carryout the works expeditiously was another reason.

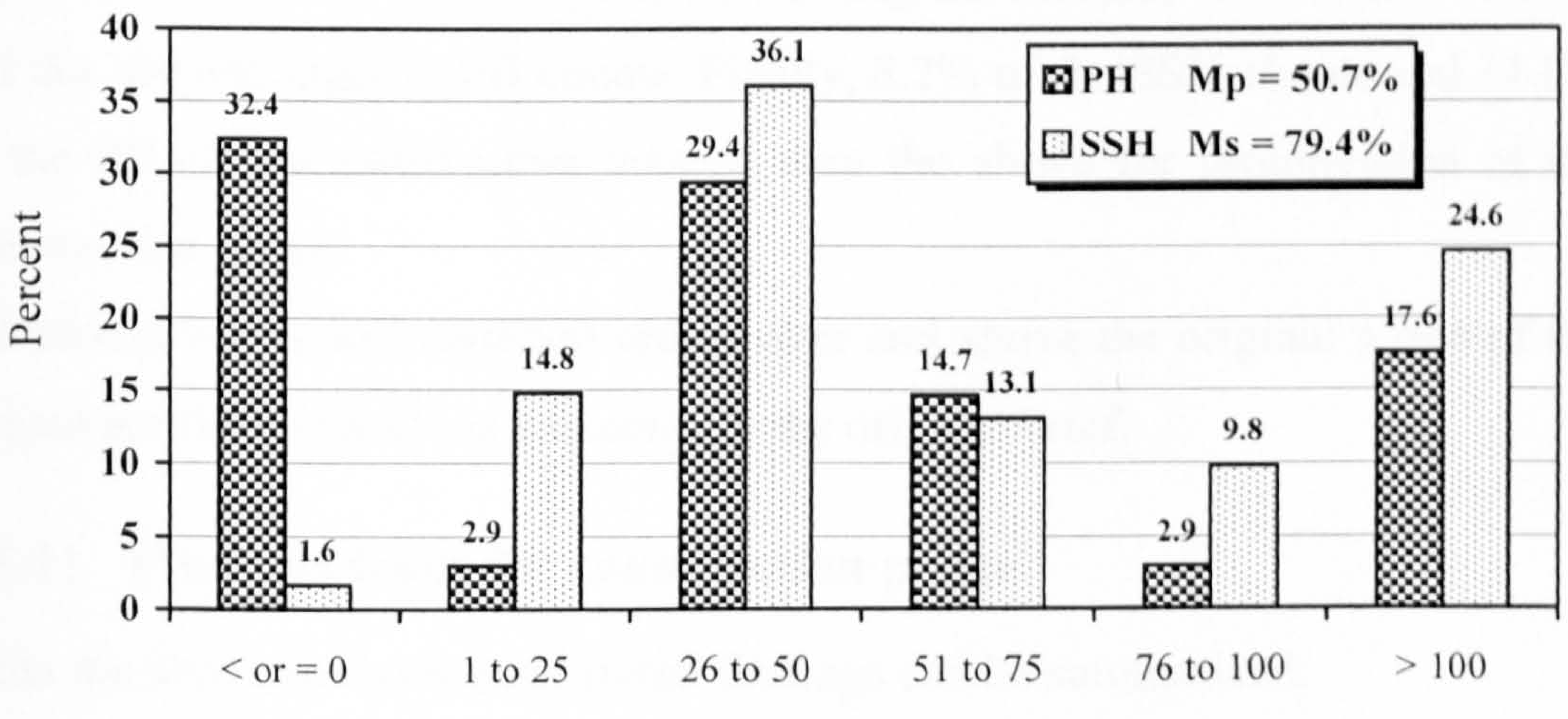


Figure (7.49): Percentage of time overrun

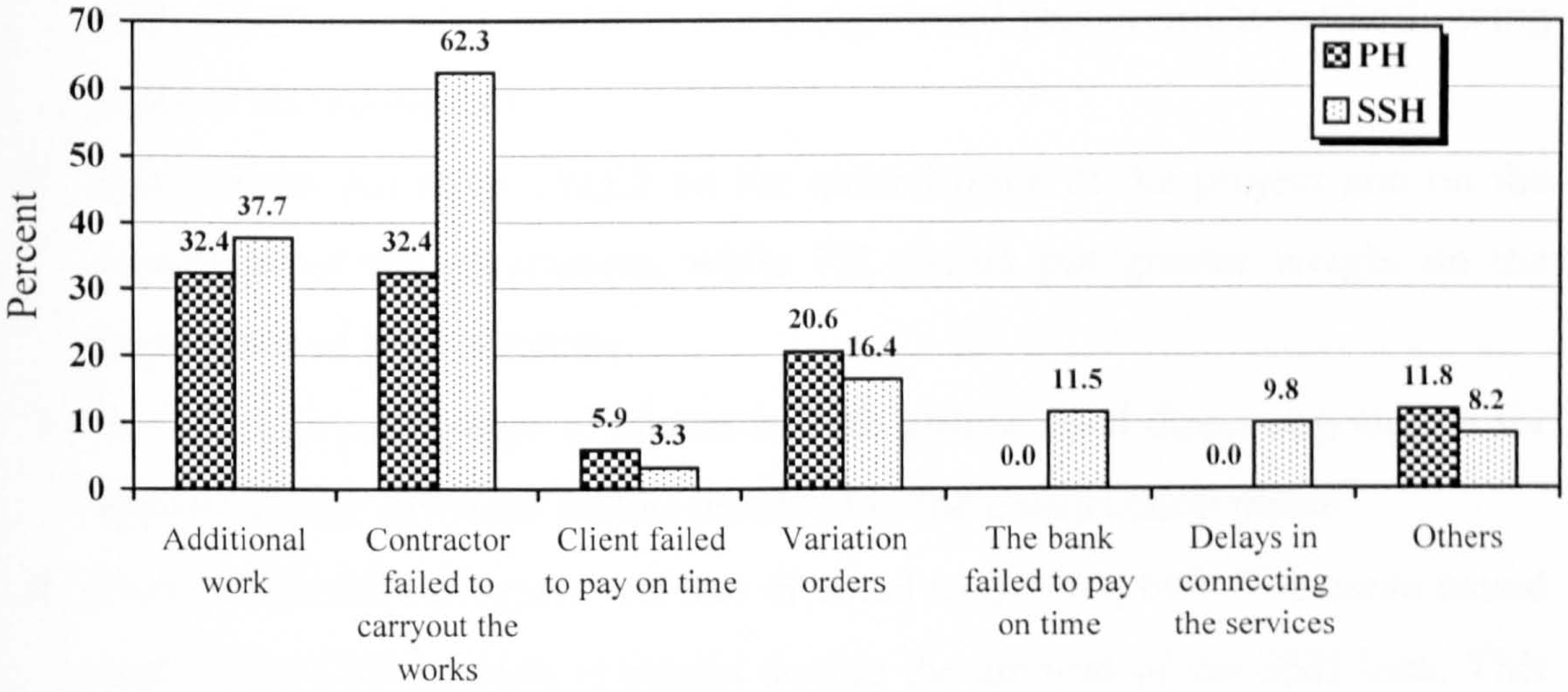


Figure (7.50): Reasons for time overrun

As the mount of SSH loan is not sufficient to build the required house, SSH clients have to pay the cost difference from their own resources. In this case part of the SSH project's payments will be paid by the clients and the other part will be paid by the bank. 3.3% of the SSH clients (two cases) and 5.9% of the PH clients (two cases) said that their failure to pay the contractor at the agreed time was another reason. The bank's failure (or rejection) to pay on time was another reason for 11.5% of the SSH clients. This category is not applicable to the PH clients. Variation orders were a further reason for one sixth of the SSH clients (16.4%) and one fifth of the PH clients (20.6%). One tenth of the SSH clients (9.8%) stated that delays in connecting the services was another reason, but this did not apply to PH clients. Finally, 8.2% of the SSH clients and 11.8% of the PH clients stated other reasons than the above for prolongation of the construction phase.

Additional works and variation orders over and above the original scope of the project are the result of inadequacies in the original brief.

7.5.11 Findings from the construction phase

From the above analysis some initial findings can be summarised:

1. More PH clients used procurement methods other than the traditional approach, such as construction management and design/build. However,

SSH clients are not allowed to use design/build procurement method owing to the SSH regulations.

2. SSH clients put more weight on the quoted price of the project and on the reputation of the contractors, while PH clients put greater weight on the experience of the contractor.
3. A very high percentage of clients in both groups used direct negotiation for appointing the different parties involved in the construction phase.
4. None of the SSH projects cost less or equal to QR600, 000. The mean actual cost of the SSH projects is almost double the amount of the SSH loan. This confirms the finding earlier in section 7.3.4.
5. Most of the projects under investigation from the two housing schemes ended with a cost and time overrun. The clients believe this is owing to the additions to the initial design, as well as the contractor's failure to carry out the works timeously.
6. The unawareness of the quantity surveyor's role may mean less cost and time control/monitoring.
7. More than one fifth of the SSH projects took more than three years to construct. On the other hand, none of them ended in less than one year. This is due to the way the bank applies the payment procedure.

7.6 Disputes

Figure (7.51) shows the disputes that led to delays during the different phases of the project.

In every item of the figure SSH have more disputes than PH except in disputes with sub-contractors and the utility departments. It is obvious that PH clients did not report any disputes with the Lands Department or the bank, as they are not involved with their housing projects.

Most of the disputes that the clients had were with their contractors and subcontractors. Disputes with contractor were more frequent in the SSH projects, while disputes with subcontractor were more frequent in the PH projects.

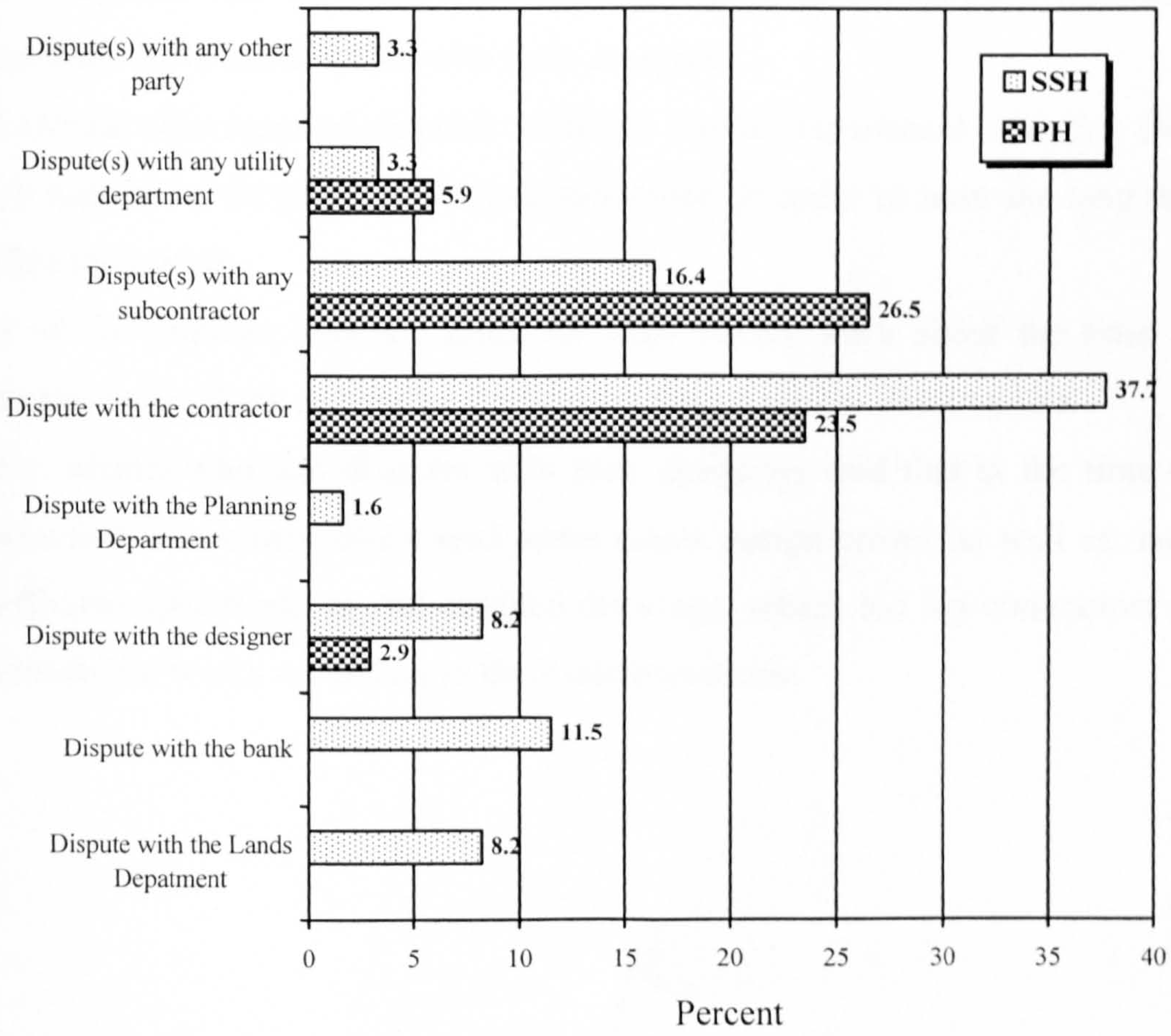


Figure (7.51): Disputes during different phases of the project

Informal discussion with the clients revealed that reasons behind these disputes were, in order of importance, poor workmanship, no commitment to work on site, variation orders and timing of payments. Clients also stated that disputes escalate as conflict between the contractor and the designer arises over quality standards.

The clients agreed that most of the disputes with the contractors and the subcontractors were solved by compromising. Only a few clients indicated that they had to cancel their contract with their contractors and file charges against them.

Clients also agreed that lack of good alternative dispute resolution escalates the problems and increases delays in the project.

Figure (7.51) also shows that of the total sample size of the SSH clients, 11.5% of had disputes with the bank, 8.2% had disputes with the Lands department, and another 8.2% had disputes with their designers.

SSH clients who reported disputes with the Lands Department said that they had to wait up to six years, and sometimes more, in order to have the land that satisfies their needs.

Most of the disputes with the Bank for SSH clients were about the time of payments, as the Bank refuses to make payments related to work on site.

Finally, clients who had disputes with their designers said that at the time of construction works they discovered some major design errors, as well as, lack of sufficient specifications and detailed drawings, which led the contractors to implement the works according to their interpretations.

CHAPTER EIGHT

8 DATA ANALYSIS: SATISFACTION AND QUALITY

8.0 Introduction

The previous chapter presented, and to some extent discussed, the characteristics of the SSH and the PH projects under investigation. It was revealed that SSH clients took more time to obtain their land and, on average, SSH projects have more overrun in cost and in time than PH projects. SSH clients stated that the amount of SSH loan was not adequate to build houses to the required standard. These variations are expected to have an important influence on clients' attitudes towards their housing projects.

This chapter aims to explore the clients' attitudes towards their housing project, in particular the client's attitudes towards the different phases of the project, the different parties involved in the projects, and the quality of their houses. Therefore, this chapter is divided into two main sections:

This chapter also aims to present and discuss the quality of houses under investigation mainly by two aspects of quality, aesthetic quality and technical quality.

1. The first section compares the clients' level of satisfaction with project's outcomes, such as time and cost, the different phases of the project, such as the location of land, and the different parties involved in the project, such as the contractor. Emphasise will be put on examining if there is association between the level of satisfaction with the projects and the type of housing schemes, and the factors that affect the level of satisfaction with the project.
2. The second section is divided into two subsections. The first one explores the clients' rating on the quality of their houses, in particular clients' attitudes towards the quality of the form, such as the aesthetic quality of interior, function, such as the relationship between space to layout, and the outdoor environment, such as odour, of their projects. The second part

presents the independent evaluation of quality. Again it is divided into two sub-sections: aesthetic quality evaluation and technical quality evaluation.

8.1 Client Satisfaction

The level of client satisfaction was measured using five point Likert scale.

8.1.1 Satisfaction with Total Cost of the Project

It was revealed in section 7.5.7 that 82.4% of the PH projects and 95.1% of the SSH projects finished with a cost overrun. On average PH projects finished 17% over the estimated cost and with SSH projects 29% over the estimated cost. The respondents were asked to rate their level of satisfaction with the total cost of their projects. As figure (8.1) shows, on average, both SSH and PH clients were in the range level (neutral to satisfied), but PH clients were more satisfied on the total cost of the project than the SSH clients. The overall satisfaction with total cost of the project was 3.42.

Although as expected, the level of satisfaction with cost for PH clients is higher than the SSH clients, it was also expected, in respect of the projects' cost outcomes, to find a lower satisfaction level than is shown in figure (8.1). Some reasons for this phenomenon can be listed as follow:

- Most of the clients, 70.5%, have no previous construction experience to compare the outcomes of their projects with, instead they compare the

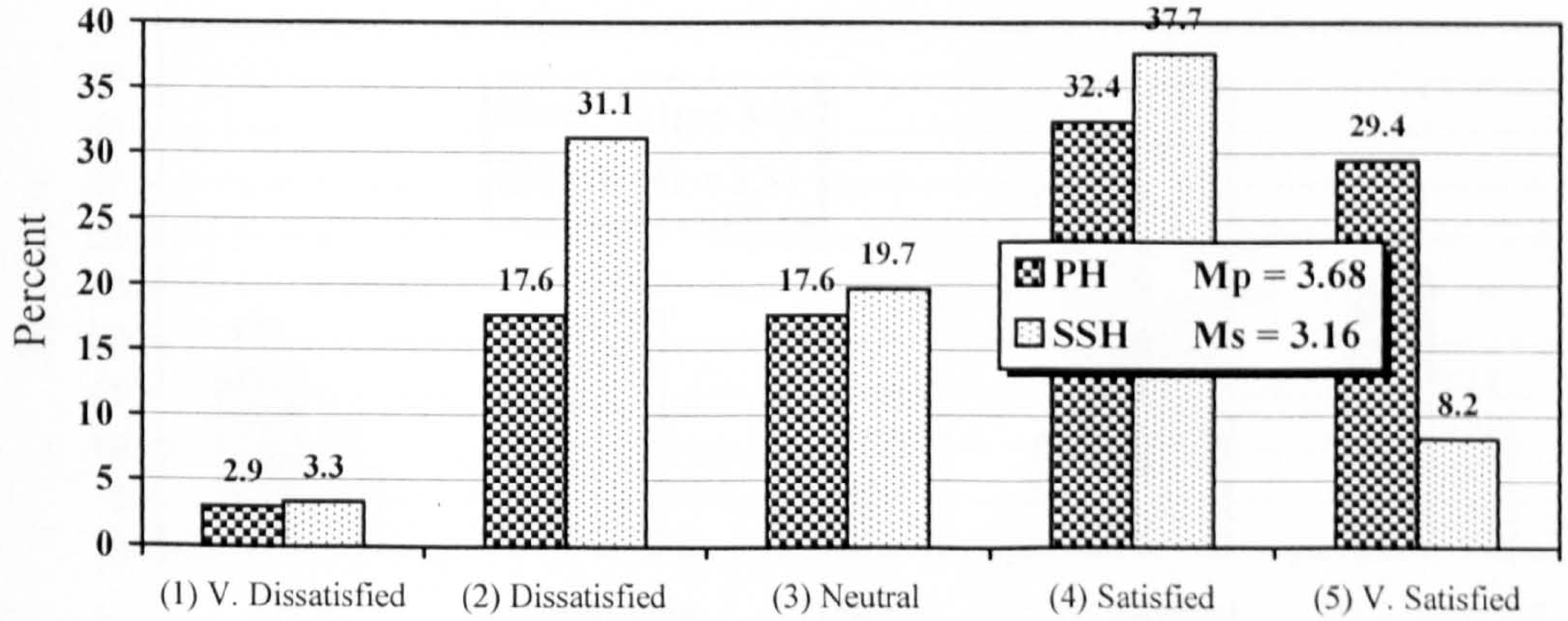


Figure (8.1): Satisfaction with total cost of the project

outcomes of their projects with the outcomes of other clients projects who are most likely have no previous construction experience as well.

- When rating their level of satisfaction with cost the clients keep in their minds some factors affecting the final cost of their projects that were not accounted for when starting works on site, such as additions, changes in the specifications and modifications to the design.
- The absence of quantity surveyors, as cost estimators, in housing projects in Qatar has led to an overrun in cost being normal, so that the clients have been familiarised with cost overrun and see it as normal.

On the other hand, most clients who were dissatisfied stated that the main reason for their dissatisfaction is that they did not expect the final cost to be as high as they predicted when they started their projects. One client summed the feelings of this group: *"the final cost over reached all of my expectations and my capabilities."*

8.1.2 Satisfaction with Total Time of the Project

It was revealed in section 7.5.10 that two thirds of the PH projects and almost all of the SSH projects finished with time overrun. In fact, the mean time overrun for the PH projects was 50.7%, while it was 79.4% for the SSH projects under investigation. The respondents were asked to rate their level of satisfaction with the total time of their projects. As figure (8.2) shows, on

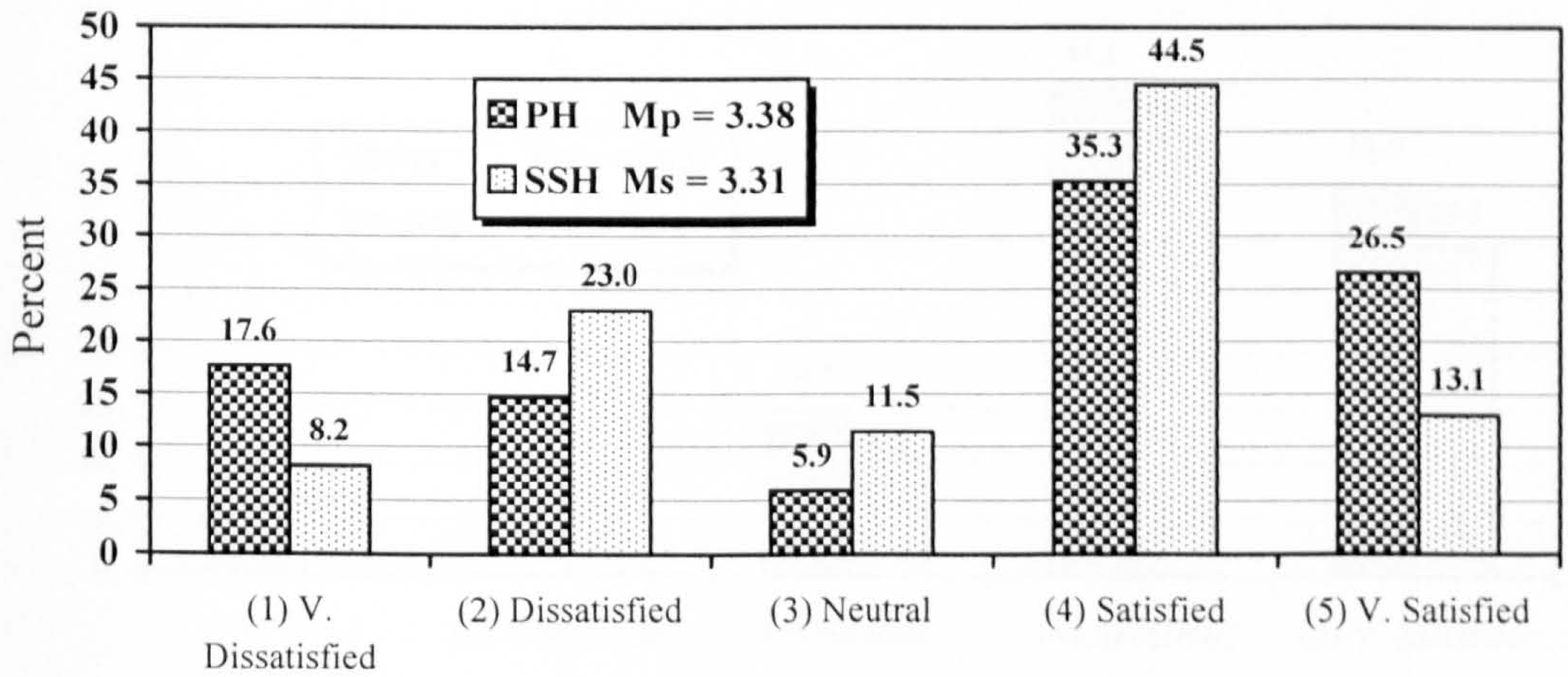


Figure (8.2):Satisfaction with total time of the project

average, both SSH and PH clients were in the range level (neutral to satisfied), but PH clients were more satisfied on the total time of the project than the SSH clients. The overall satisfaction with total time of the project for the combined two schemes was 3.34.

On the other hand, more PH clients (17.6%) were very dissatisfied than SSH clients (8.2%). Most of the clients who were dissatisfied put the blame of their dissatisfaction on their contractors as they failed to carry out their duties for delivering the projects on the agreed time. The fact that PH clients have a larger family size than SSH clients, see section 7.1.7, means that they want to move to the new house as soon as possible, while the SSH clients tend to take things slowly in order to provide the necessary funds to complete the building of their houses.

Again here, as mentioned in section 8.1.1 with the satisfaction with the total cost of the project, a lower level of satisfaction with the total time of the project was expected than that actually obtained from the respondents. The same reasons that apply to the satisfaction with cost apply here with satisfaction with time.

8.1.3 Satisfaction with Obtaining the Land

Figure (8.3) shows client satisfaction with obtaining the land. Most of PH and SSH clients were satisfied (79.4% and 68.9% respectively). The overall

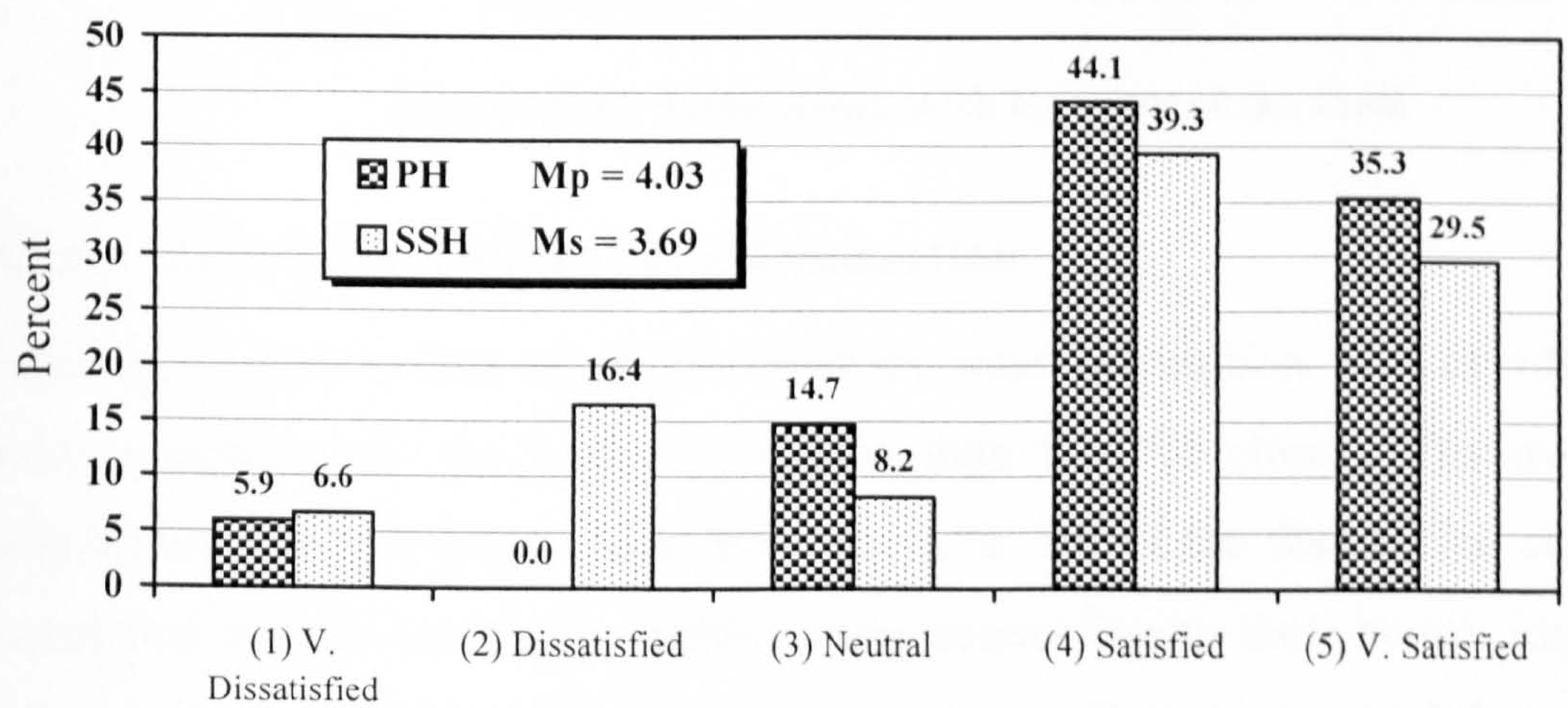


Figure (8.3): Satisfaction with obtaining the land

satisfaction on obtaining the land was 3.86 (neutral to satisfied). Specifically, the PH clients were more satisfied on obtaining the land than the SSH clients. The reasons for dissatisfaction as stated by the dissatisfied clients are:

- Those who got their land from the Lands Department stated that they had to wait very long periods to obtain their land.
- Those who bought their land privately and had been compensated by the Government stated that the amount of compensation was far below the cost of their land.

8.1.4 Satisfaction with Location of the Land

Figure (8.4) shows client satisfaction with location of the land. Most of PH and SSH clients were satisfied or very satisfied (82.4% and 88.6% respectively). SSH clients who were not satisfied stated that they did not have the choice to select land other than what had been offered to them by the Land Department.

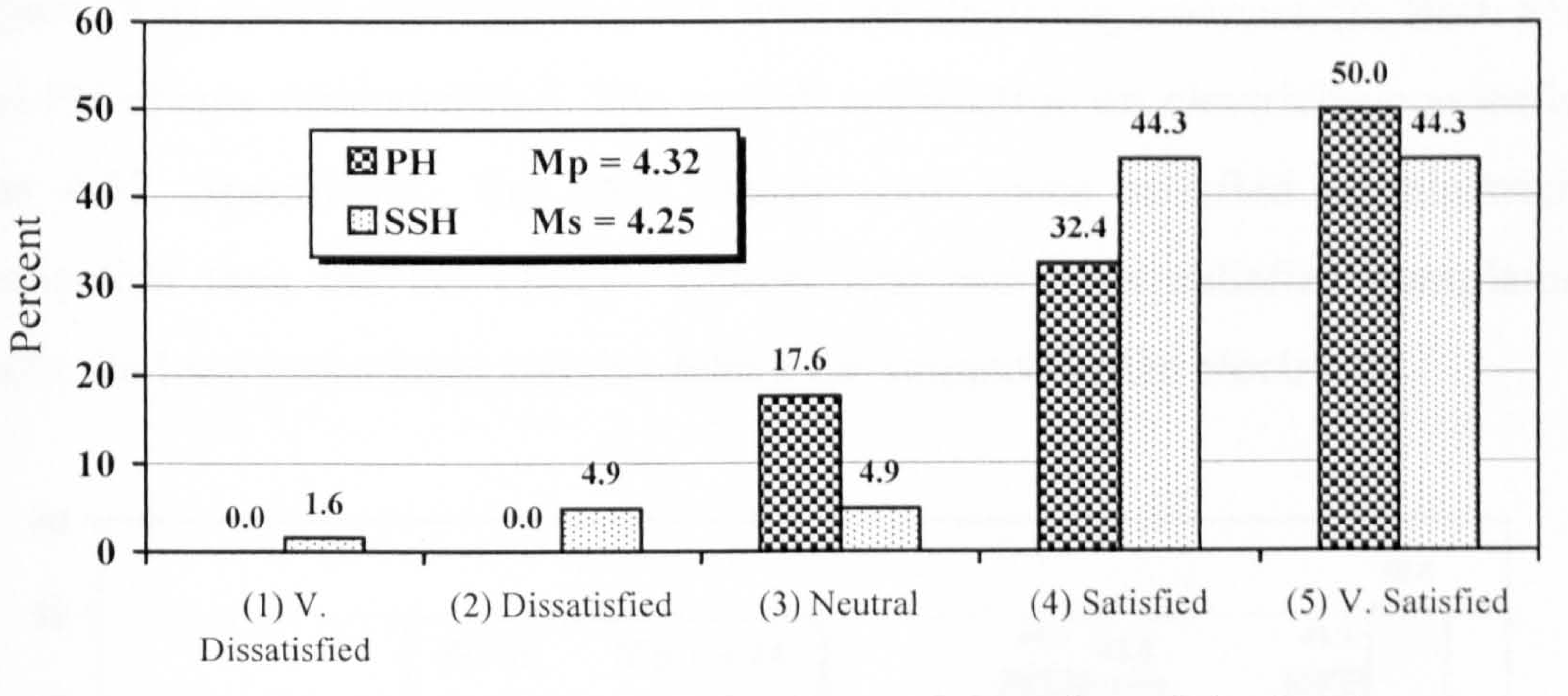


Figure (8.4): Satisfaction with location of the land

8.1.5 Satisfaction with Water Connection

Figure (8.5) shows client satisfaction with the water connection. SSH clients are more satisfied with the water connection than the PH clients. The overall satisfaction with the water connection was 3.78. All of the dissatisfied clients stated that they do not have a public water connection to their house, instead they rely on car tankers to supply them with water. One client stated that: *"the*

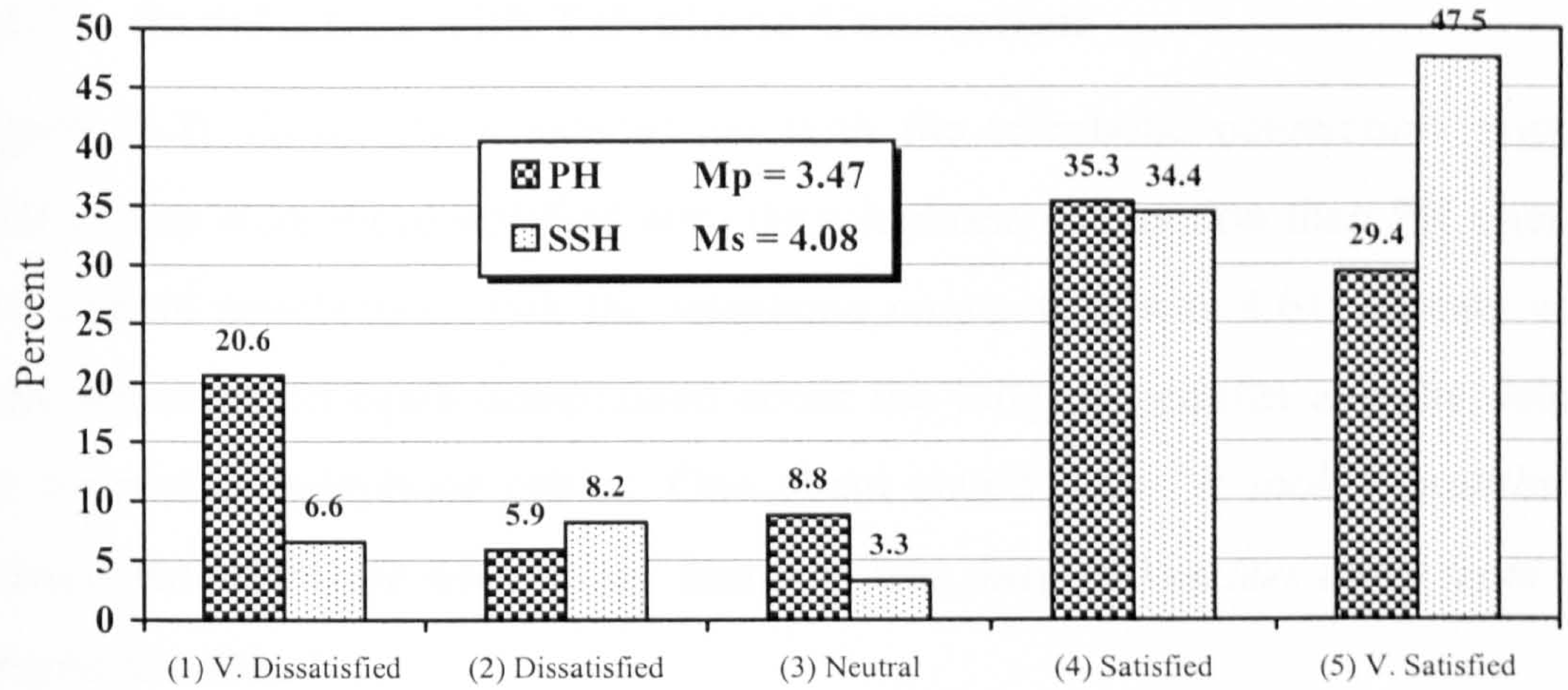


Figure (8.5):Satisfaction with water connection

main public water tank is only 100 meter away from my house, yet no public water is supplied to my house while the main tank supplies houses far away from it."

8.1.6 Satisfaction with electricity connection

Figure (8.6) shows client satisfaction with the electricity connection. Both SSH and PH clients were satisfied. The overall satisfaction on electricity connection was 4.32. Specifically, the SSH clients were more satisfied on electricity connection than the PH clients. Clients who were not satisfied complained about the long procedures and the delays for connecting the electricity.

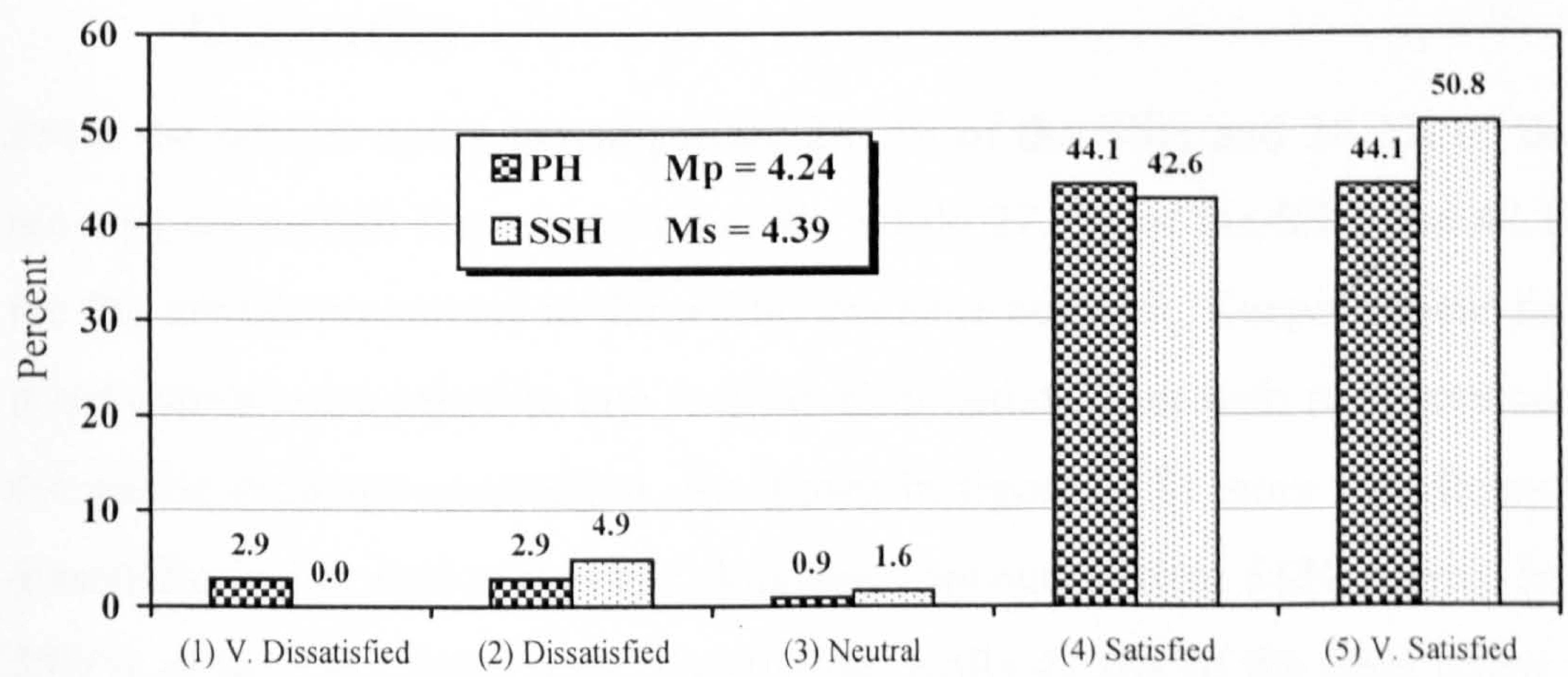


Figure (8.6):Satisfaction with electricity connection

8.1.7 Satisfaction with Telephone Connection

Figure (8.7) shows client satisfaction with the telephone connection. Again, SSH clients were more satisfied with the telephone connection than PH clients. The overall satisfaction with the telephone connection was 4.01. Clients who were not satisfied again complained about the long procedures and the delays for connecting telephone cables. One client stated that: *"it took 7 months to connect the telephone wires to my house. It was only 200 meters away from the telephone cable."*

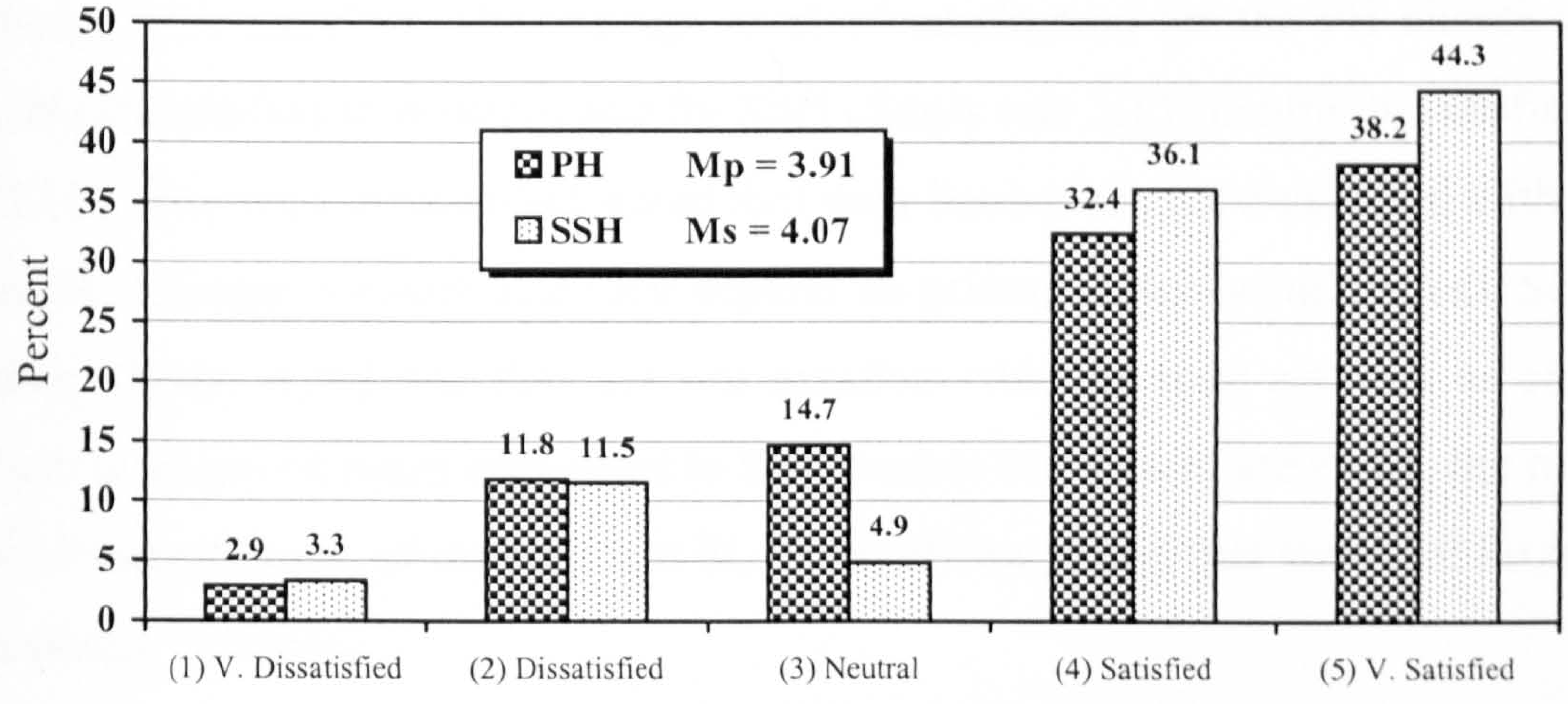


Figure (8.7): Satisfaction with telephone connection

8.1.8 Satisfaction with Road Services and Public Drainage Connection

From the houses under investigation, 26.2% of the SSH and 38.2% of the PH are only accessible from unpaved roads, while 27.9% of the SSH and 47.1% of the PH are not connected to the public drainage network. Keeping these facts in mind clients were asked to rate their level of satisfaction with road services and the public drainage connection. As shown in figure (8.8) more PH clients were dissatisfied with road and public drainage connection than SSH clients. In fact, 55.9% of the PH clients were dissatisfied, while 41.0% of the SSH client were dissatisfied. On the other hand, 20.6% of the PH clients and 45.9% of the SSH

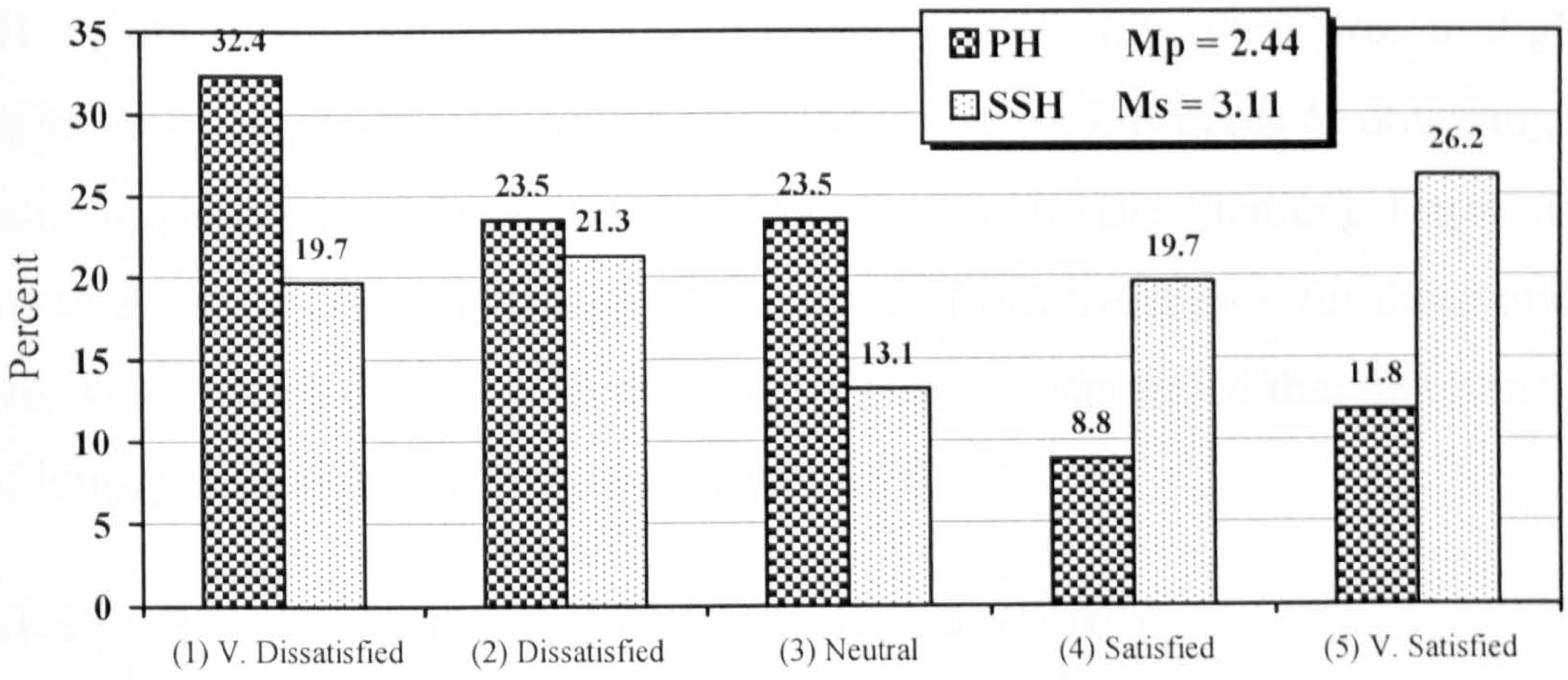


Figure (8.8):Satisfaction with road services & public drainage

clients were satisfied. The average level of satisfaction for the PH clients was 2.44 (dissatisfied to neutral), and for SSH clients was 3.11 (neutral to satisfied). Clients who were dissatisfied stated that their houses are not connected with the public drainage network and they depend on private water-borne system. Some other clients stated that they are not satisfied with the road services as either there is no paved roads connected to their houses or, if there are roads, the roads need maintenance, or they are not lit. Other clients stated that there are no road drainage facilities.

8.1.9 Satisfaction with Obtaining the Building Permission

Figure (8.9) shows client satisfaction with obtaining the building permission from the Planning Department. Most of the clients were satisfied (79.4% of the

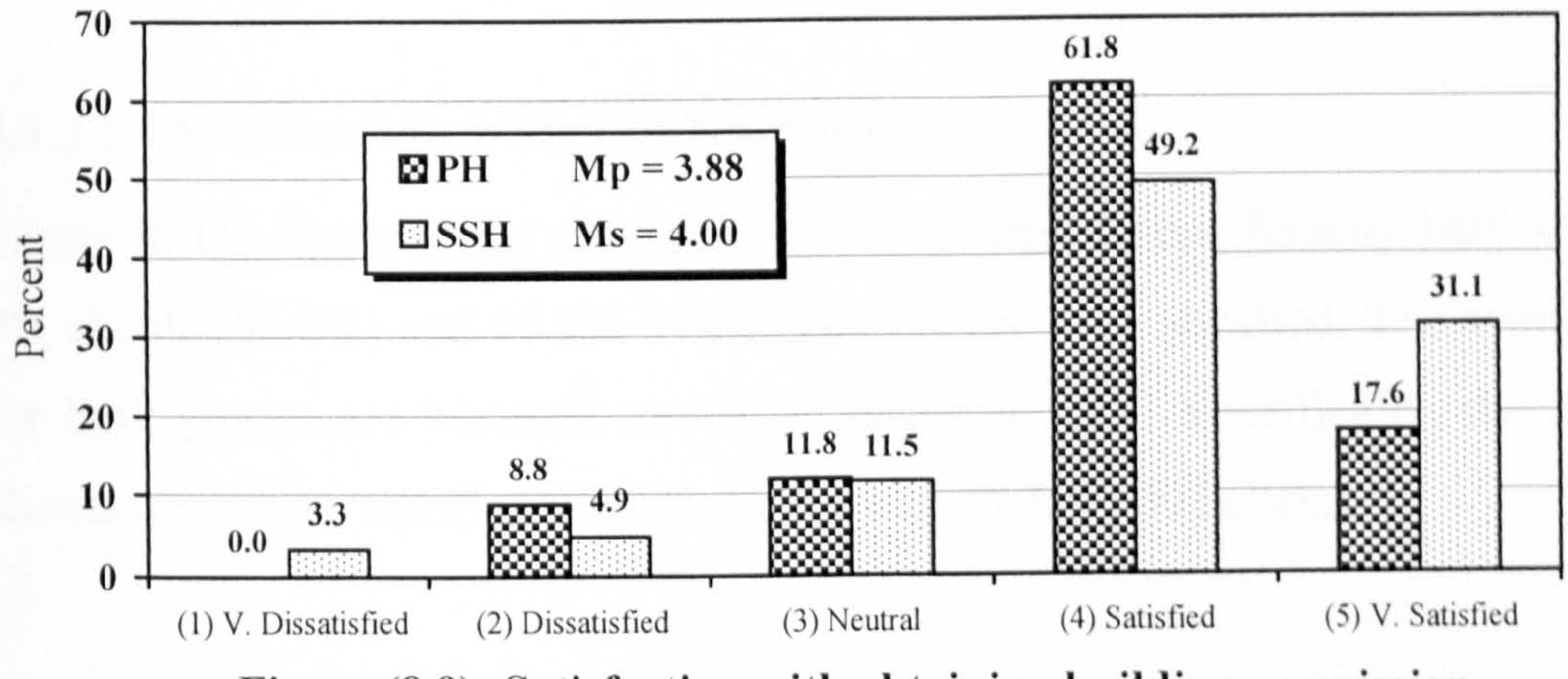


Figure (8.9): Satisfaction with obtaining building permission

PH clients and 80.3% of the SSH clients). Specifically, there was a slightly higher level of satisfaction among SSH clients with the process of obtaining the building permission. The rejection of some plans by the Planning Department due to planning or building regulation violation was the reason for those clients who were not satisfied. On the other hand, other clients stated that obtaining the building permission took longer than expected.

8.1.10 Satisfaction with Contractual Procedures

Figure (8.10) shows client satisfaction with contractual procedures. Again most clients were satisfied (68.8% of the SSH clients and 55.9% of PH clients). The average level of satisfaction for the SSH clients was 3.77 (neutral to satisfied), and for PH clients was 3.47 (neutral to satisfied). Clients who were not satisfied believe that the contractual procedures are long, complicated and not reliable.

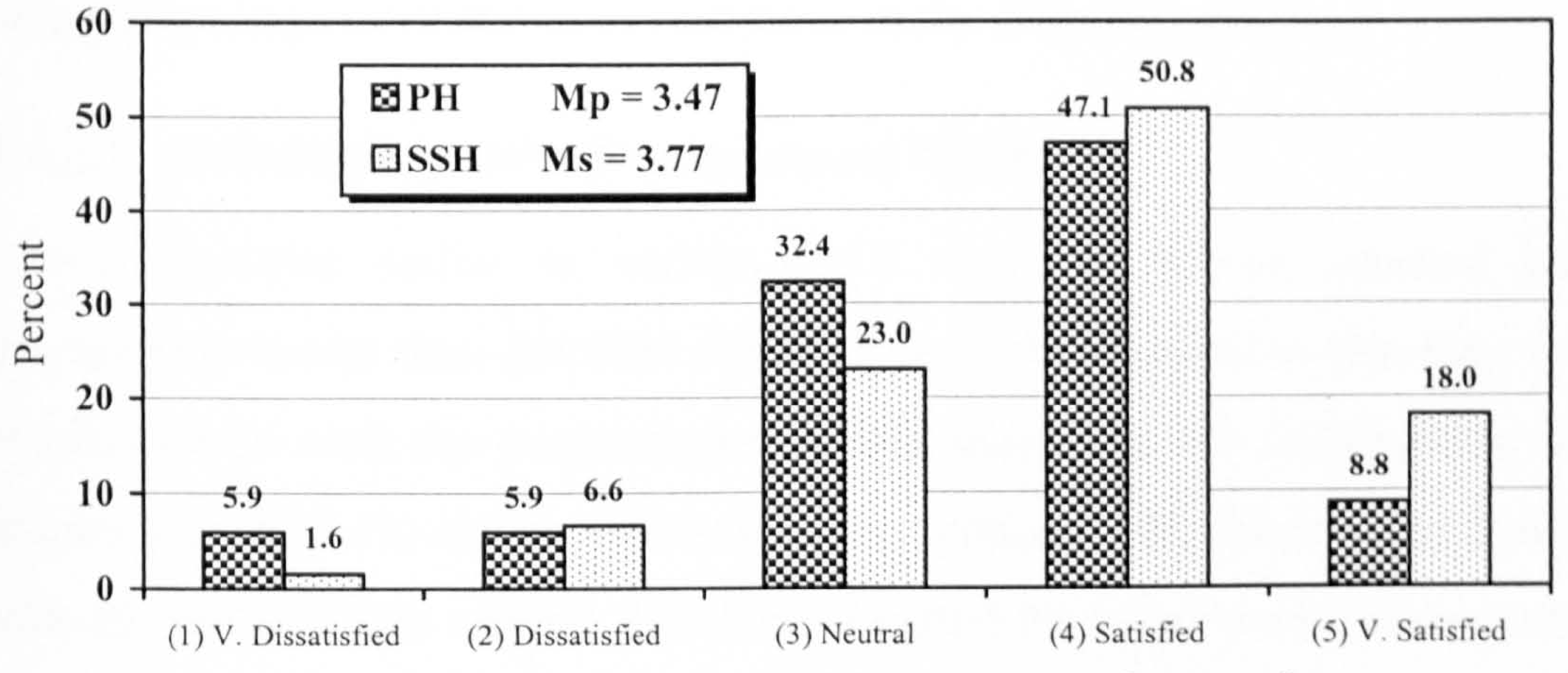


Figure (8.10): Satisfaction with contractual procedures

8.1.11 Satisfaction with Contract Forms

Figure (8.11) shows client satisfaction with contract forms. Exactly half of the PH clients (50.0%) and 60.6% of the SSH clients were satisfied. The averages for both groups are between neutral to satisfied scale. Specifically, the SSH clients were more satisfied with contract forms than the PH clients.

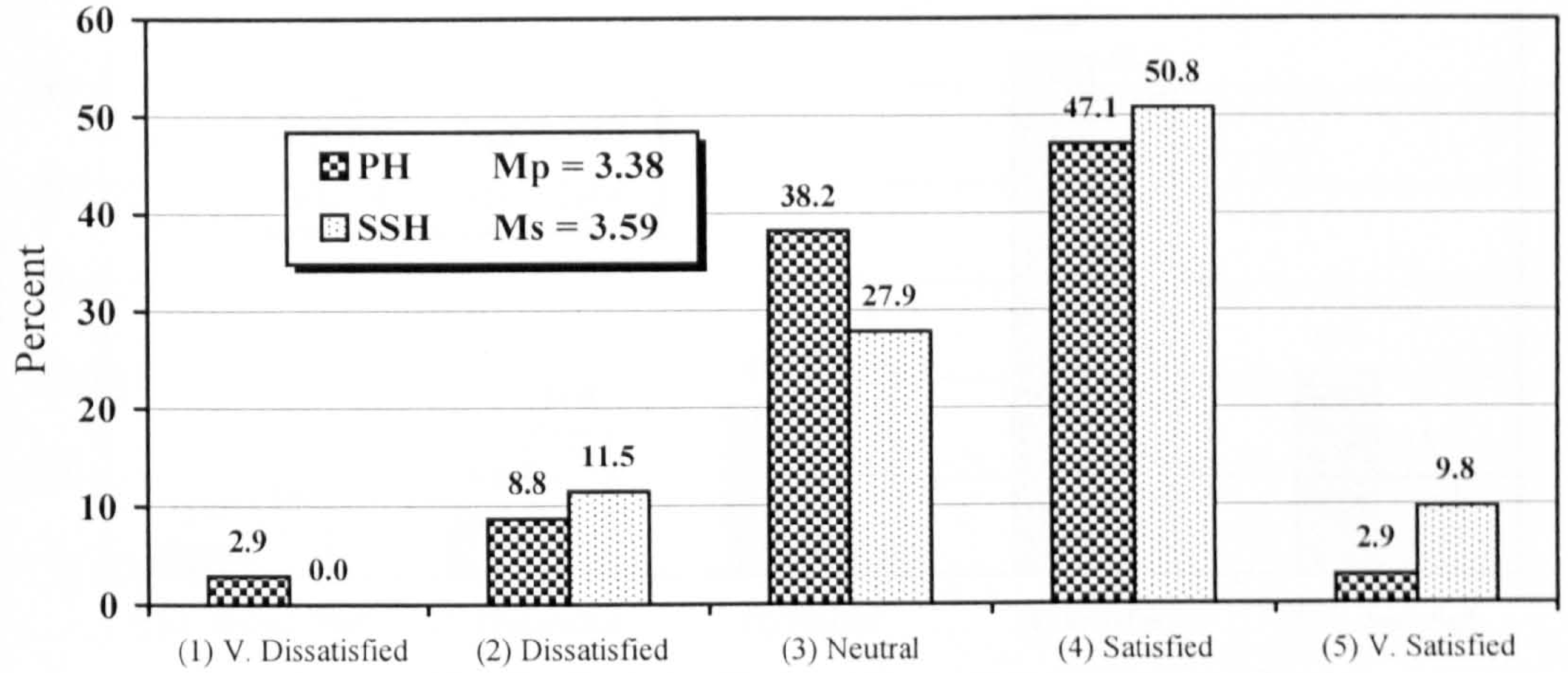


Figure (8.11): Satisfaction with contract forms

Clients who were not satisfied stated that the absence of general contract forms has led them to use pre-contract forms written by the contractors that had a lot of gaps from which the contractors benefited at the time of the execution. Other clients said that the contracts they used were vague and contained unclear phrases to assign roles and responsibilities to the different parties.

8.1.12 Satisfaction with Procurement Method

It was revealed earlier in section 7.5.1 that PH clients selected more procurement routes than did SSH clients. Clients were asked to rate their level of satisfaction with the procurement method they used for constructing their houses. Figure (8.12) shows that most of the SSH and PH clients were satisfied with the procurement method they have adopted for constructing their houses. About three-quarters of the PH clients (73.5%) and 59.0% of the SSH clients were satisfied. Furthermore, PH clients were more satisfied on the procurement methods they used than were SSH clients.

On the other hand, one fifth of the SSH clients (19.7%) were not satisfied. Most SSH clients who were not satisfied stated that the limitation as to the procurement method they can select was the main reason for their dissatisfaction. Other clients from both groups stated that due to the procurement method they used, especially the traditional method, the project finished with an overrun in time because of the delays occasioned by the

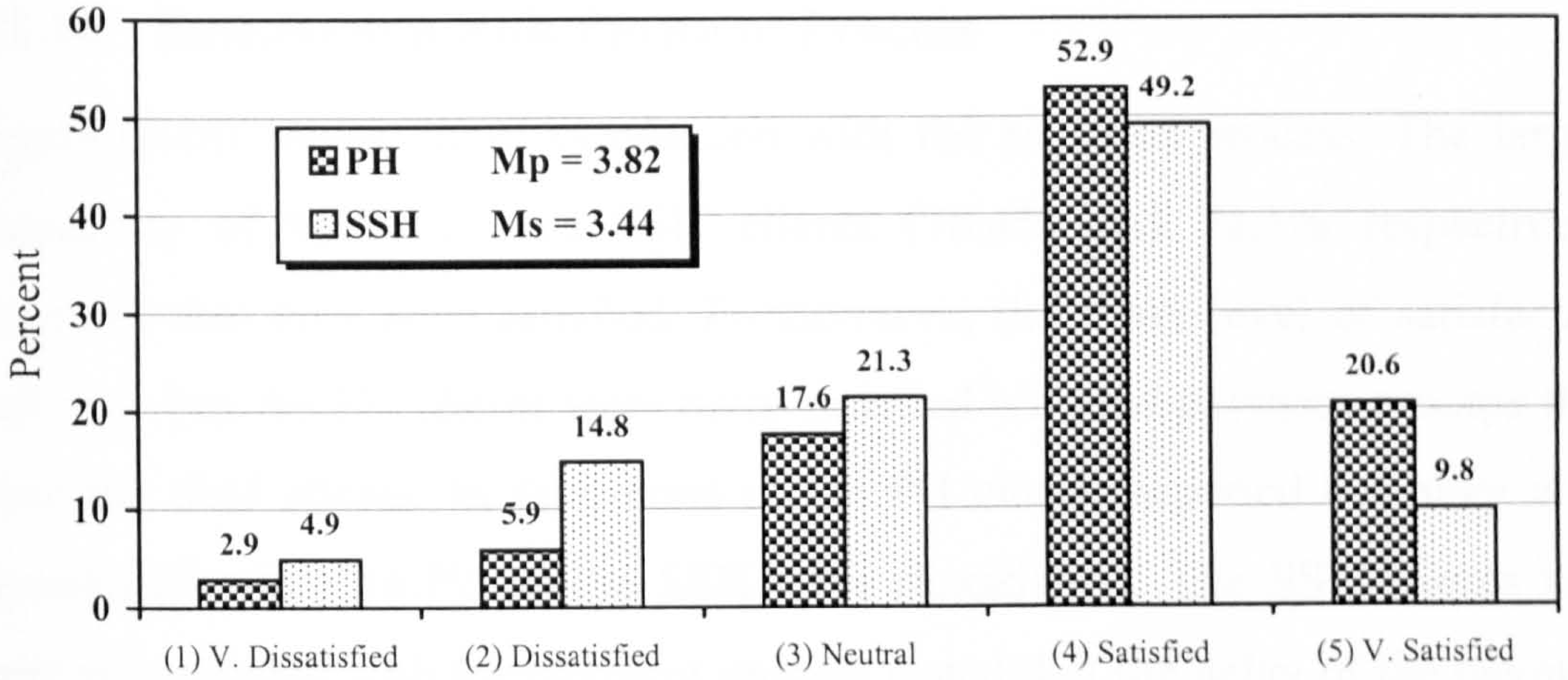


Figure (8.12): Satisfaction with procurement method

contractor. These clients think that if they selected other procurement methods, such as construction management or design/build, they would have finished their projects in a much shorter time.

8.1.13 Satisfaction with Tender Procedure

Figure (8.13) shows client satisfaction with the tender procedure. Again, clients of both groups were satisfied (57.4% of the SSH clients and 55.9% of the PH clients). The mean levels of satisfaction for both groups were in the range of (neutral to satisfied). Furthermore, the PH clients were more satisfied on the tender procedure they used than were the SSH clients. A large minority of both groups stated that their level of satisfaction with the tender procedure is neutral.

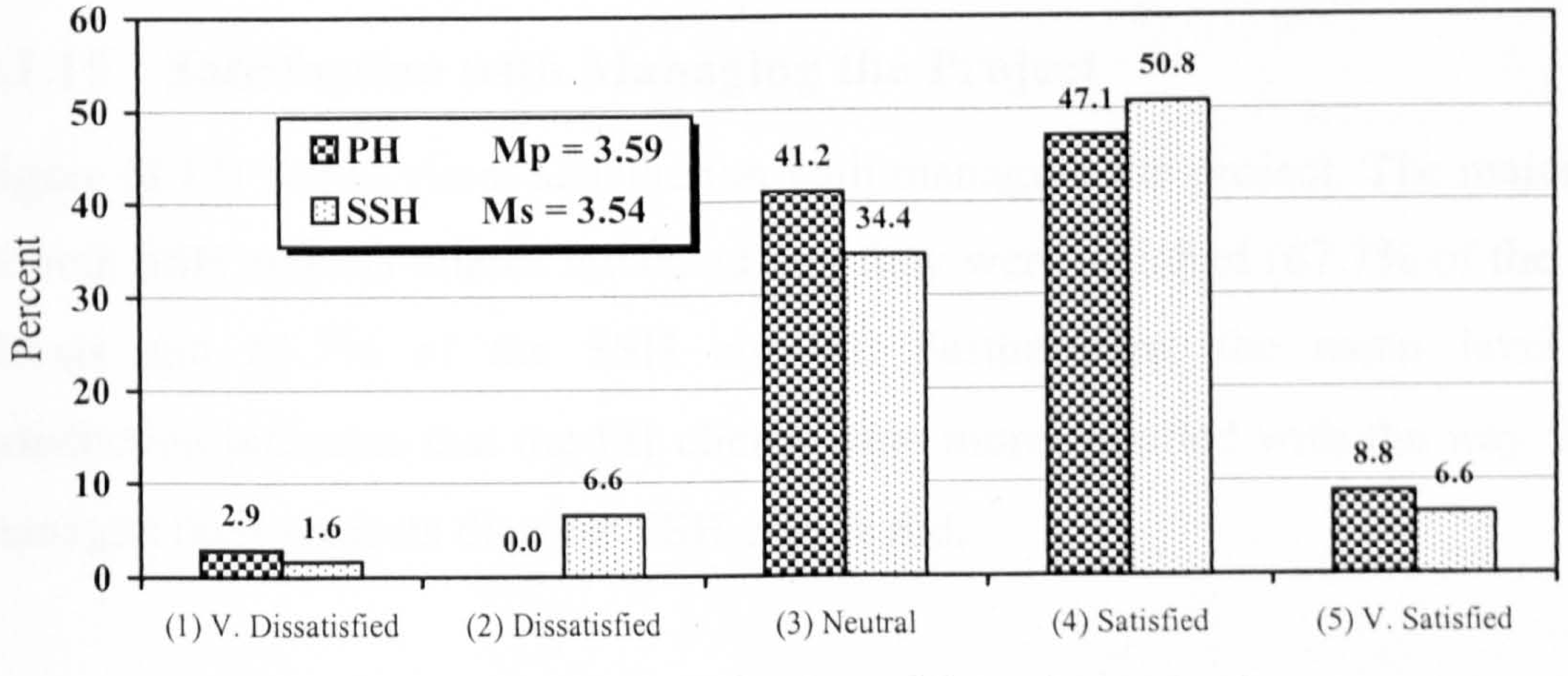


Figure (8.13): Satisfaction with tender procedures

8.1.14 Satisfaction with Payment Process

Figure (8.14) shows client satisfaction with the payment process. The largest proportion of both PH and SSH clients (76.4% and 72.1% respectively) indicated that they were satisfied. Furthermore, the mean level of satisfaction indicates that the PH clients were more satisfied with the payment process than were the SSH clients. In fact, none of the PH clients reported that they were dissatisfied while 14.7% of the SSH were dissatisfied. The SSH clients who were not satisfied with the payment process stated that the delay of the payment process by the bank led the contractor to stop the works on site. Others stated that the amount of the payment was small.

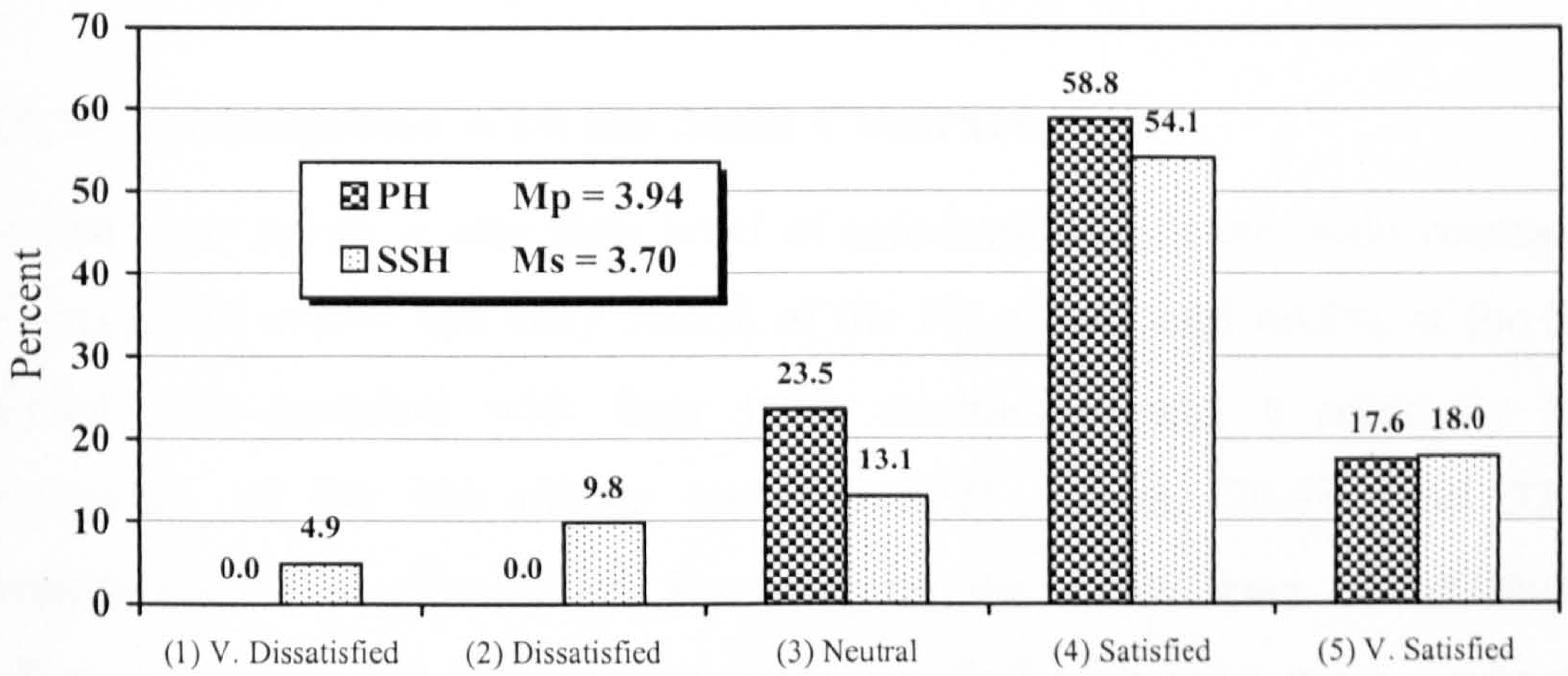


Figure (8.14): Satisfaction with payment process

8.1.15 Satisfaction with Managing the Project

Figure (8.15) shows client satisfaction with managing the project. The majority of both SSH and PH clients indicated that they were satisfied (67.7% of the PH clients and 61.7% of the SSH clients). Furthermore, the mean level of satisfaction indicates that the PH clients were more satisfied with the way they managed their projects than the SSH clients did.

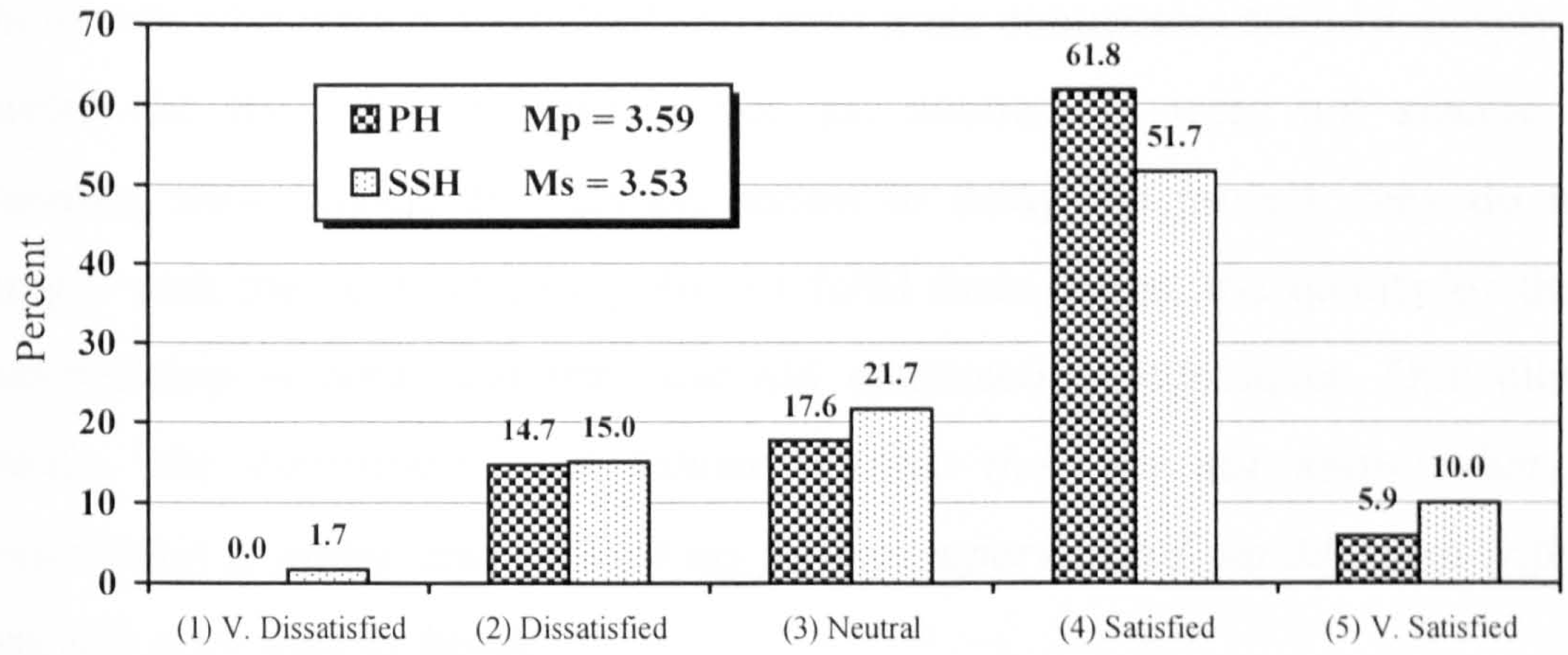


Figure (8.15): Satisfaction with managing the project

Most of the clients who were not satisfied think that lack of experience with construction projects was the main reason for managing the project less effectively than they thought at the outset of the project.

8.1.16 Satisfaction with the Main Contractor

Clients were asked to rate their level of satisfaction with the main contractor. Figure (8.16) shows that only 58.8% of the PH clients and 49.2% of the SSH clients were satisfied with their main contractors and a relatively high percentage of the PH clients and the SSH clients, 20.6% and 32.8% respectively, were dissatisfied. Furthermore, the mean level of satisfaction indicates that the PH clients were more satisfied with their main contractors than were the SSH clients.

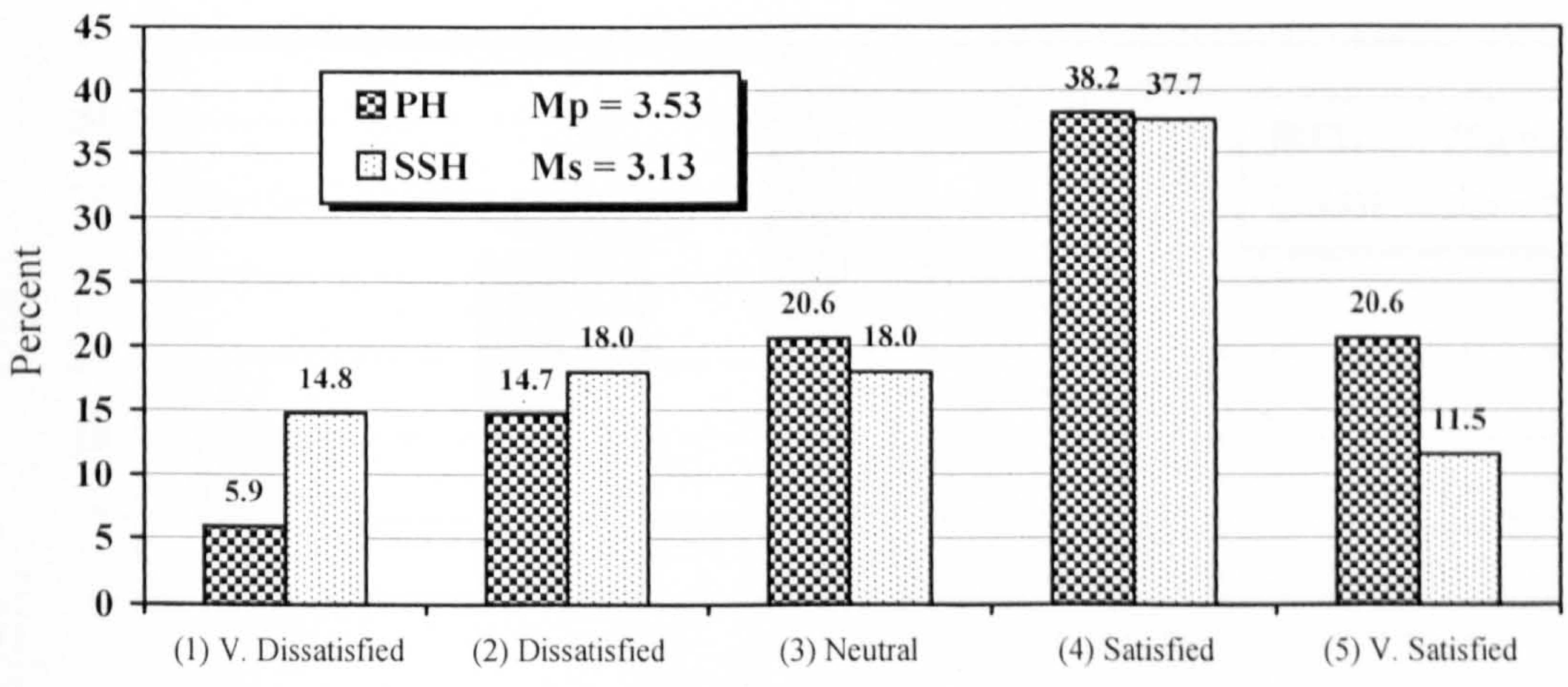


Figure (8.16): Satisfaction with main contractor

The clients who were not satisfied with their main contractors stated a variety of reasons for their dissatisfaction. Such as: contractors were not sincere in executing their works, they always meant to delay the project, they do not comply with the contracts, they do not fulfil their duties, the quality of their workmanship is poor, and they use old construction techniques. One client stated: *"the contractor used labourers that they do not know what is construction is about, and without my proper supervision I would finish with a complete poor quality house."*

It is interesting to note here that none of the dissatisfied clients mentioned reasons related to the cost of the project, instead most of them gave reasons related to time and quality. That is mainly because the clients look at the service provided to them by the contractors, time and quality, once they have agreed on the cost of the project.

8.1.17 Satisfaction with the Sub-contractor(s)

Clients were asked to rate their level of satisfaction with their sub-contractors (where applicable). Figure (8.17) shows that only 35.7% of the PH clients and 34.1% of the SSH clients were satisfied with their sub-contractors and a high percentage of the PH clients and the SSH clients, 32.1% and 34.1% respectively, were dissatisfied. Another large minority of both groups was neutral. Furthermore, the mean levels of satisfaction indicates that there is no

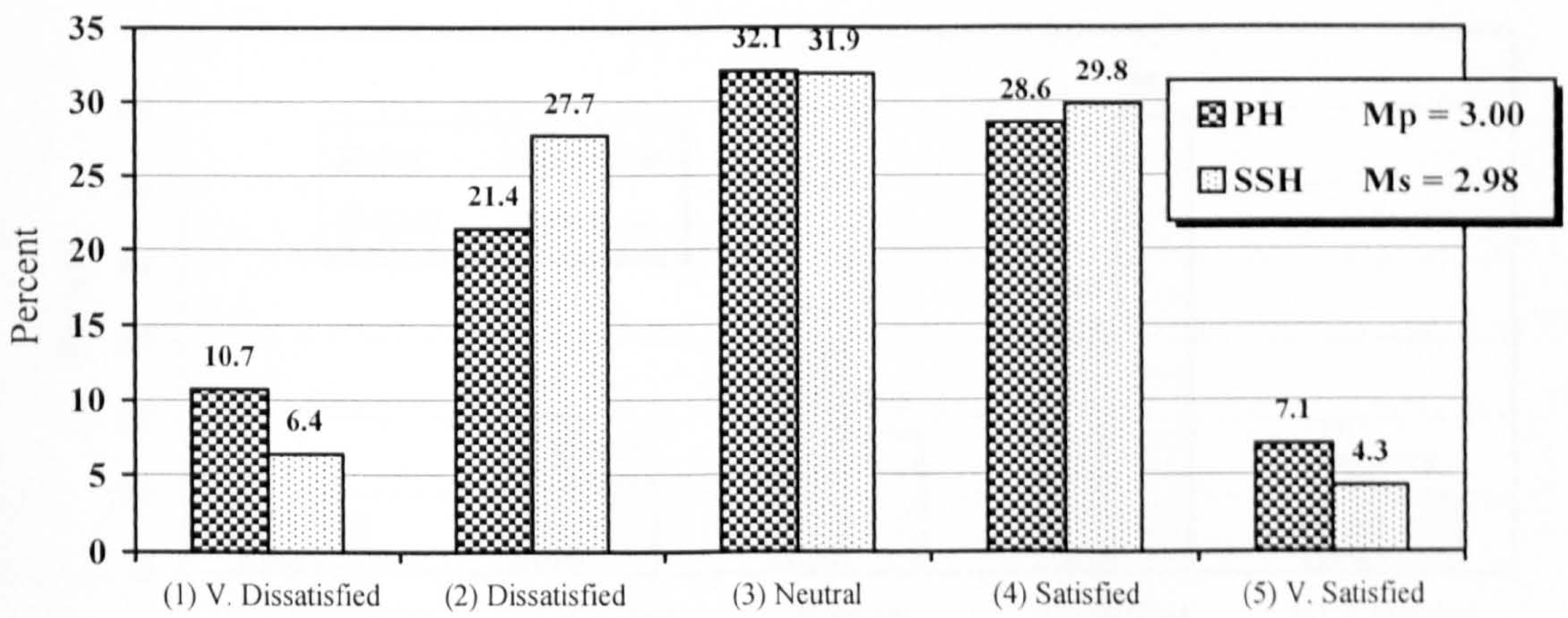


Figure (8.17): Satisfaction with the subcontractors

difference between the two groups in relation to satisfaction with sub-contractors.

The same reasons stated by the clients in the previous sub-section for not being satisfied with the main contractors were mentioned again as their reasons for dissatisfaction with their subcontractors. A client summed up the problem as: *"the workmanship of the subcontractors were very low, the procrastination and breaking of their promises are common features."* Again, no mention of cost.

8.1.18 Satisfaction with the Designer

Clients were asked to rate their level of satisfaction with their designers. Figure (8.18) shows that 47.1% of the PH clients and 68.8% of the SSH clients were satisfied with their designers. On the other hand, 23.5% of the PH clients and only 13.1% of the SSH were dissatisfied. The figure also shows that 29.4% of the PH clients and 18.0% of the SSH were neutral. Furthermore, the mean levels of satisfaction indicate that the SSH clients were more satisfied with their designers than the PH clients.

Clients who were not satisfied stated that at the time of the execution of the project they discovered some design deficiencies. Others stated that the designers did not bother to spend more time to get an economical structural design. Instead they assigned more steel reinforcement to the building than it really needed which cost the clients more money.

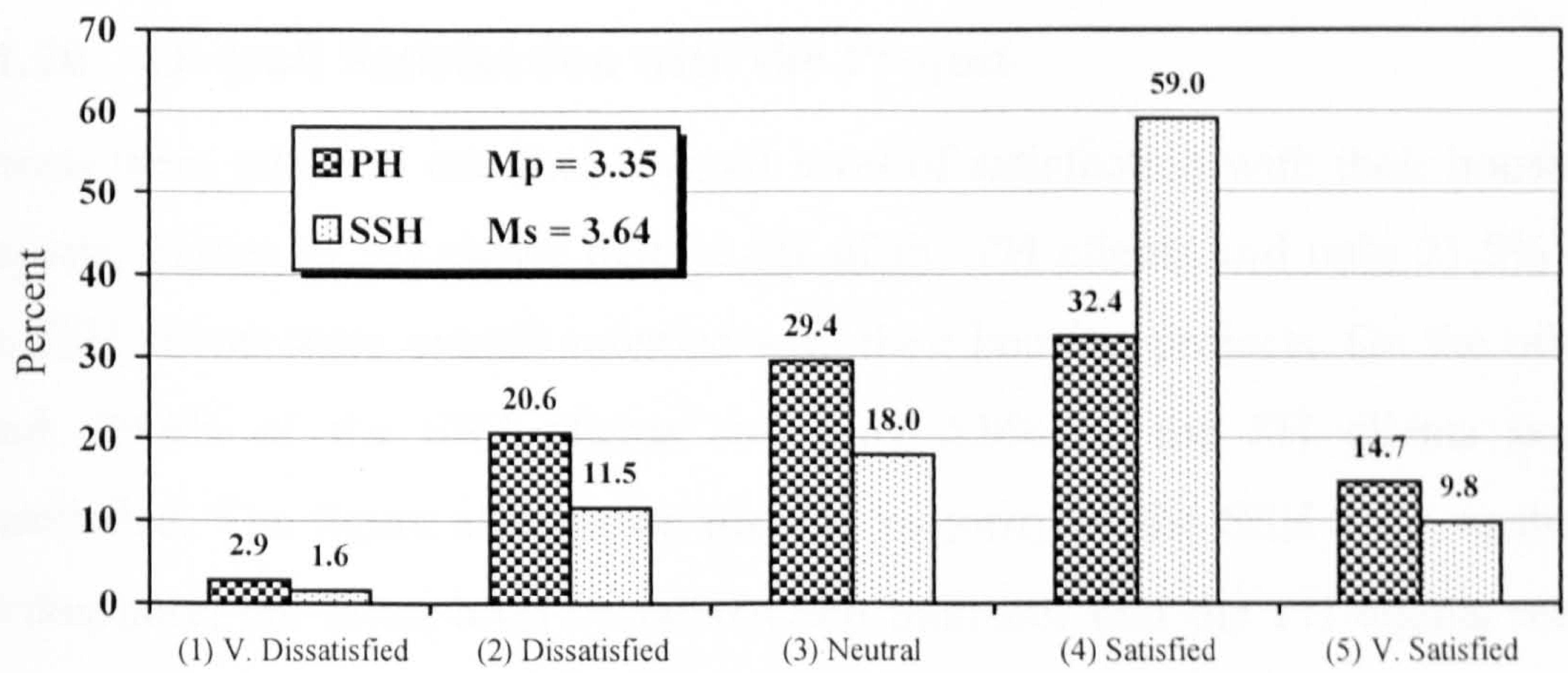


Figure (8.18): Satisfaction with the designer

8.1.19 Satisfaction with the Site Supervisor Engineer

Clients were asked to rate their level of satisfaction with their site supervisor engineers. Figure (8.19) shows that 40.7% of the PH clients and 53.3% of the SSH clients were satisfied with their supervisor engineers. On the other hand, 25.9% of the PH clients and 26.7% of the SSH were dissatisfied. The figure also shows that 33.3% of the PH clients and 20.0% of the SSH were neutral. Furthermore, the mean level of satisfaction indicates that the PH clients were more satisfied with their supervisor engineers than were the SSH clients.

Most of the dissatisfied clients agreed unanimously that their supervisor engineers did not fulfil their duties. They said that their supervisor engineers did not follow up with the contractors and they did not fulfil their quality control function.

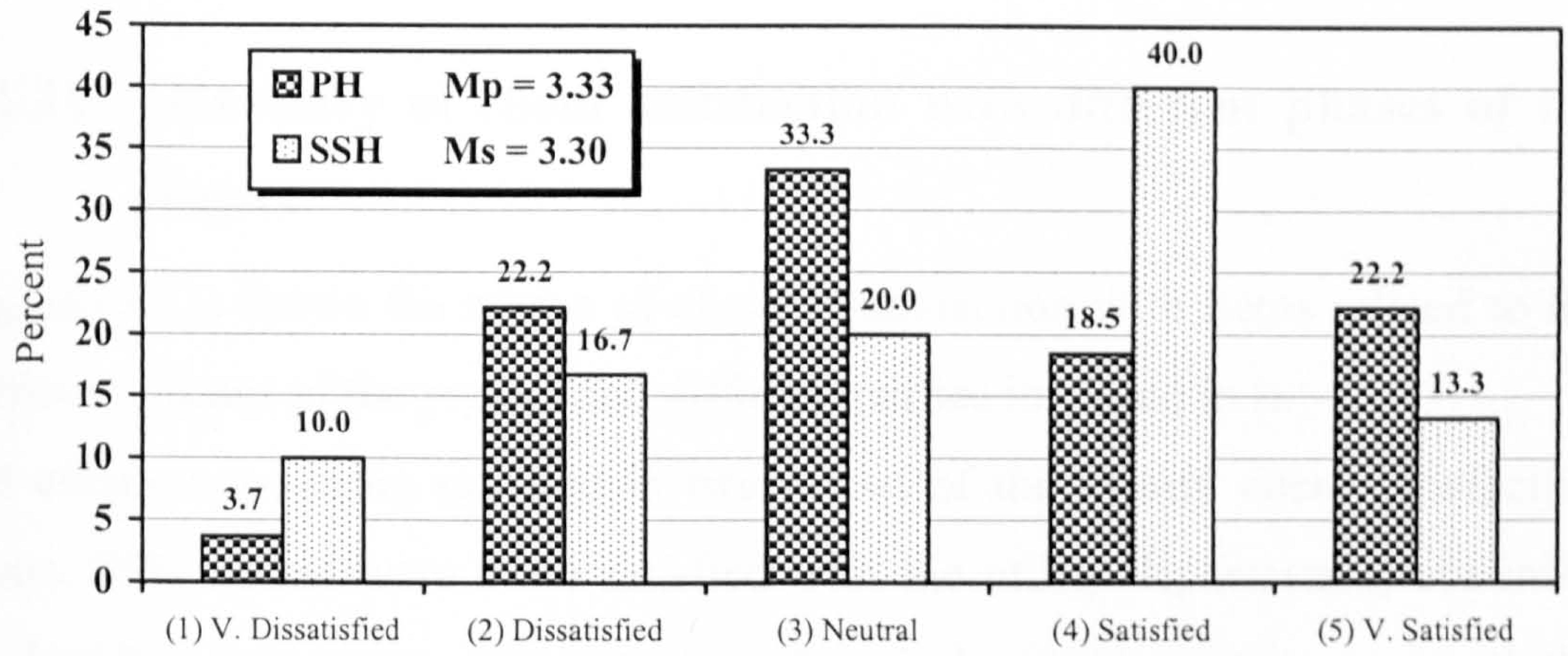


Figure (8.19): Satisfaction with the site supervisor engineer

8.1.20 Overall Satisfaction with the Project

Clients were asked to rate their overall level of satisfaction with their housing projects. Figure (8.20) shows that 76.4% of the PH clients and only 21.5% of the SSH clients were overall satisfied with their housing projects. On the other hand, 29.6% of the SSH clients and only 5.9% of the PH clients were dissatisfied. The figure also shows that the majority of the SSH were neutral. Furthermore, the mean level of satisfaction indicates that the PH clients were more satisfied with their housing projects than the SSH clients.

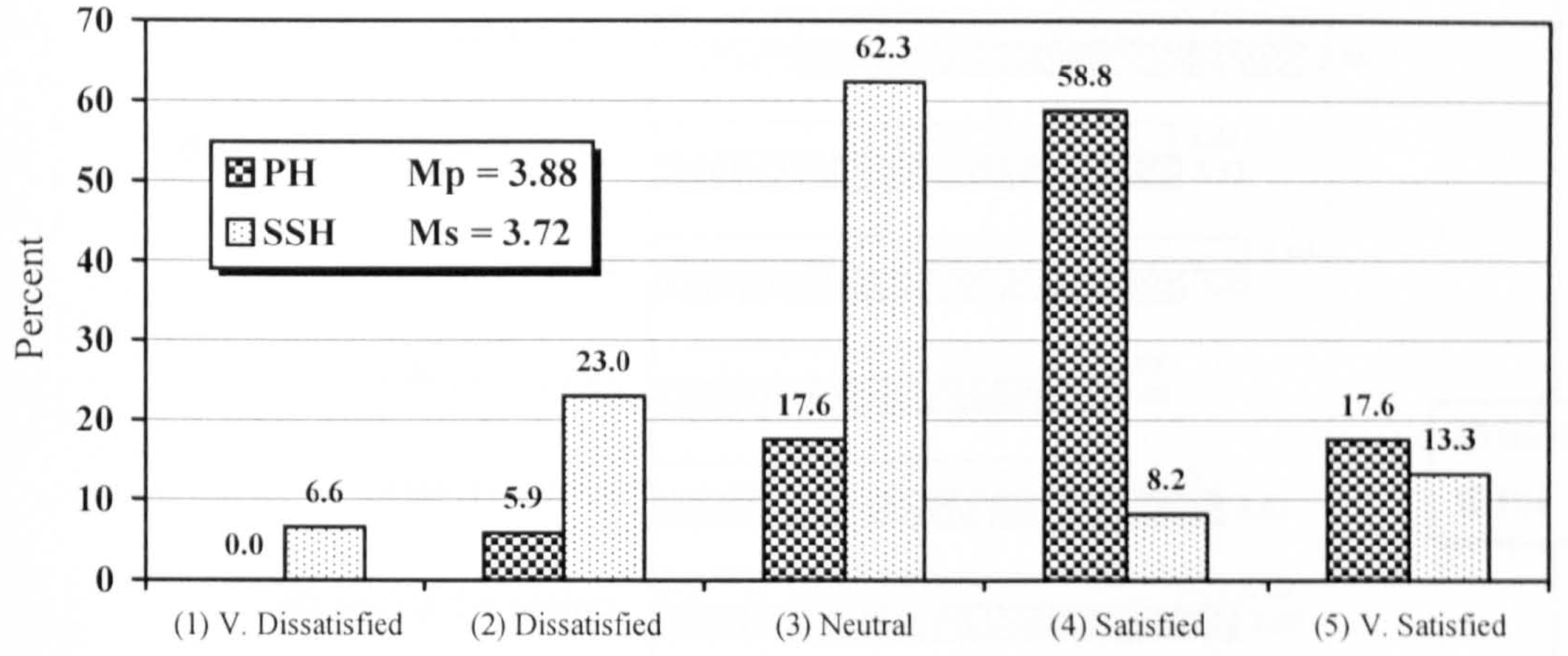


Figure (8.20): Overall satisfaction with the project

Clients who were not satisfied with the outcomes of their projects stated that deficiency in the design of their houses was the reason. While other clients, especially the SSH, stated the delays of the contractors and poor workmanship were their main reasons for the overall dissatisfaction with their projects.

8.1.21 Summary of client satisfaction with different phases of the project

Figure (8.21) shows the means of client's satisfaction with items related to the different phases of the project and different parties involved in it.

PH clients were more satisfied in twelve out of the twenty client satisfaction items. SSH clients were more satisfied with the utility departments, obtaining the building permission, contractual arrangements, contract forms, and with the designers.

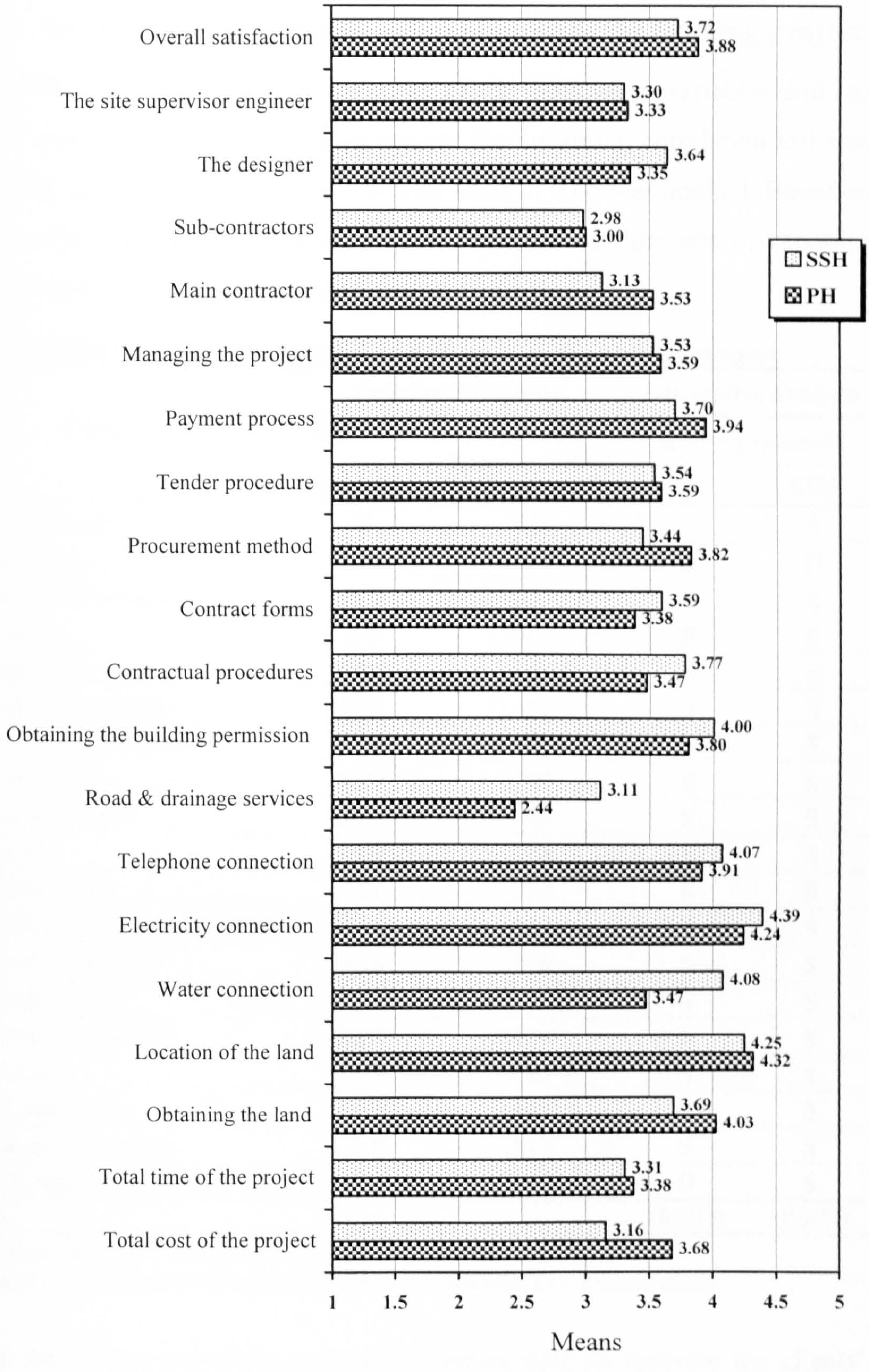


Figure (8.21): Means of Client satisfactions

8.1.22 Factors affecting overall satisfaction with the housing project

To identify any relationship between the client satisfaction variables and the overall satisfaction with the housing project the Spearman correlation test was run on the data collected and a significance level of 0.05 was applied. Based on the Spearman (Rho) the following relationships between the sets of variables were established in order of ranking (see table (8.1)).

Table (8.1): Factors affecting overall satisfaction with the housing project

Variables	Relational Analysis		Descriptive Analysis	
	Significant test (P-value)	Rank order Spearman (Rho) correlation	Scouring system** PH	SSH
Main contractor	.000	.614	S	S
Subcontractor(s)	.000	.585	S	D
Procurement method	.000	.547	S	S
Total time	.000	.509	S	S
Site supervisor engineer	.000	.469	S	S
Managing the project	.000	.458	S	S
Contractual procedures	.000	.405	S	S
Contract forms	.000	.399	S	S
Tender procedure	.000	.360	S	S
Designer	.000	.358	S	S
Obtaining land	.011	.258	S	S
Obtaining building permission	.013	.227	S	S
Location of the land	.018	.226	S	S
Payment process	.078*	.182	S	S
Electricity connection	.091*	.174	S	S
Total cost	.115*	.163	S	S
Water connection	.197*	.133	S	S
Telephone connection	.260*	.117	S	S
Road & drainage services	.529*	.065	D	S
Total			**18S/1D**	**18S/1D**

* Not significant at P equals 0.05 or less

** Based on the highest rate of response (S = Satisfied, D = Dissatisfied)

It was found that out of the nineteen variables used to measure the clients' satisfaction with their housing project, thirteen of them were significantly associated with the overall satisfaction and these are discussed below.

Table (8.1) shows that overall housing project satisfaction was associated most strongly with the main contractor for the project (P=0.000, Rho=0.614).

58.8% of the respondents in the PH scheme and 49.2% of the respondents of the SSH scheme were satisfied or very satisfied with their main contractors.

The second association between overall housing project satisfaction was significantly related to the subcontractors of the project (P=0.000, Rho=0.585).

It was found that only 35.7% of the respondents in the PH scheme and 34.1% of the respondents of the SSH scheme showed satisfaction with their subcontractors.

The third relationship between overall housing project satisfaction and other variables was significantly related to the procurement method used for the project (P=0.000, Rho=0.547).

It was found that 73.5% of the respondents in the PH scheme and 59.0% of the respondents of the SSH scheme were satisfied or very satisfied with the procurement method.

The fourth relationship between overall housing project satisfaction and different variables was significantly related to the total time of the project (P=0.000, Rho=0.509).

It was found that 57.6% of the respondents in the SSH scheme and 61.8% of the respondents of the PH scheme were satisfied or very satisfied with the total time of the project.

The fifth relationship between overall housing project satisfaction and different variables was significantly related to the site supervisor engineer (P=0.000, Rho=0.469).

It was found that 53.3% of the respondents in the SSH scheme and 40.7% of the respondents of the PH scheme were satisfied or very satisfied with their site supervisor engineer.

The sixth relationship between overall housing project satisfaction and different variables was significantly related to the management of the project (P=0.000, Rho=0.458).

It was found that 67.7% of the respondents in the PH scheme and 61.7% of the respondents of the SSH scheme were satisfied or very satisfied with the way they managed their housing project.

The seventh relationship between overall housing project satisfaction and different variables was significantly related to the contractual procedures (P=0.000, Rho=0.405).

It was found that 68.8% of the respondents in the SSH scheme and 55.9% of the respondents of the PH scheme were satisfied or very satisfied with the contractual procedures.

The eighth relationship between overall housing project satisfaction and different variables was significantly related to the contract forms used for the project (P=0.000, Rho=0.399).

It was found that 60.6% of the respondents in the SSH scheme and 50.0% of the respondents of the PH scheme were satisfied or very satisfied with the forms of contracts used for the project.

The ninth relationship between overall housing project satisfaction and different variables was significantly related to the tender procedure for appointing the different parties involved in the project (P=0.000, Rho=0.360).

It was found that 57.4% of the respondents in the SSH scheme and 55.9% of the respondents of the PH scheme were satisfied or very satisfied with the tender procedure they used.

The tenth relationship between overall housing project satisfaction and different variables was significantly related to the designer of the house (P=0.000, Rho=0.358).

It was found that 47.1% of the respondents in the PH scheme and 68.8% of the respondents of the SSH scheme were satisfied or very satisfied with the designer of their houses.

The eleventh relationship between overall housing project satisfaction and different variables was significantly related to the acquisition of the land (P=0.011, Rho=0.258).

It was found that 79.4% of the respondents in the PH scheme and 68.9% of the respondents of the SSH scheme were satisfied or very satisfied with the acquisition of their lands.

The twelfth relationship between overall housing project satisfaction and different variables was significantly related to obtaining the building permission (P=0.013, Rho=0.227).

It was found that 79.4% of the respondents in the PH scheme and 80.3% of the respondents of the SSH scheme were satisfied or very satisfied obtaining their building permission.

The thirteenth relationship between overall housing project satisfaction and different variables was significantly related to the location of the land (P=0.018, Rho=0.226).

It was found that 82.4% of the respondents in the PH scheme and 88.6% of the respondents of the SSH scheme were satisfied or very satisfied with the location of their lands (houses).

8.1.23 SSH client satisfaction with SSH regulations

SSH clients were asked to rate their satisfaction level with the SSH laws and regulations. The results are shown in figure (8.22).

42.7% of the SSH clients were satisfied with the SSH regulations, 39.3% of the clients were neutral, and 18.0% of the clients were dissatisfied. Those who were dissatisfied stated that the SSH regulations are out of date and need to be updated. One client said: *"the Senior Staff Housing Project needs to be re-organised."* Other clients stated that unnecessary restrictions need to be taken out of the regulations, such as the condition of separating design from construction and the condition of prohibiting SSH clients from selling their houses for fifteen years, even after paying all the loan instalments.

The SSH clients were asked about their level of satisfaction with the amount of the SSH loan. As expected in sections 7.3.4 and 7.5.5 figure (8.22) shows that 62.3% of the SSH clients were not satisfied (VD+D) with the current amount of

SSH loan. In fact, none of the SSH clients was very satisfied. Only 13.1% of them stated that were satisfied with the amount of the SSH loan, while 24.6% of the were neutral.

All of the unsatisfied clients agreed that QR 600,000 is not adequate to fulfil their housing needs. They said that the loan is not enough to build a two-storied house consisting of five bedrooms, five bathrooms, three receptions, outside annex, and the outside fence. One client said: *"despite the rising cost of building the amount of the SSH loan has been constant since 1982, while the amount of Public Housing loan has increased from QR 45,000 in 1975 to QR 300,000 in 1997."*

SSH clients also stated that they had to get additional loans from other banks in order to cover the cost of the construction project. These additional loans were

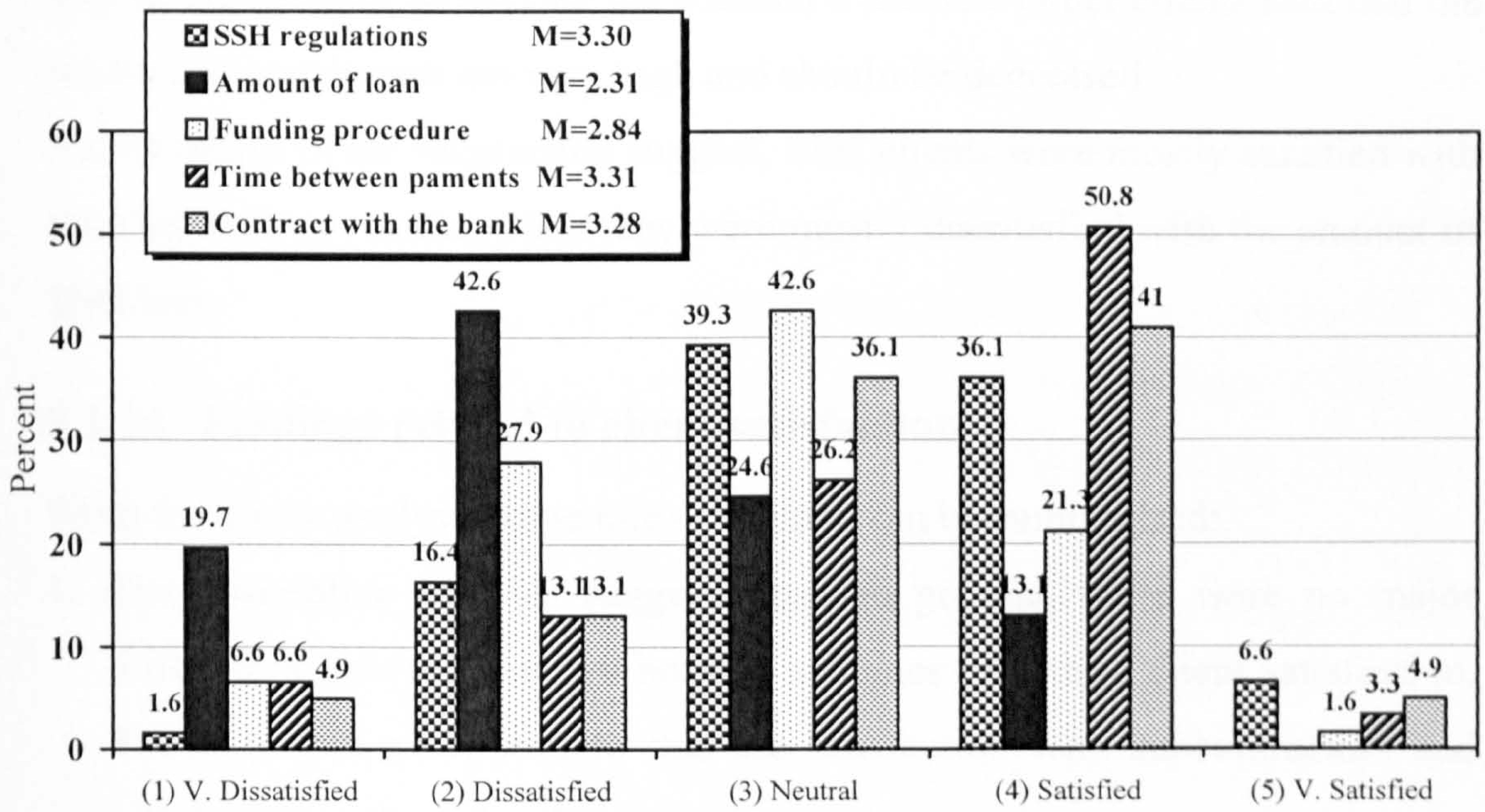


Figure (8.22): Satisfaction with the SSH regulations

given to them under high interest rates that affected their living standards and kept them under severe pressure.

SSH clients were also asked to rate their level of satisfaction with the funding procedures. As shown in figure (8.22) 22.9% of the SSH clients were satisfied with the funding procedures, while 42.6% of them were neutral. On the other hand, 34.5% of the SSH clients stated that they are dissatisfied with the funding procedures. Some of these dissatisfied clients said that funding process is very long and very complicated.

SSH clients were asked to rate their level of satisfaction with time between payments. As shown in figure (8.22) the majority of the SSH clients (54.1%) were satisfied, while 26.2% of them were neutral and 19.7% of them were dissatisfied. This last group stated that the delays in paying the payments and the long duration between the payments are the reason for their dissatisfaction.

Finally, the SSH clients were asked to rate their level of satisfaction with the contract for the SSH loan. As shown in figure (8.22) the largest group (45.9%) was satisfied with the SSH loan contract, while 36.1% of them were neutral and 18.0% of them were dissatisfied. Some unsatisfied clients stated that there is no way of changing or modifying the contract's articles. Other clients said that the repayment instalments are very high and should be decreased.

As the means of the satisfaction suggest, SSH clients were mostly satisfied with time between payments, while they were mostly dissatisfied with the amount of SSH loan.

8.1.24 Findings related to client satisfaction

From the above analysis some initial findings can be summarised:

1. The descriptive analysis suggests that, in general, there were no major differences between the two housing schemes regarding client satisfaction. The only two exceptions to this are satisfaction with subcontractors and satisfaction with road and drainage services.
2. The means of client's satisfaction shows that PH clients were more satisfied in most of the client satisfaction items. In fact, SSH were more satisfied in eight items out of the twenty variables. Mainly with the utility departments, obtaining the building permission, contractual arrangements, contract forms, and with the designers.

3. The means of the client satisfaction variables do not necessary represent the true attitudes of the respondents. To illustrate this let us take the SSH clients' level of satisfaction with road services and public drainage. The average client satisfaction was 3.11 (neutral to satisfied), but only 13.1% of the SSH clients actually stated that they were neutral. In fact, most of the SSH clients stated that they were either satisfied or dissatisfied (45.9% and 41.0 respectively).
4. The overall level of satisfaction of the housing project is contingent upon, in order of importance, main contractor, subcontractor(s), procurement method, total time, site supervisor engineer, managing the project, contractual procedure, contract forms, tender procedure, designer, obtaining land, obtaining building permission and location of land. This order of importance suggests that client satisfaction items related to the execution of the project were more related to the overall satisfaction of the project as compared with client satisfaction items related to the utility departments.
5. Based on the analysis above, it can be concluded that the main contractor for the project is an important variable that influences the client level of satisfaction with the project in high income housing schemes in Qatar. It was found that the main reasons for dissatisfaction with the main contractors were: the insincerity of the contractors to fulfil their obligations, the quality of their workmanship is poor, and they use old construction techniques. No motives were given related to the cost of the project as a reason for dissatisfaction with the main contractor.
6. The subcontractor variable is the second most important variable that affects the level of satisfaction with the housing projects in Qatar. The reasons for the dissatisfaction with the subcontractor are the same as for main contractor.
7. The study also showed that the procurement method was the third most related variable to overall client satisfaction for the housing projects in Qatar. The study showed that PH clients were more satisfied with their

selected procurement method simply because they had more options to choose from than did the SSH clients. Thus, the SSH regulation should allow SSH clients to have a choice of procurement method if satisfaction level is important.

8. Finishing the project on time increases the level of satisfaction. It was found that other factors affect the level of satisfaction with time and how important time is for the client, such as previous place of living, size of family and availability of funds.
9. More than one quarter of the PH clients showed their dissatisfaction with the water connection as they rely only on car tankers to supply their houses with water.
10. A large percentage of both groups, SSH and PH clients, also are dissatisfied with the road services as they access to their houses through unpaved and/or unlighted roads. Their houses were not connected with the public drainage network and they depend on private water-borne system.
11. The clients less weighting for the importance of selecting qualified designers had led to the dissatisfaction of the clients with the designers at the time of executing as design deficiencies emerged.
12. SSH clients expressed their dissatisfaction with the long waiting periods for land acquisition, as well as, for obtaining the SSH loan.
13. SSH clients also showed their dissatisfaction with the current SSH regulations regarding the procurement method they would like to choose for executing their housing projects, as well as, regarding the long time for obtaining the payments.
14. Most of the SSH clients are dissatisfied with the amount of the SSH loan, they think that it is not adequate to fulfil their needs, instead they are willing to pay larger instalments if the SSH loan is higher.
15. Finally, a large SSH clients minority thinks that the SSH regulations are not adequate for the present situation and it needs to be reorganised.

8.2 Housing Quality

Housing quality evaluation is divided in two main sections, clients' evaluation and independent evaluation. The independent evaluation is also divided in two sections, aesthetic quality evaluation and technical quality evaluation. This section presents the data obtained from both the client and the independent evaluations.

8.2.1 Clients' Rating on Quality of their Houses

Clients were asked to evaluate the quality of their houses by a five points Likert scale from very good to very poor quality.

8.2.1.1 Client evaluation of aesthetic quality of interior

Figure (8.23) shows the client evaluation of aesthetic quality of interior. Although SSH clients gave a slightly higher rating in their evaluation than did PH clients, there is a similarity between the two groups. The majority of both SSH and PH clients, 82.0% and 76.5% respectively, rated the interior aesthetic quality of their houses between good to very good. In fact, none of the clients, both SSH and PH, rated the interior aesthetic quality of their houses as very poor, while only one PH client thinks it is poor.

8.2.1.2 Client evaluation of aesthetic quality of exterior

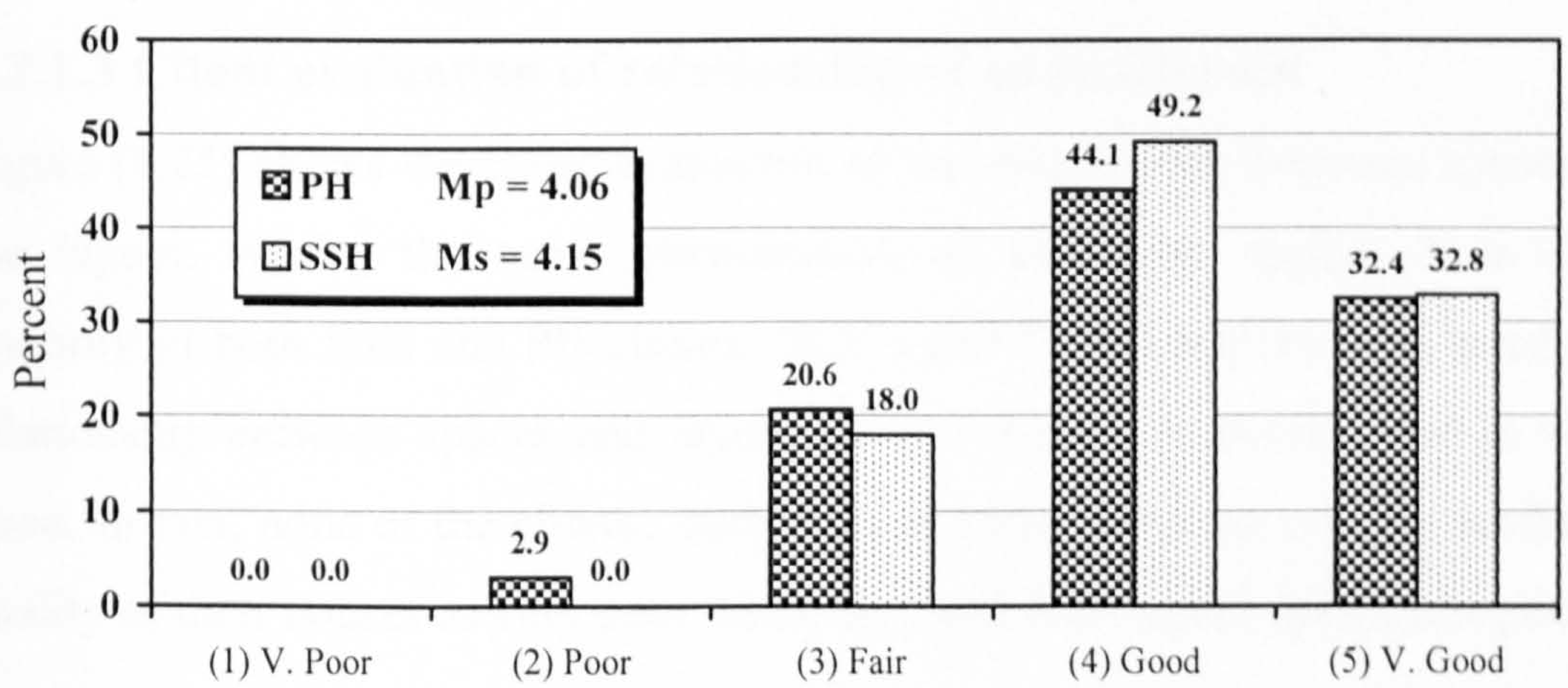


Figure (8.23):Client evaluation of aesthetic quality of interior

Figure (8.24) shows the client evaluation of aesthetic quality of exterior. As occurred with the interior aesthetic quality, there is a similarity between the two groups. The majority of both SSH and PH clients, 73.8% and 73.5% respectively, rated the exterior aesthetic quality of their houses between good to very good. In fact, none of the clients, both SSH and PH, rated the exterior aesthetic quality of their houses as very poor while only one PH client thinks it is poor. This was the same PH client who said that the interior quality of his house is poor. In fact, the same client gave poor quality rating for wall finishings, building materials, and water heating and cooling system.

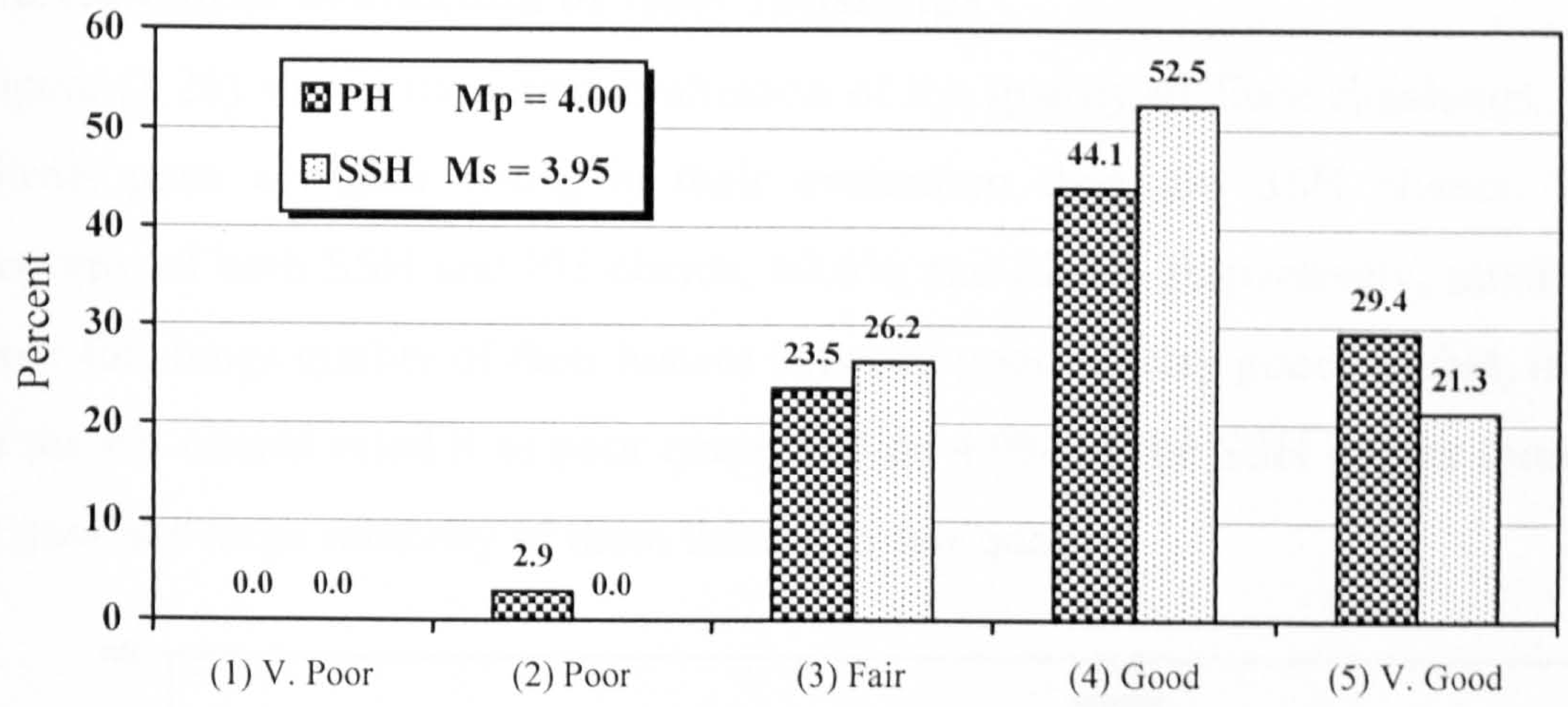


Figure (8.24):Client evaluation of aesthetic quality of exterior

8.2.1.3 Client evaluation of relationship of spaces/layout

Figure (8.25) shows the client evaluation of the relationship between spaces to the layout. Again, the same phenomenon of similarity applies here. The majority of both SSH and PH clients, 72.1% and 73.5% respectively, rated the relationship between spaces and layout of their houses between good to very good. In fact, none of the clients, both SSH and PH, rated the interior aesthetic quality of their houses as very poor while only one SSH client thinks it is poor.

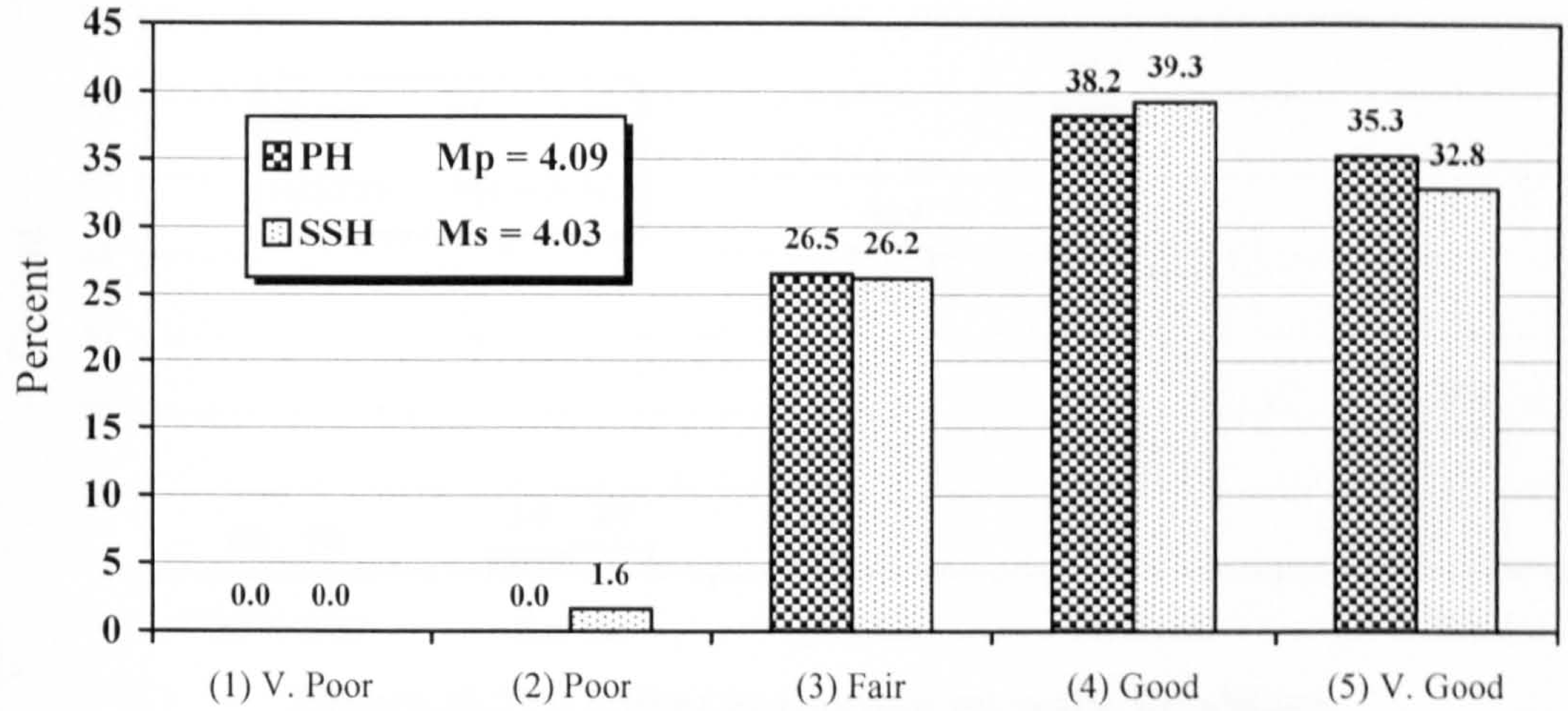


Figure (8.25): Client evaluation on relationship of spaces/layout

8.2.1.4 Client evaluation of floor finishings

Figure (8.26) shows the client evaluation of the quality of floor finishings. PH clients gave a higher rating in their evaluation than did SSH clients. The majority of both SSH and PH clients, 60.6% and 82.4% respectively, rated the floor finishings quality of their houses between good to very good. In fact, none of the PH clients rated it as poor quality while 4.9% of the SSH clients think it is poor and large minority of them think it is fair quality.

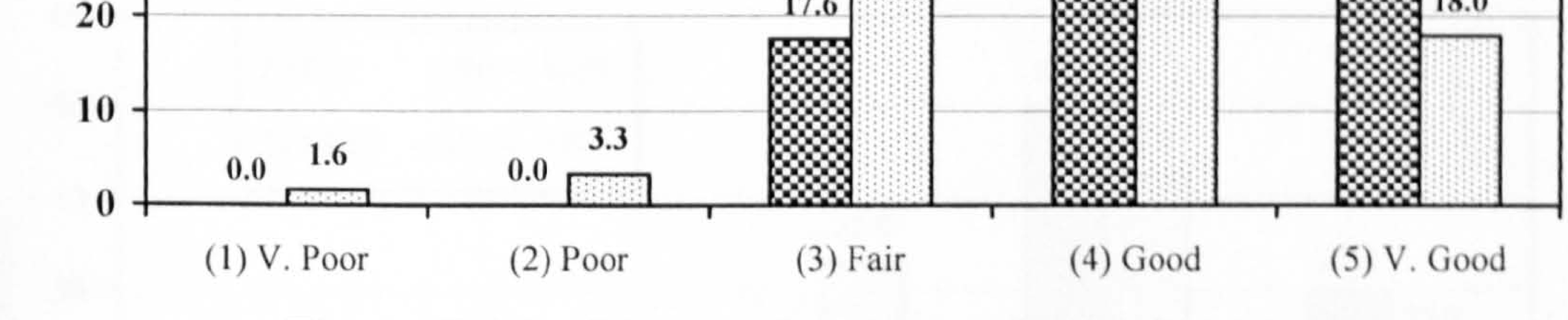


Figure (8.26): Client evaluation on floors' finishing

8.2.1.5 Client evaluation of wall finishings

Figure (8.27) shows the client evaluation of the quality of wall finishings. PH clients gave a higher rating in their evaluation than did SSH clients. The

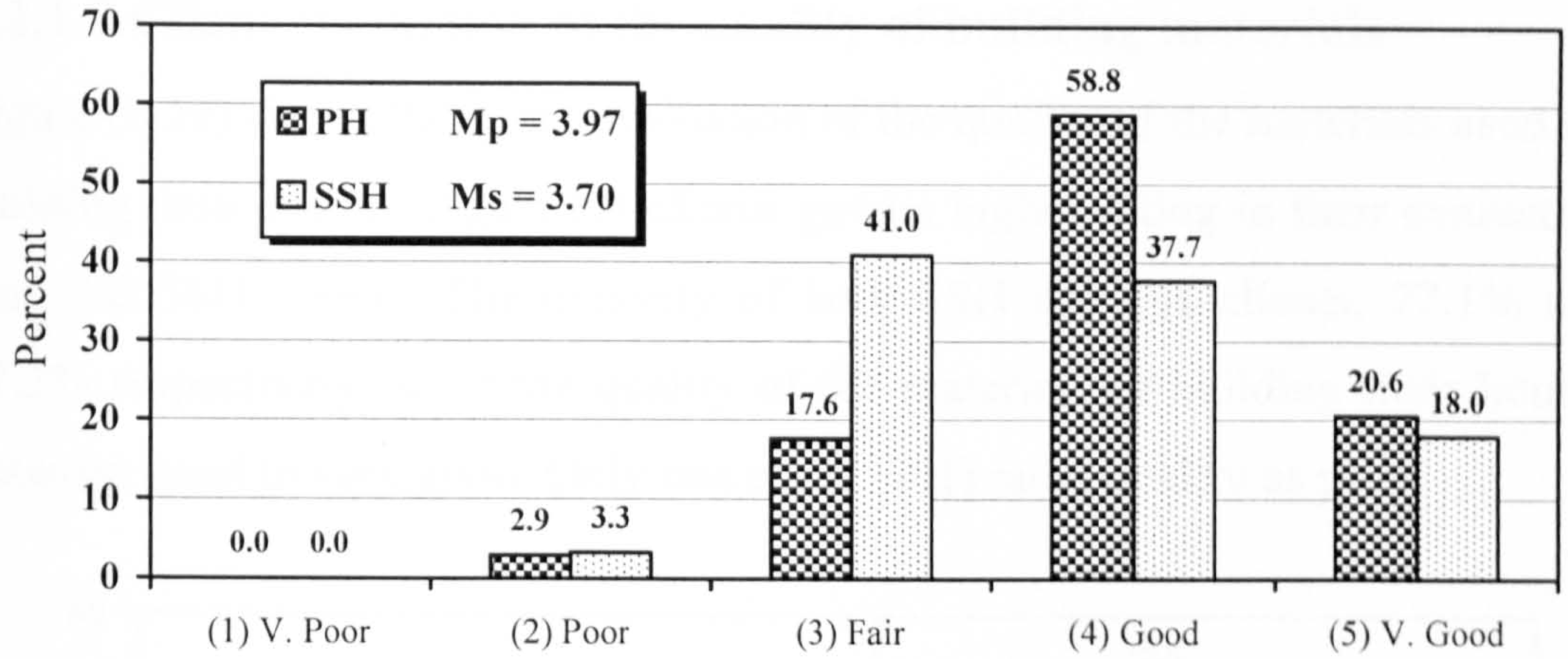


Figure (8.27): Client evaluation on walls finishings

majority of both SSH and PH clients, 55.7% and 79.4% respectively, rated the wall finishings quality of their houses between good to very good. In fact, one PH client and two SSH clients rated it as poor quality, while a large minority of the SSH clients think it is fair quality.

8.2.1.6 Client evaluation of ceilings finishings

Figure (8.28) shows the client evaluation of the quality of ceilings finishings. As with wall finishings quality, PH clients gave higher rate in their evaluation than did SSH clients. The majority of both SSH and PH clients, 65.6% and 79.4% respectively, rated the wall finishings quality of their houses between good to very good. In fact, from all the clients only one SSH client rated it as poor quality, while a large minority of the SSH clients thinks it is fair quality.

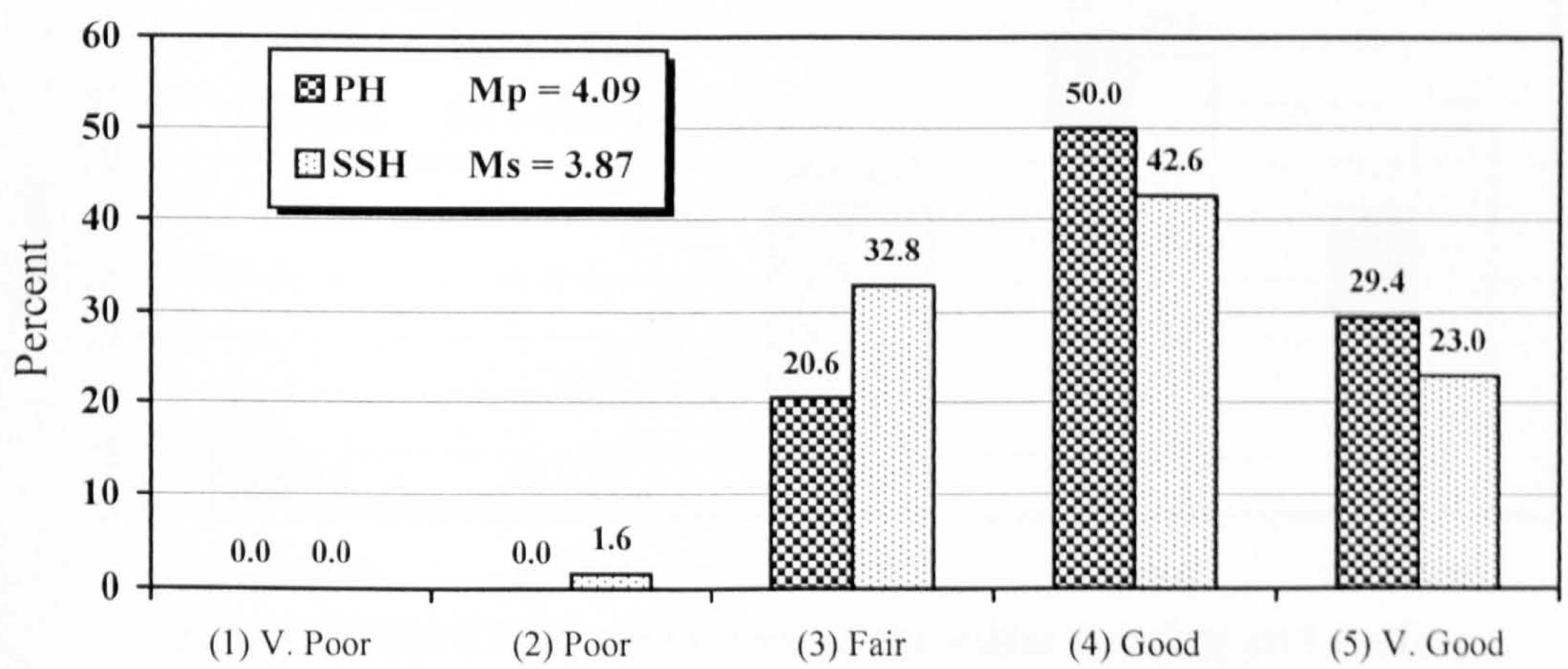


Figure (8.28): Client evaluation of ceilings finishings

8.2.1.7 Client evaluation of the quality of building materials

Figure (8.29) shows the client evaluation of the quality of the materials used for building their houses. Again PH clients gave a higher rating in their evaluation than did SSH clients. The majority of both SSH and PH clients, 77.1% and 82.3% respectively, rated the quality of the material for building their houses between good to very good. Only one client (PH) rated quality as poor.

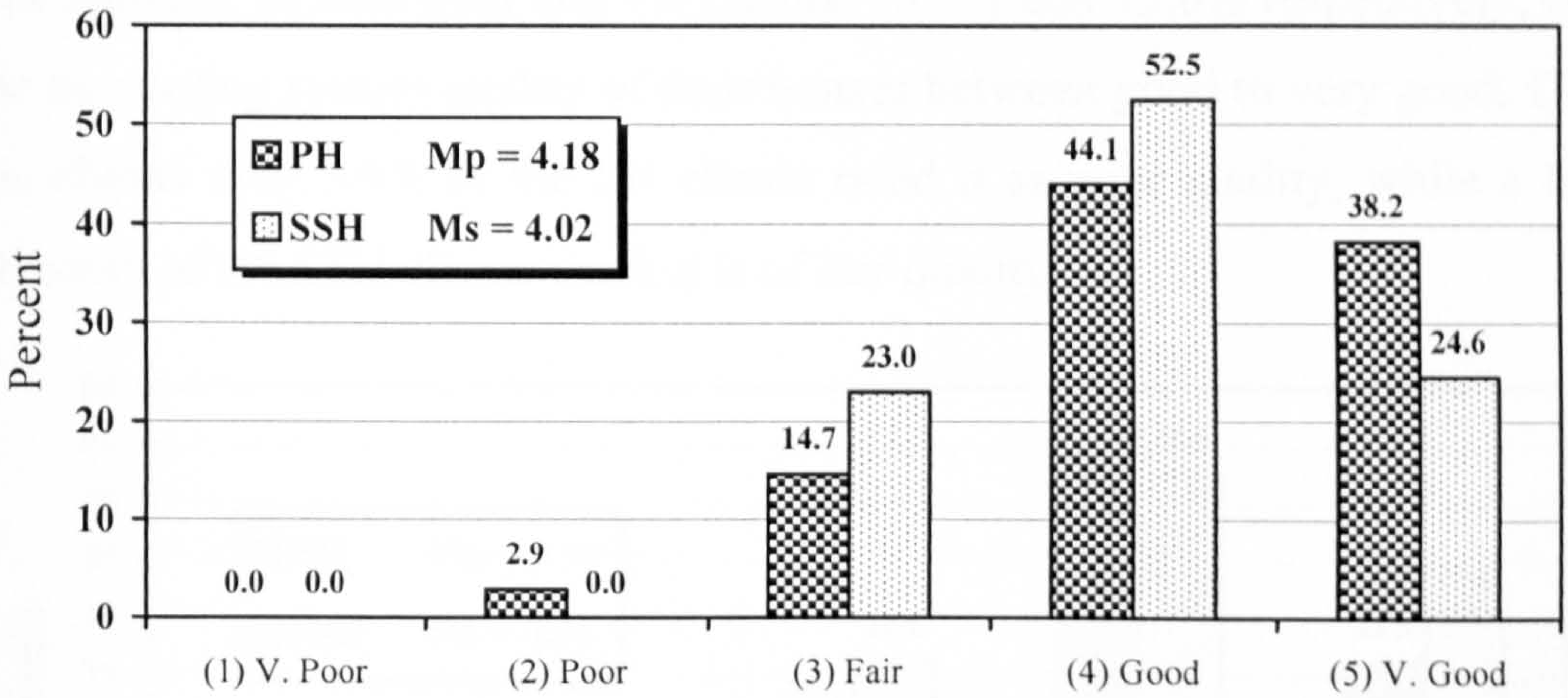


Figure (8.29): Client evaluation of quality of building materials

8.2.1.8 Client evaluation of the water heating and cooling system

Figure (8.30) shows the client evaluation of the quality of water heating and cooling system. SSH clients gave a higher rating in their evaluation than did PH clients. The majority of both SSH and PH clients, 72.1% and 67.7%

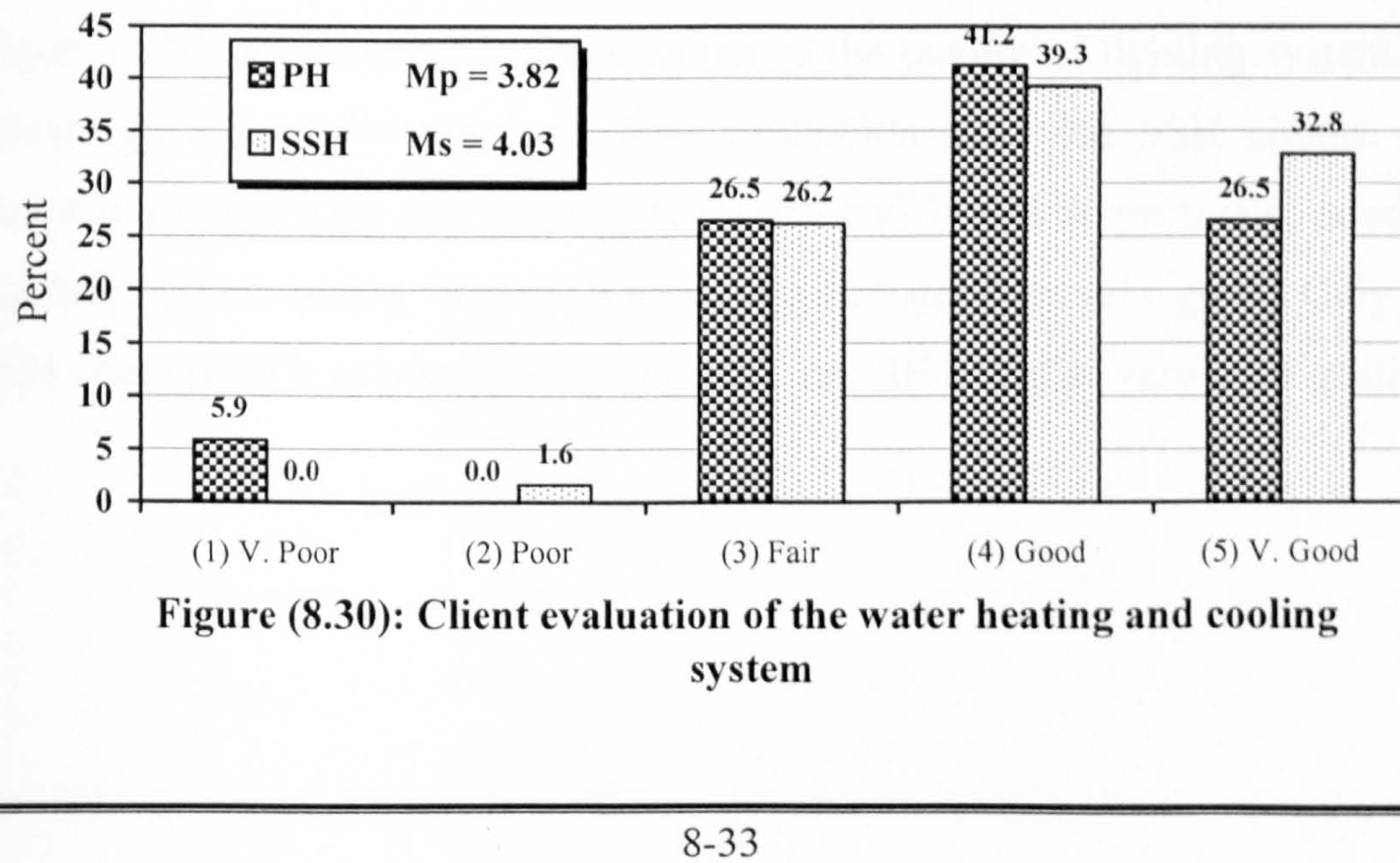


Figure (8.30): Client evaluation of the water heating and cooling system

respectively, rated the water heating and cooling system quality between good to very good. Interestingly, two PH clients stated that the quality of the water heating and cooling system is very poor, with one SSH client rating it as poor quality.

8.2.1.9 Client evaluation of air cooling system

Figure (8.31) shows the client evaluation of the quality of air cooling system. The majority of both SSH and PH clients, 73.7% and 73.6% respectively, rated the air cooling system quality of their houses between good to very good. Of all the clients only 5.9% of the PH clients rated it as poor quality, while a large minority of the SSH clients think it is of fair quality.

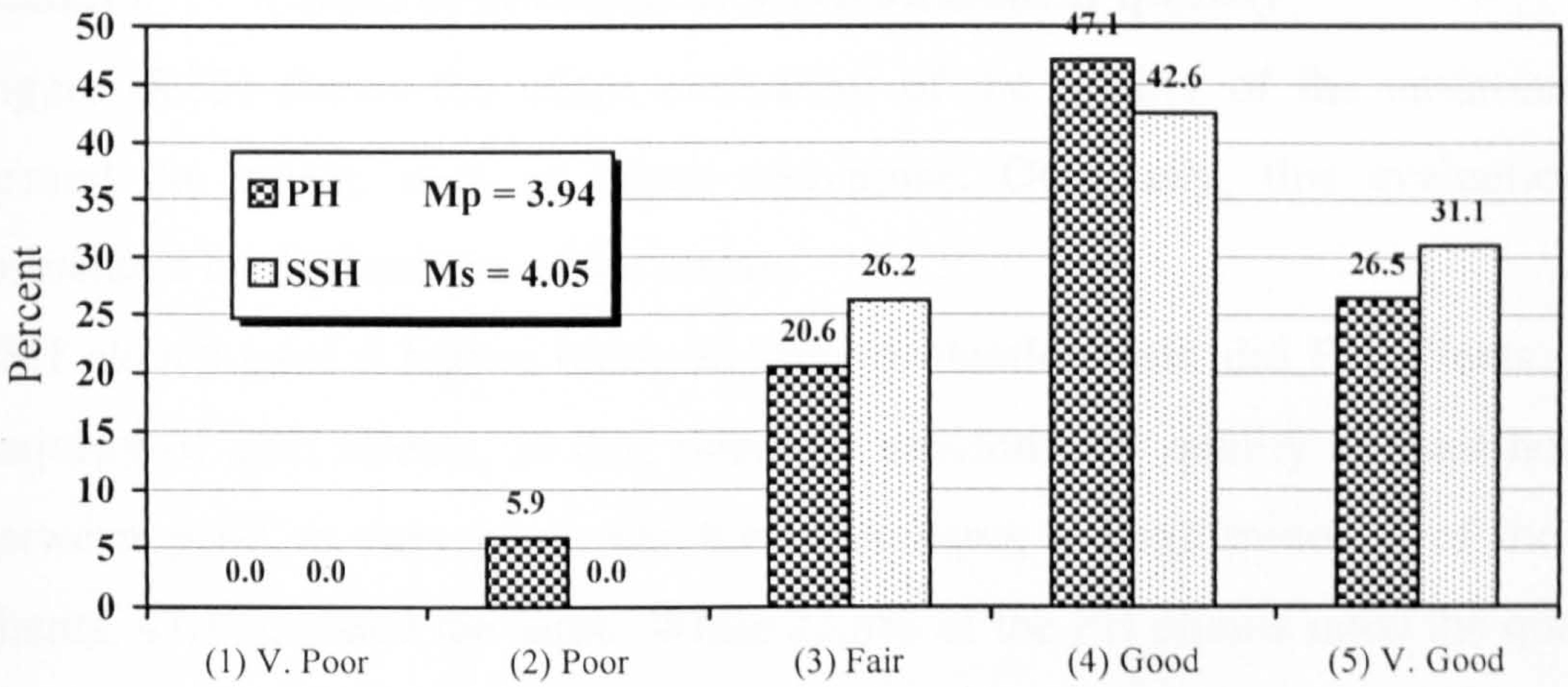


Figure (8.31): Client evaluation of air cooling system

8.2.1.10 Client evaluation of lighting system

Figure (8.32) shows the client evaluation of the quality of lighting system. PH clients gave a higher rating in their evaluation than did SSH clients. The majority of both SSH and PH clients, 73.7% and 79.4% respectively, rated the lighting system quality of their houses between good to very good. Only one SSH client rated it as poor quality and another SSH client as very poor quality.

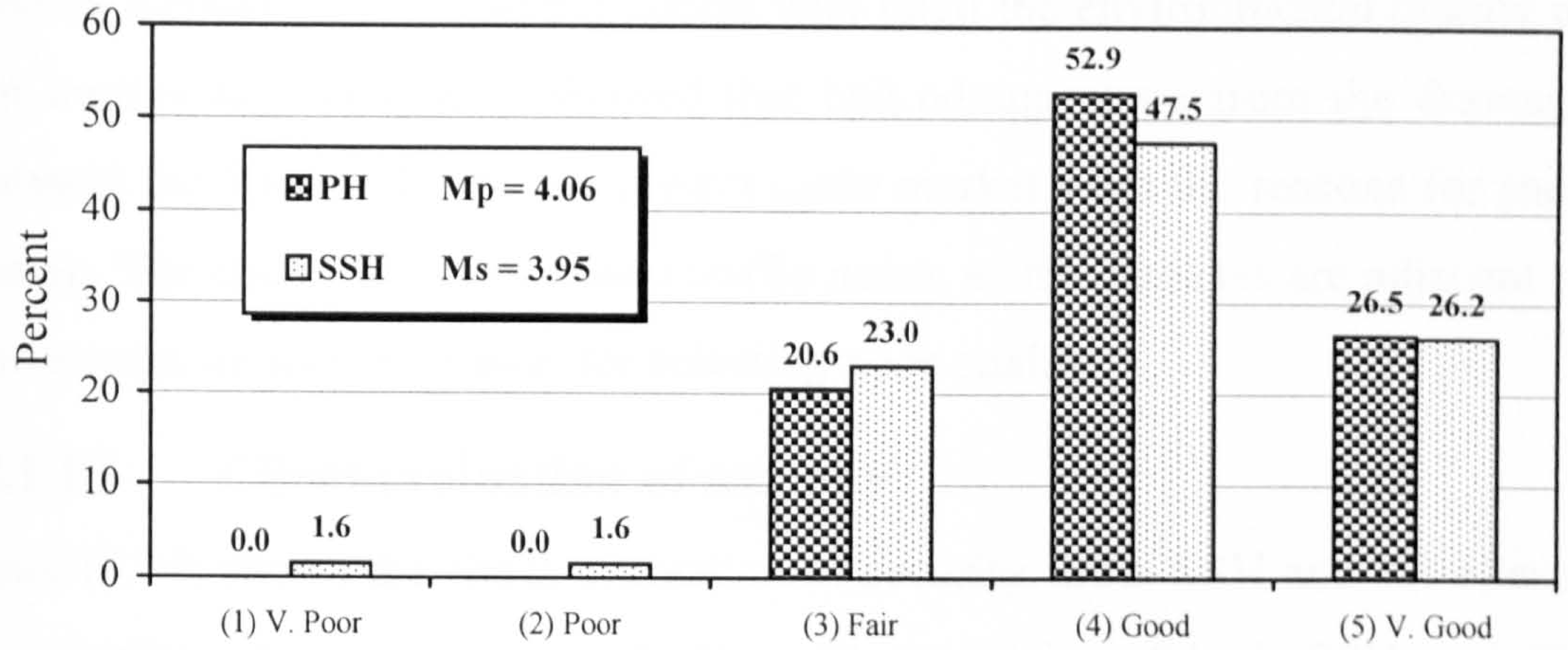


Figure (8.32): Client evaluation of lighting system

8.2.1.11 Client evaluation of environmental quality

Figure (8.33) shows the client evaluation of the quality of the environment around the house, such as odour and noise. Obviously, this evaluation is influenced by the location of the house.

SSH clients gave a higher rating in their evaluation than did PH clients. The majority of SSH clients, 59.0%, rated the environment quality of their houses between good to very good. On the other hand, a large minority of the PH clients, 47.1%, stated the same. While 23.5% of the PH clients rated the quality of the environment around their houses as poor. In contrast, only two SSH clients rated it as poor quality.

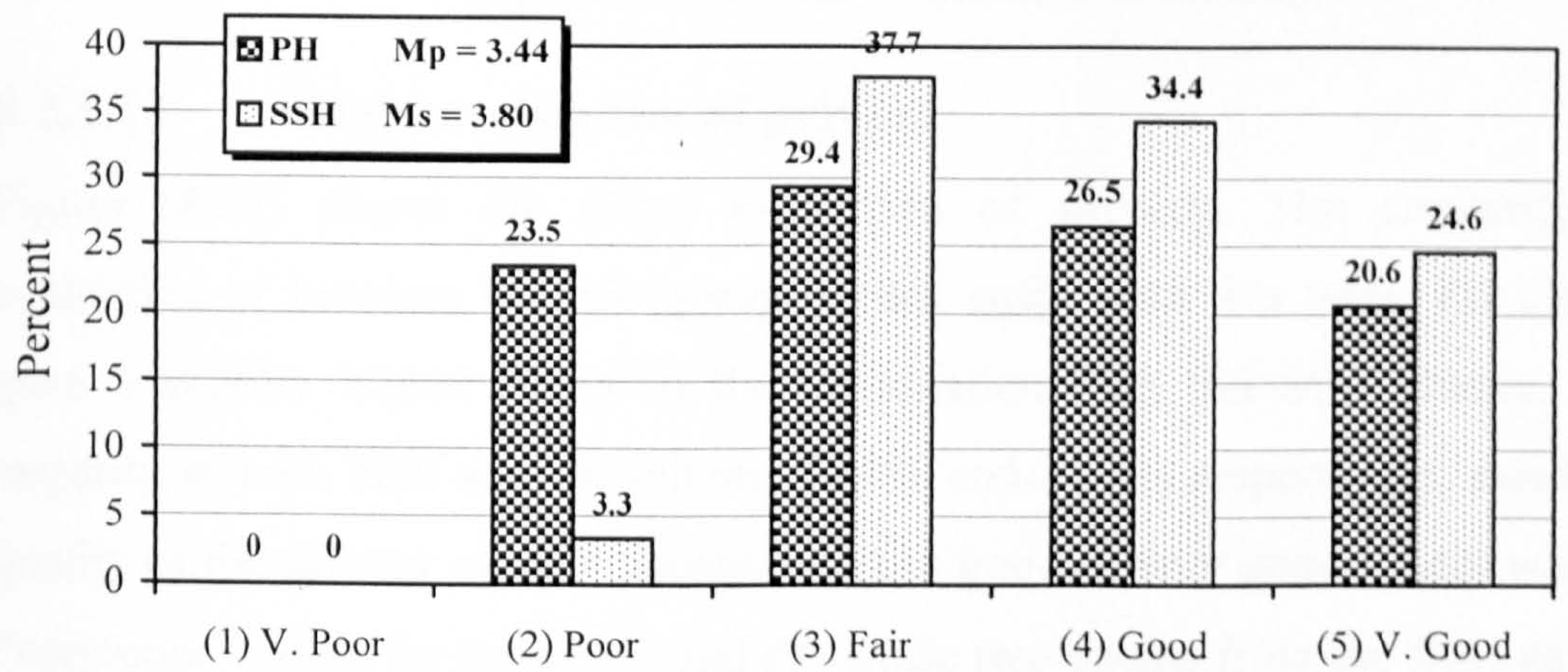


Figure (7.33): Client evaluation of environmental quality

Informal discussion with the PH clients who rated the environmental quality of their houses as poor quality showed that bad odours come from the drainage treatment facilities and from the central cattle market were the reasons for such a rating. The clients also mentioned traffic noise, as their houses are adjacent to main streets, as another reason for selecting poor quality.

8.2.1.12 Client evaluation of security

Figure (8.34) shows the client evaluation of security. Both SSH and PH clients gave similar ratings in their evaluation. The majority of both SSH and PH clients, 78.7% and 79.4% respectively, rated the security of their houses between good to very good. There was no "very poor" rating for both SSH and PH but 5.9% of the PH clients indicated that security of their houses was "poor".

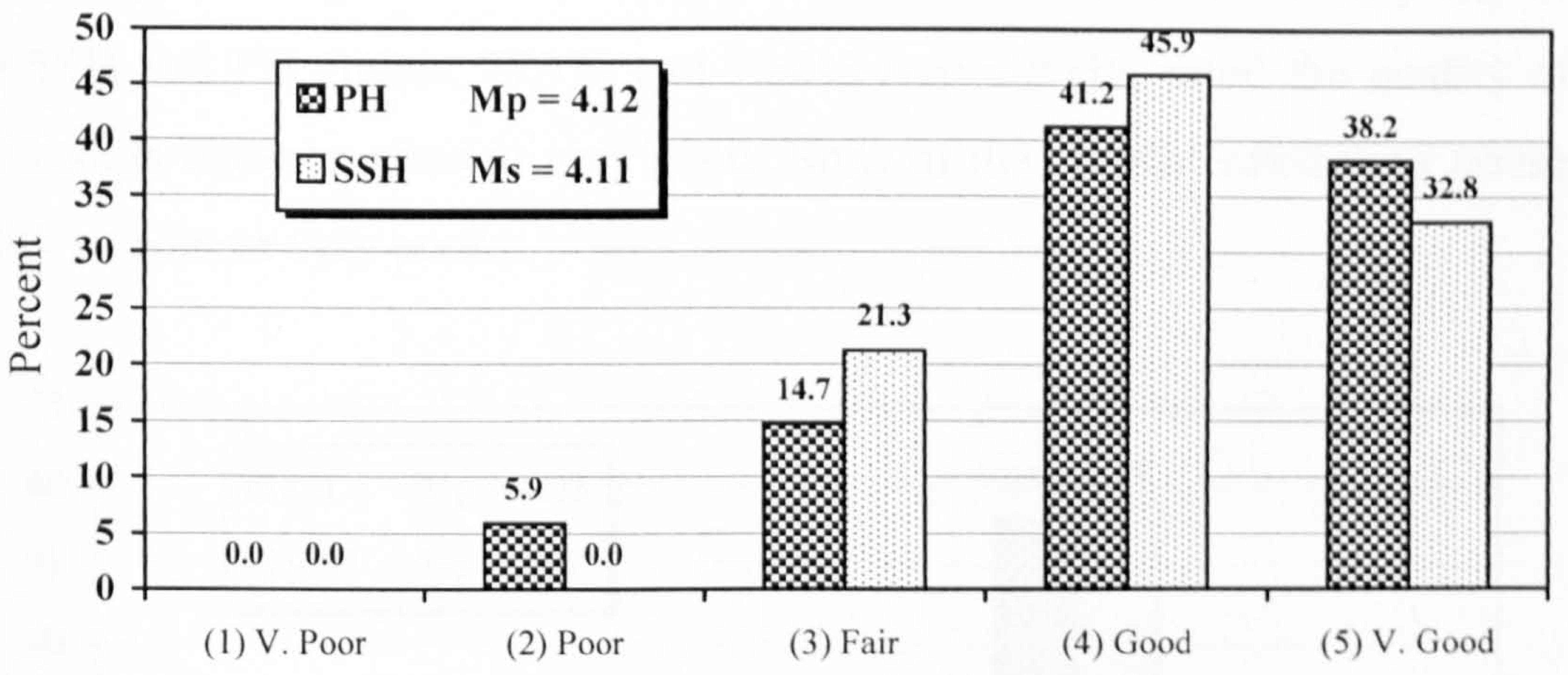


Figure (8.34): Client evaluation of security

8.2.1.13 Client evaluation of privacy

Figure (8.35) shows the client evaluation of privacy. The similarity of evaluation of between the two groups exists again with this item. PH clients gave a slightly higher rating in their evaluation than did SSH clients. The majority of both SSH and PH clients, 75.4% and 82.3% respectively, rated the quality of the privacy of their houses between good to very good. There was no "very poor" rating for both SSH and PH while two clients from the SSH gave a "poor" rating.

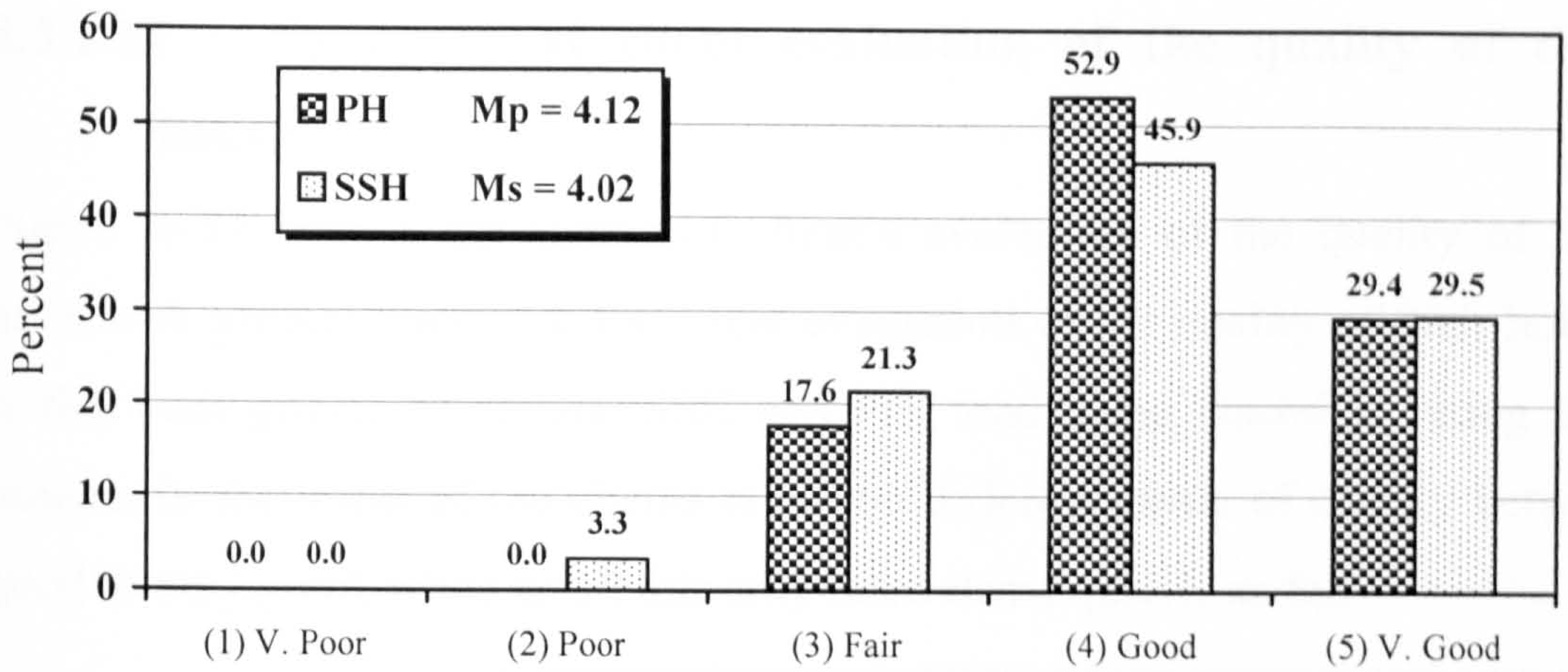


Figure (8.35): Client evaluation of privacy

8.2.1.14 Client evaluation of overall quality

Figure (8.36) shows the clients' evaluation of overall quality of their houses. Again the rating is almost identical between the two groups. PH clients gave a slightly higher rating in their evaluation than did SSH clients. The majority of both SSH and PH clients, 77.1% and 79.4% respectively, rated the quality of their houses between good to very good. None of the clients' rated their house quality as poor or very poor.

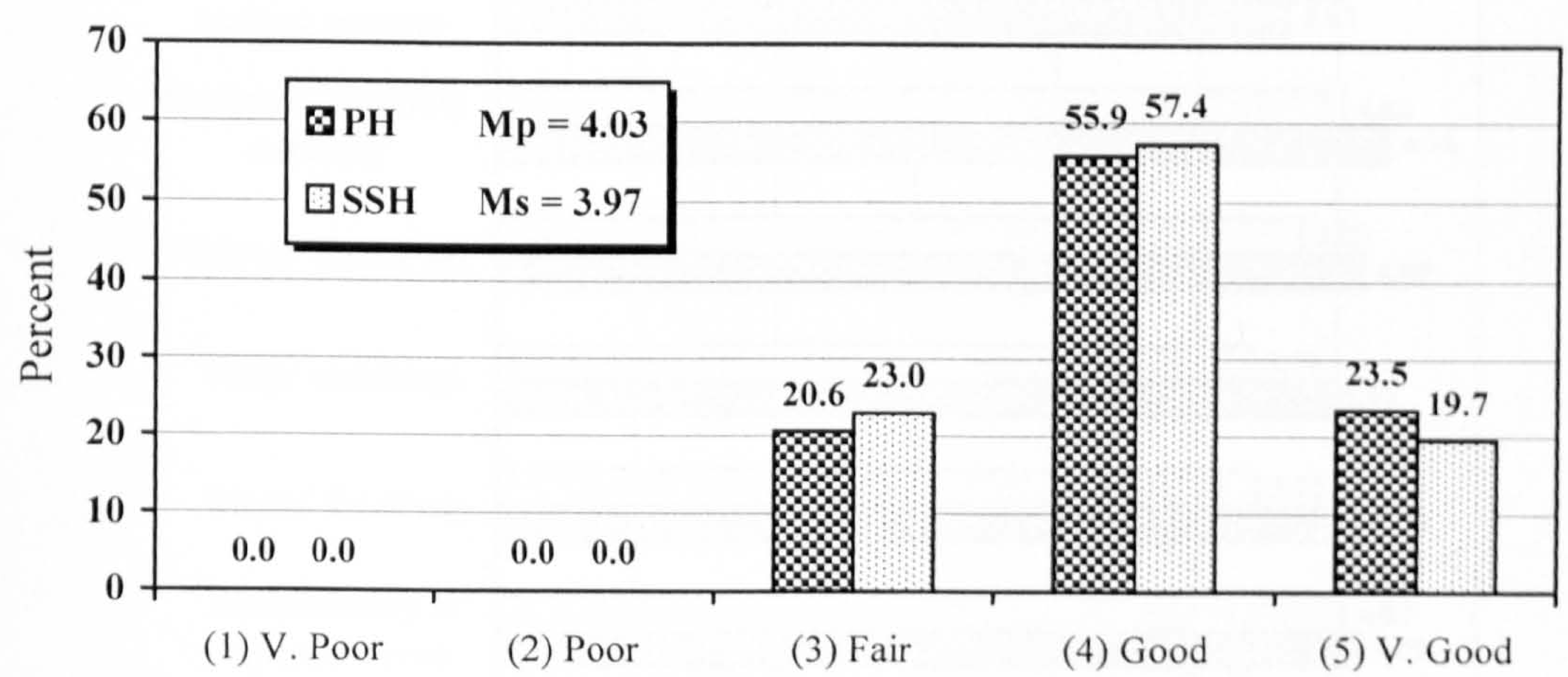


Figure (8.36): Client evaluation of overall quality

8.2.1.15 Summary of client evaluation of the quality of their houses

Figure (8.37) shows the means of client's evaluation of the quality of their houses. A general feature of the client evaluation of the quality of their houses is that both groups of clients, SSH and PH, tend to be biased in rating their houses. In fact most of the clients rated the different items of quality between good to very good, while small minority rated items quality as fair.

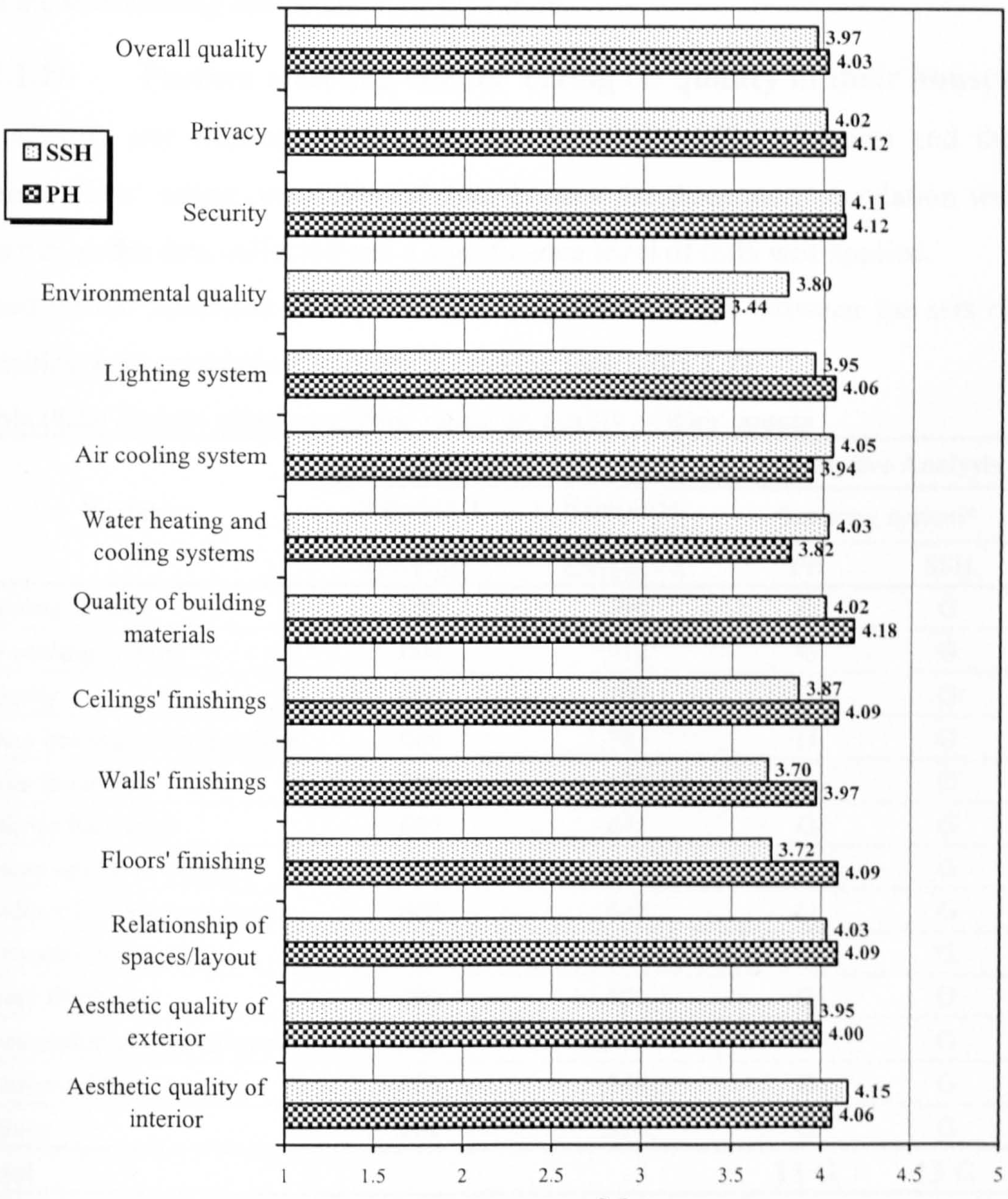


Figure (8.37): Summary of client evaluation of quality

Another feature of this evaluation is the similarity in rating quality between the SSH clients and PH clients. In most items both groups gave almost identical rating for quality. This is very clear with items that are difficult to judge, such as the aesthetic quality of interior, the aesthetic quality of exterior, relationship of spaces to layout. The difference of rating begins to emerge when clients were asked to rate the quality of items that are easier to account for, such as the quality of floor finishings, wall finishings, ceiling finishings, building materials and the surrounding environment of the house.

8.2.1.16 Factors affecting clients' rating on quality of their houses

To identify any relationship between the housing quality variables and the overall client' rating on quality of their houses the Spearman correlation test was run on the data collected and a significance level of 0.05 was applied.

Based on the Spearman (Rho) the following relationships between the sets of variables were established in order of ranking (see table 8.2).

Table (8.2): Factors affecting clients' rating on quality of their houses

Variables	Relational Analysis		Descriptive Analysis	
	Significant test (P-value)	Rank order Spearman (Rho) correlation	Scouring system*	
			PH	SSH
Lighting system	.000	.790	G	G
Air cooling system	.000	.712	G	G
Security	.000	.707	G	G
Water heating/cooling system	.000	.703	G	G
Walls finishings	.000	.690	G	G
Ceilings finishings	.000	.671	G	G
Interior aesthetic quality	.000	.654	G	G
Quality of building materials	.000	.642	G	G
Environmental quality	.000	.596	G	G
Floors finishings	.000	.591	G	G
Relationship of spaces/layout	.000	.582	G	G
Exterior aesthetic quality	.000	.544	G	G
Privacy	.000	.514	G	G
Total			**13 G**	**13 G**

* Based on the highest rate of response (G = Good quality, P = Poor quality).

It was found that all of the thirteen variables used to measure the clients attitudes toward the quality of their houses were significantly associated with the overall rating of quality at P value less than 0.001. This finding was expected due to the fact that most clients, from both groups, rated the quality items between good to very good.

The overall rating of housing quality is contingent upon, in order of importance, lighting system, air cooling system, security, water heating/cooling system, walls finishings, ceilings finishings, interior aesthetic quality, quality of building materials, environmental quality, floors finishings, relationship of spaces/layout, exterior aesthetic quality and privacy.

8.2.1.17 Findings related to clients' rating on quality

Based on the above analysis some initial findings can be summarised:

1. Almost all the clients from both groups gave good quality rating for all the quality variables of their houses.
2. In most items both groups, SSH and PH clients, gave almost identical rating for quality. This is very clear with items that are difficult to judge, such as the aesthetic quality of interior, the aesthetic quality of exterior, relationship of spaces to layout.
3. There were different ratings when clients were asked to rate the quality of items that are easier to account for, such as the quality of floors finishings, walls finishings, ceilings finishings, building materials and the surrounded environment of the house.
4. All of the thirteen variables used to measure client attitudes toward the quality of their houses were significantly associated with the overall rating of quality.
5. 23.5% of the PH clients rated the environmental quality of their houses as poor quality. This is due to the bad odour and noise. In fact that was the only large minority that gave a poor quality rating.

8.2.2 Independent evaluation of quality

Beside the clients' evaluation of the quality of their houses, independent quality evaluation was carried out by the researcher. This evaluation was divided into two parts, mainly aesthetic evaluation and technical evaluation. The results of this evaluation are presented in this section.

8.2.2.1 Aesthetic quality evaluation

As explained in chapter 6, the aesthetic quality is evaluated in three areas: function, form and economy. Aesthetic function has six items, all of which looks after how the building works for people and things. Aesthetic form has four items related to what the building looks and feel like. Aesthetic economy has another four items, which measures maximum effect with minimum means in relating function and form. Each item was marked along a scale with a maximum of 10, perfect, to a minimum of 1, complete failure.

The results of these evaluations are shown in figure (8.38), figure (8.39) and figure (8.40). Finally the aesthetic quality quotients of SSH and PH are shown in figure (8.41).

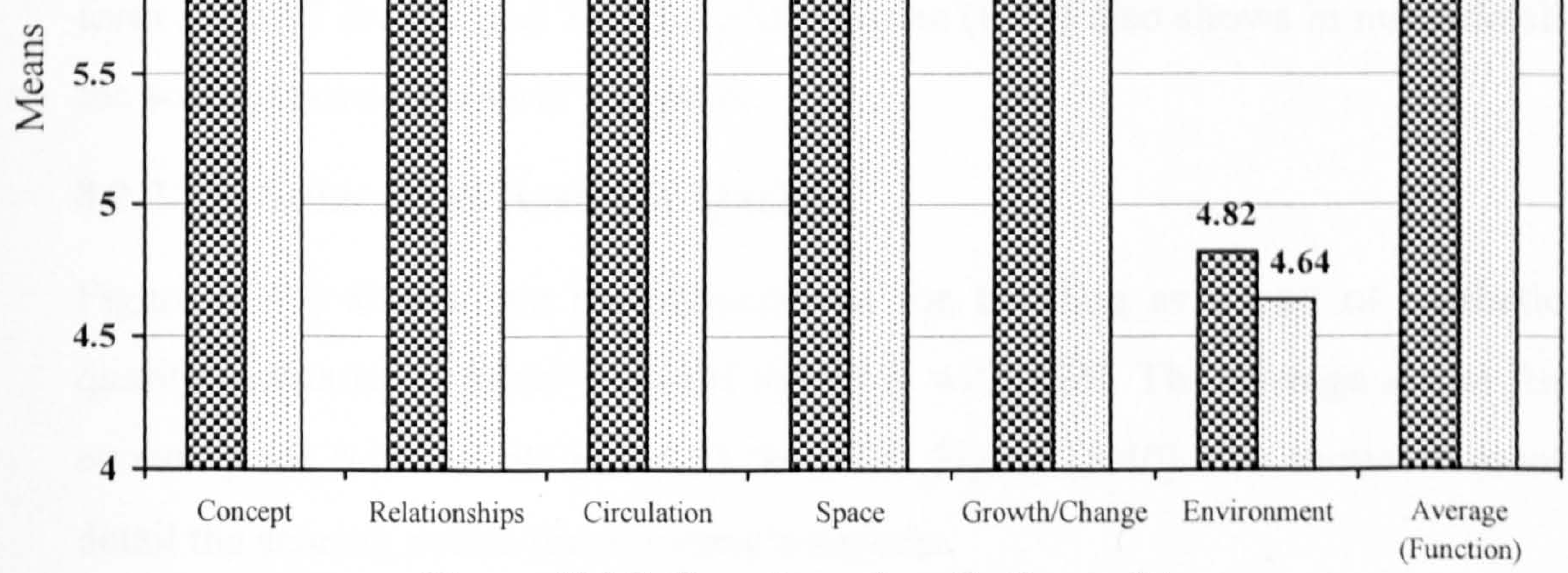


Figure (8.38):Function of aesthetic quality

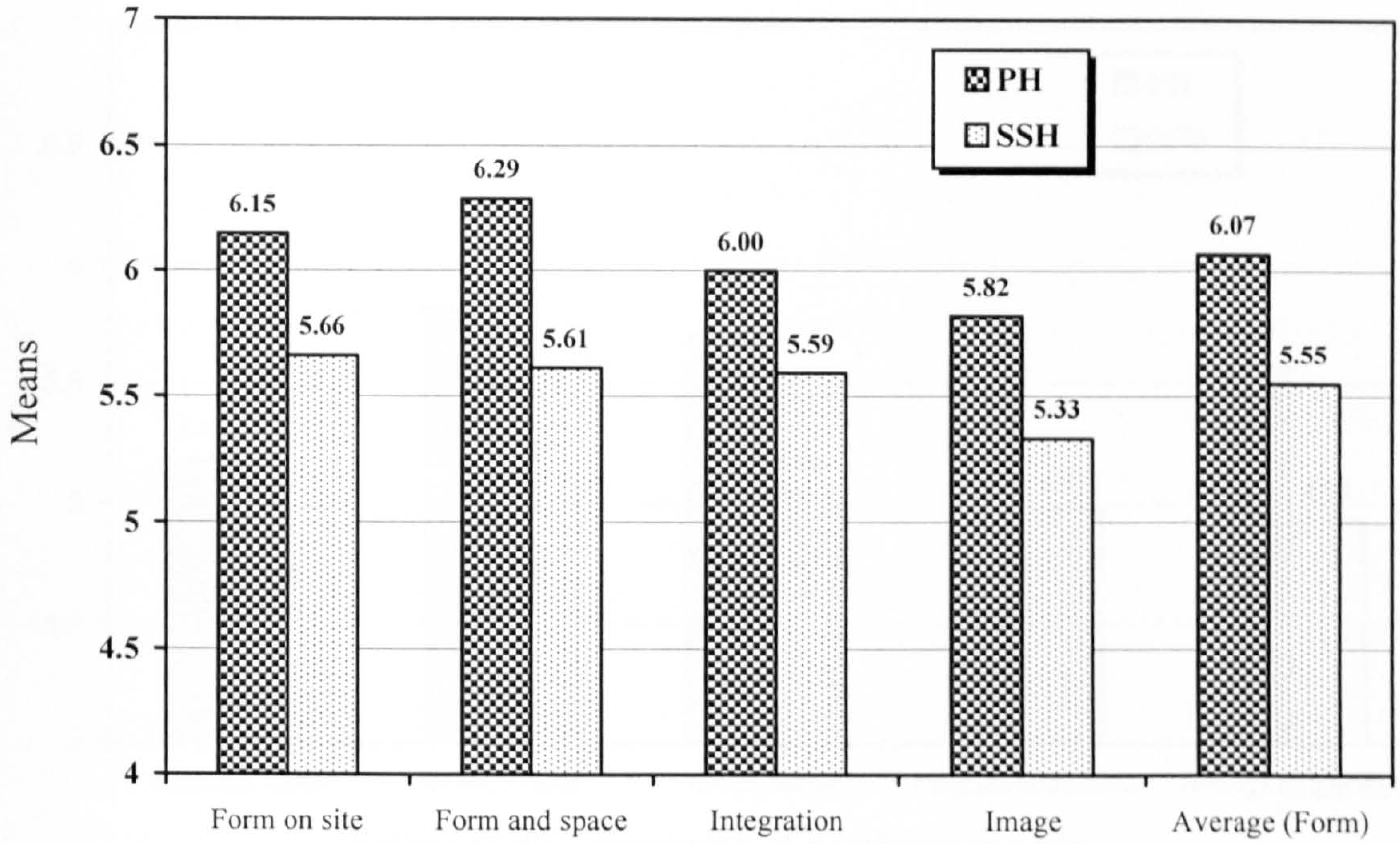


Figure (8.39): Form of aesthetic quality

8.2.2.1.1 Function of Aesthetic Quality

Figure (8.38) shows that the function of the building in all aspects of aesthetic quality evaluation is better with PH than it is with SSH. In fact the average scores for function are 6.17 for PH and 5.84 for SSH. Figure (8.38) also shows in more detail the scoring points for function's aspects.

8.2.2.1.2 Form of Aesthetic Quality

Figure (8.39) shows that the form of the building in all aspects of aesthetic quality evaluation is better with PH than it is with SSH. The average scores for form are 6.07 for PH and 5.55 for SSH. Figure (8.39) also shows in more detail the scoring points for form's aspects.

8.2.2.1.3 Economy of Aesthetic Quality

Figure (8.40) shows that the economy of the building as a part of aesthetic quality evaluation is better with PH than it is with SSH. The average scores for economy are 5.57 for PH and 4.93 for SSH. Figure (8.40) also shows in more detail the scoring points for economy's aspects.

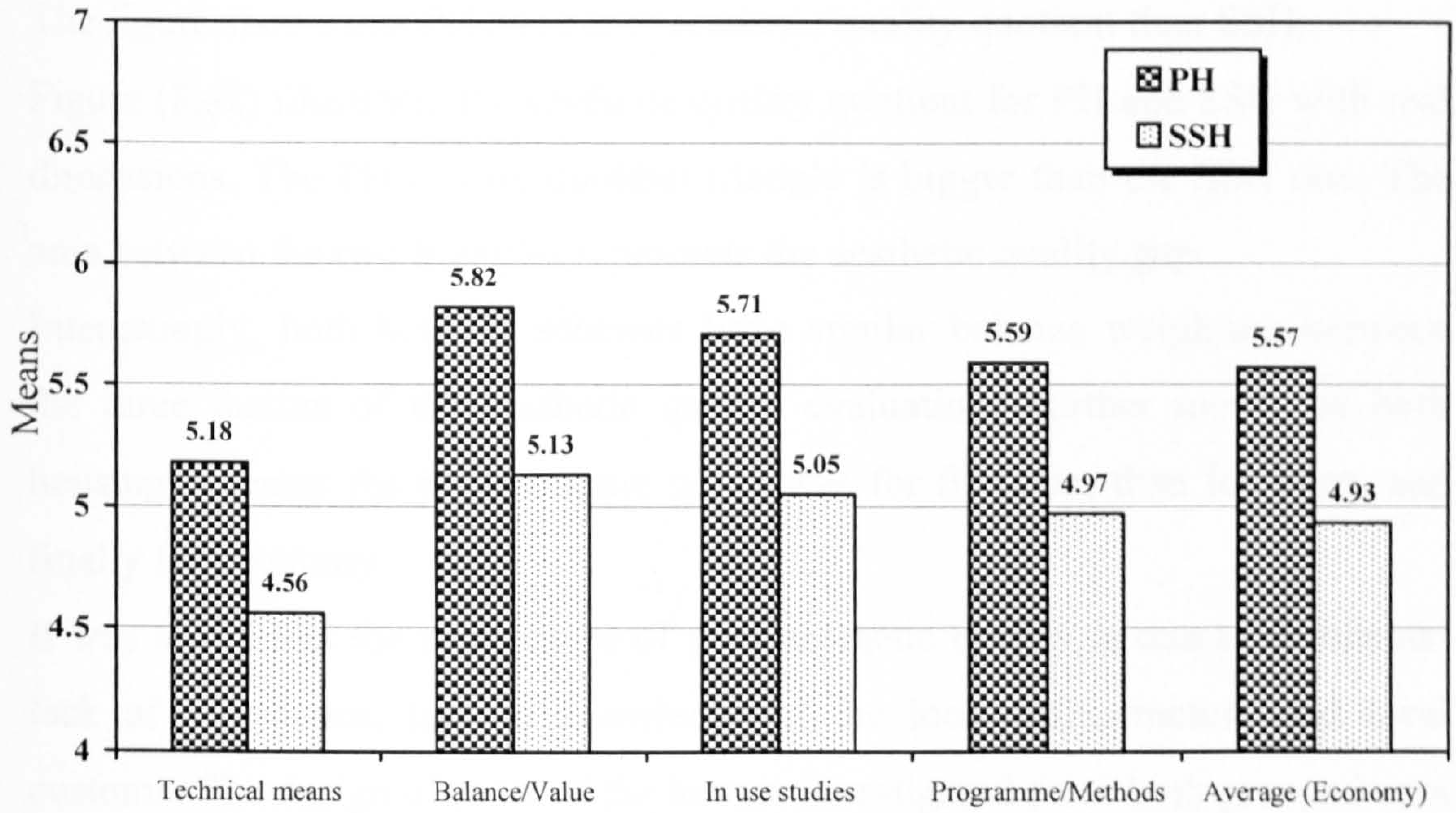


Figure (8.40): Economy of aesthetic quality

8.2.2.1.4 Aesthetic Quality Quotient

By using the quality quotient formula explained in section 6.6.1.5, the aesthetic quality values for PH and SSH can be obtained. The average aesthetic quality quotient for PH is 46.40, and for SSH it is 38.84. The quality quotients for both housing schemes are acceptable with PH close to fair.

Figure (8.41) shows that the aesthetic quality quotient for both PH and SSH.

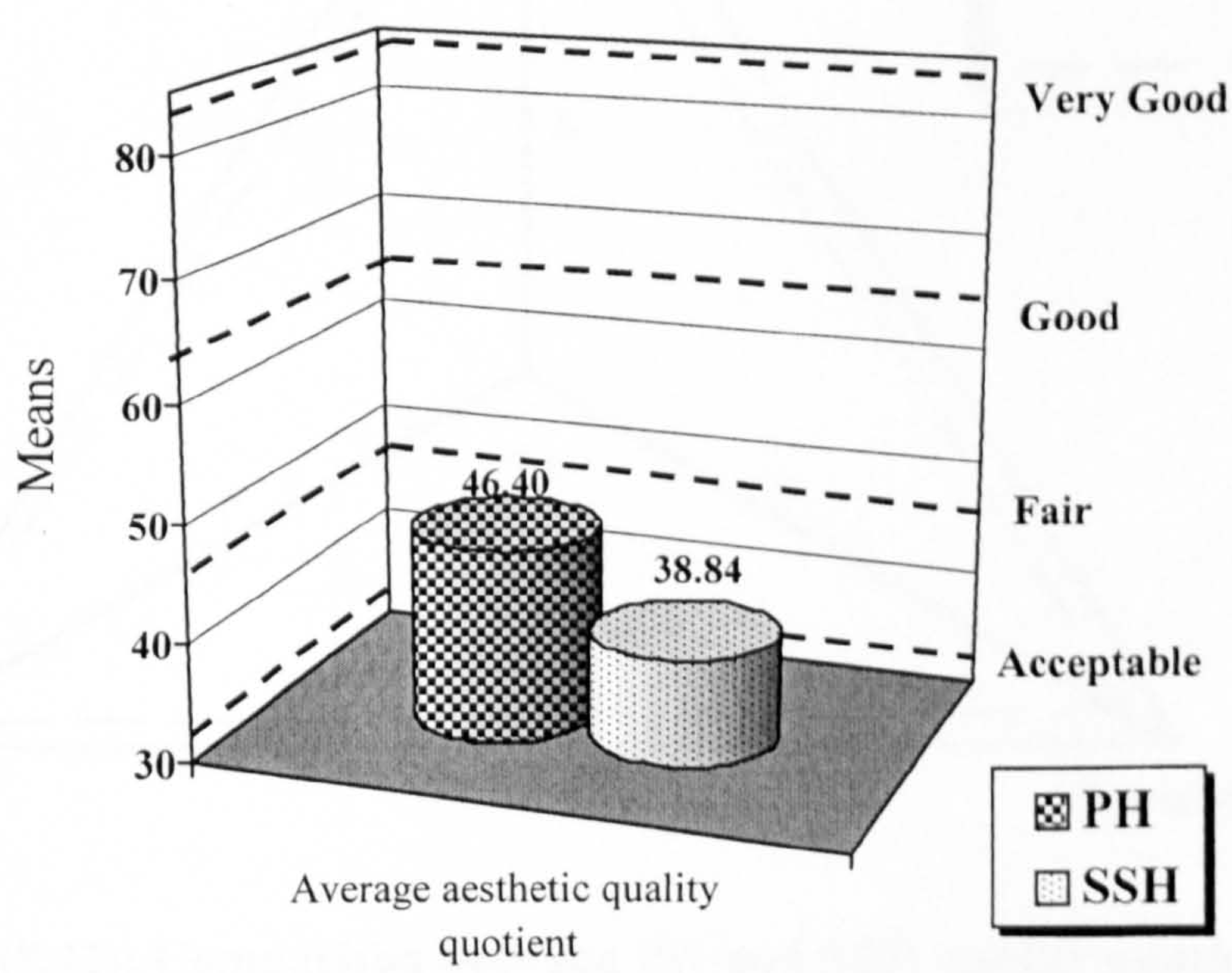


Figure (8.41): Average aesthetic quality quotient

The figure shows that PH has better aesthetic quality quotient than SSH.

Figure (8.42) illustrates the aesthetic quality quotient for PH and SSH with real dimensions. The PH quality quotient triangle is bigger than the SSH one. The area between the two triangles represents the aesthetic quality gap.

Interestingly, both housing schemes have similar balance weighting between the three factors of the aesthetic quality evaluation. Further more, for both housing schemes the highest score given was for function, then for form, and finally for economy.

It was found that the main cause of poor aesthetic quality is due to architects' lack of experience, lack of knowledge of the local infrastructure and local customs. The design of most of the houses investigated from both groups is not integrated with the local customs and environment. Some houses had western style designs that do not suite the Qatari culture and customs. Thus, more awareness of the local culture may improve the aesthetic quality.

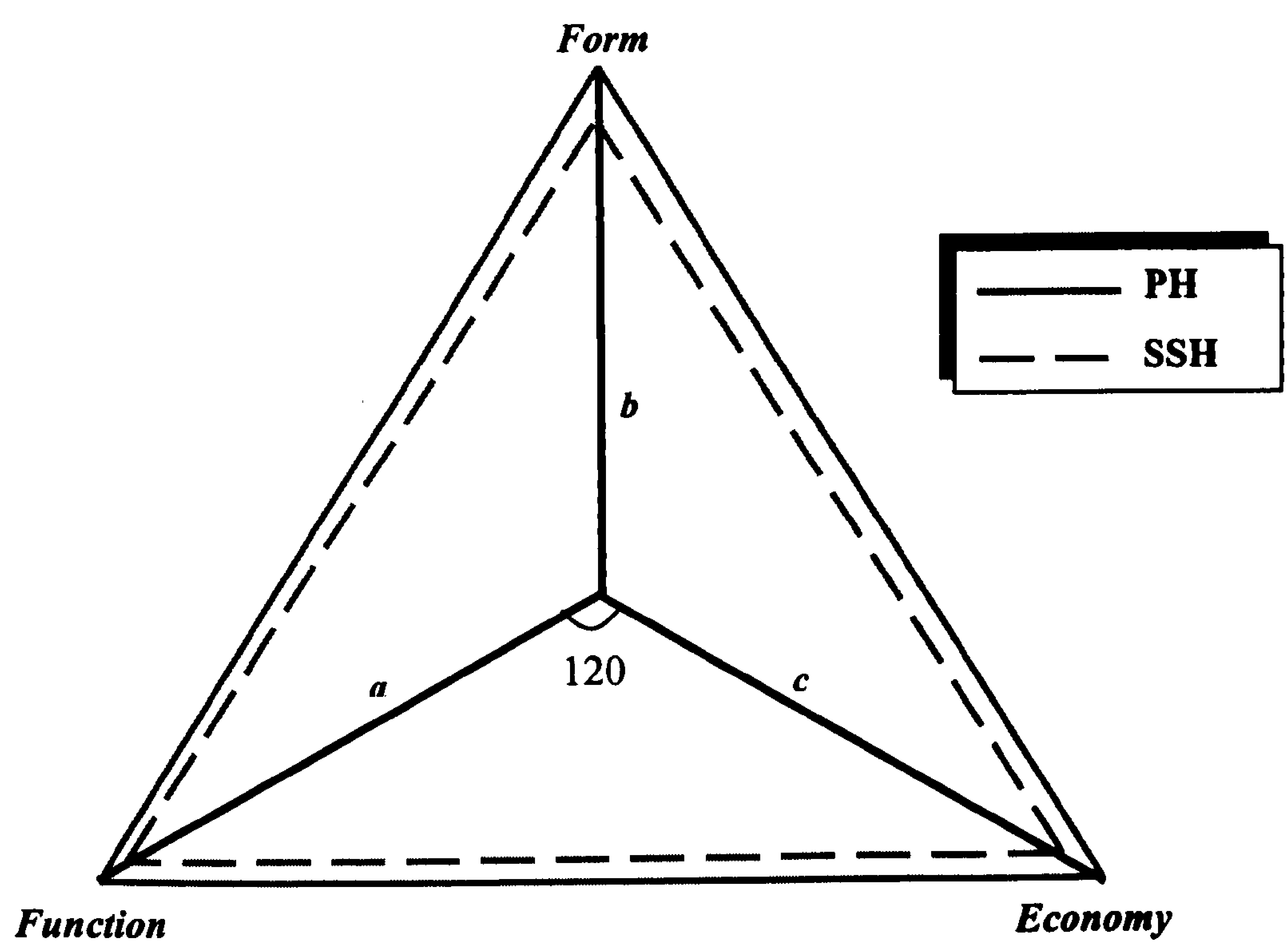


Figure (8.42): Comparison between PH and SSH quality quotient

8.2.2.2 Factors affecting aesthetic quality

Table (8.3) shows the correlation between the quality quotient values and the components of the aesthetic quality evaluation. As expected, all of the components were related to the quality quotient. That is because the value quality quotient is derived form the components of the aesthetic quality.

Form components were found to be the most related items to quality quotient, then economy components, and finally function components.

Table (8.3): Correlation between aesthetic quality quotient and its components

Variables	Relational Analysis		Descriptive Analysis	
	Significant test (P-value)	Rank order Pearson correlation	Means	
			PH	SSH
Form & space	.000	.895	Fair	Fair
Balance/Value	.000	.827	Fair	Acceptable
In use studies	.000	.827	Fair	Acceptable
Image	.000	.816	Fair	Acceptable
Integration	.000	.815	Fair	Fair
Form on site	.000	.812	Fair	Fair
Technical means	.000	.753	Fair	Fair
Relationships	.000	.747	Good	Fair
Programme/Methods	.000	.685	Fair	Acceptable
Circulation	.000	.673	Fair	Fair
Concept	.000	.668	Good	Fair
Space	.000	.656	Fair	Fair
Environment	.000	.597	Acceptable	Acceptable
Growth/Change	.000	.412	Fair	Fair

8.2.2.3 Technical Quality Evaluation

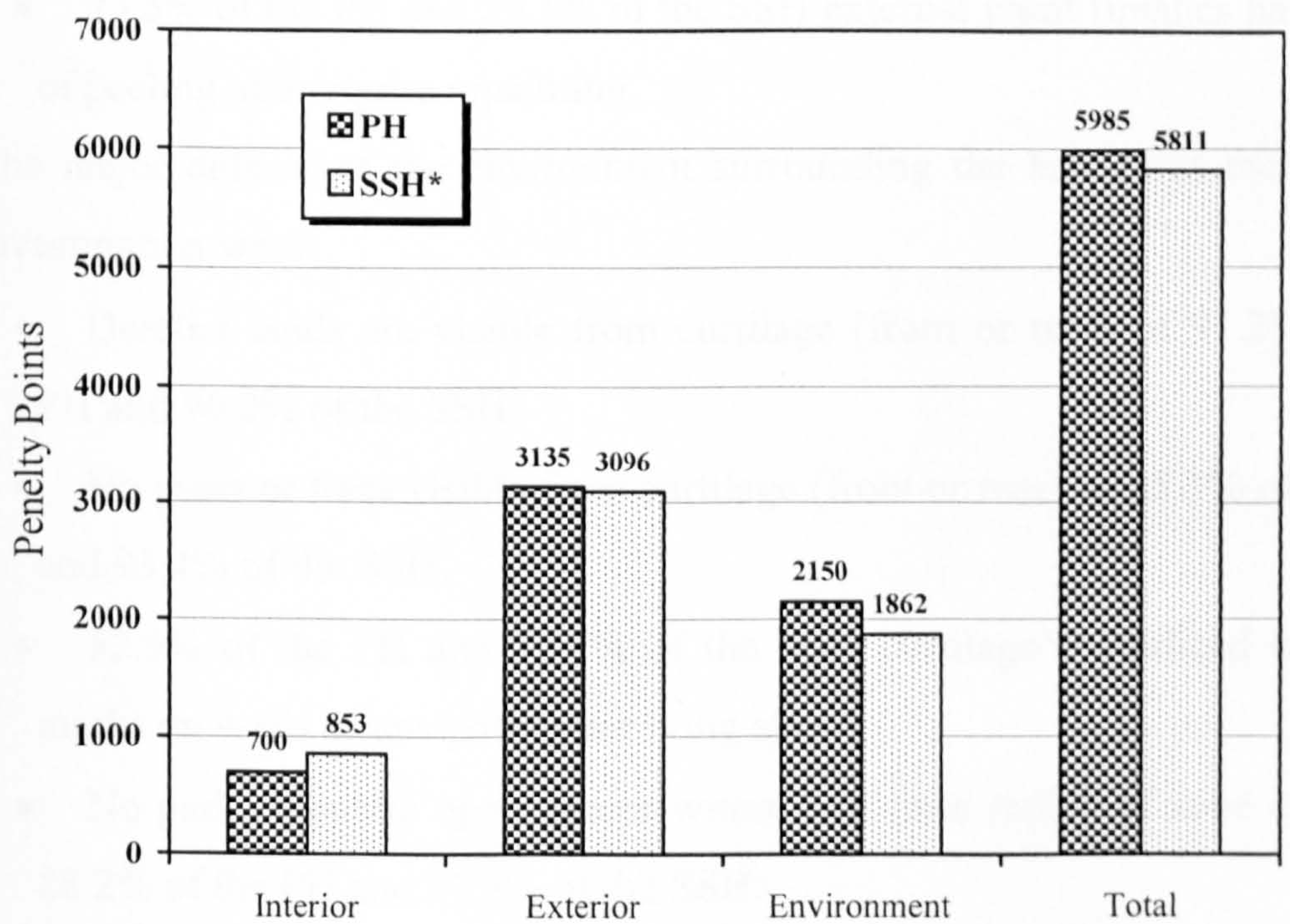
The results of the survey of the key housing quality indicators, that have been used to assess the adequacy of the SSH and PH schemes, are shown in figure (8.43).

The figure shows that there are no major differences between the two housing schemes from the technical quality point of view. Most of the defects are in the exterior of the buildings, then in the environment of the buildings and with relatively few defects in the interior of the buildings.

All of houses investigated are made of reinforced structural materials produced locally such as steel, cement, sand and concrete blocks. Most of the sand and concrete used are highly sodium chloride contaminated, which lead to steel corrosion and hence decrease the life expectancy of the buildings.

Internally, the major defects at the time of investigation were:

- 26.5% of the PH and 47.5% of the SSH have minor cracks in interior walls or ceilings.
- The supply of water of 26.5% of the PH and 27.9% of the SSH is by water tankers only.
- 47.1% of the PH and 27.9% of the SSH are not connected to the public drainage system, but have private water-borne system.
- 29.4% of the PH and 18.0% of the SSH have two persons per bedroom.



* Adjusted values to match number of cases of both housing schemes

Figure (8.43):Penelty points of technical quality evaluation

Externally, the major defects at the time of investigation were:

- 91.2% of the PH and 86.9% of the SSH windows are not double-glazed.
- 88.2% of the PH and 78.7% of the SSH walls do not have heat insulation.
- 29.4% of the PH and 55.7% of the SSH external wall surfaces contain superficial cracks.
- 20 penalty points were given to 55.9% of the PH and 49.2% of the SSH because they were two years old or less.
- 10 penalty points were given to 32.4% of the PH and 37.7% of the SSH because they were two to four years old.
- 38.2% of the PH and 26.2% of the SSH accessible only from unpaved roads.
- 29.4% of the PH and 36.1% of the SSH have cracks on the cement screed on the roof.
- 29.4% of the PH and 49.2% of the SSH have missing parts of flashing cement on the roof.
- 23.5% of the PH and 29.5% of the SSH external paint finishes have signs of peeling and require repainting.

The major defects of the environment surrounding the houses at the time of investigation were:

- Derelict lands are visible from curtilage (front or rear) of 91.2% of the PH and 90.2% of the SSH.
- No grass or trees visible from curtilage (front or rear) of 85.3% of the PH and 93.4% of the SSH.
- 52.9% of the PH and 37.7% of the SSH curtilage prejudiced by chalk marks on walls or unsightly litter lying about.
- No park or public open spaces within half mile radius of zone centre of 88.2% of the PH and 91.8% of the SSH.
- Less than six shops or a co-operative supermarket within half mile radius of zone centre of 79.4% of the PH and 60.7% of the SSH.

- No primary school within half mile radius of zone centre of 79.4% of the PH and 42.6% of the SSH.
- No mosque within half mile radius of zone centre of 38.2% of the PH and 31.1% of the SSH.
- Odour emanating from the surrounding environment of 47.1% of the PH and 34.4% of the SSH.
- 20.6% of the PH and 14.8% of the SSH have more than normal residential traffic.

Figure (8.44) shows the distributions of penalty points for the PH and SSH. Most of the houses under investigation had between 100 and 200 technical quality penalty points. That is 76.5% of the PH and 60.7% of the SSH. 20.6% of the PH and 21.3% of the SSH had between 201 to 300 penalty points. 2.9% of the PH and 16.4% of the SSH had between 0 to 100 penalty points. Only one case (1.6%) of the SSH had 301 to 400 penalty points and none from the PH. No cases had more than 400 penalty points.

Figure (8.45) illustrates the relation between location of the house and the independent quality evaluation. SSH located in the Modern Doha District had

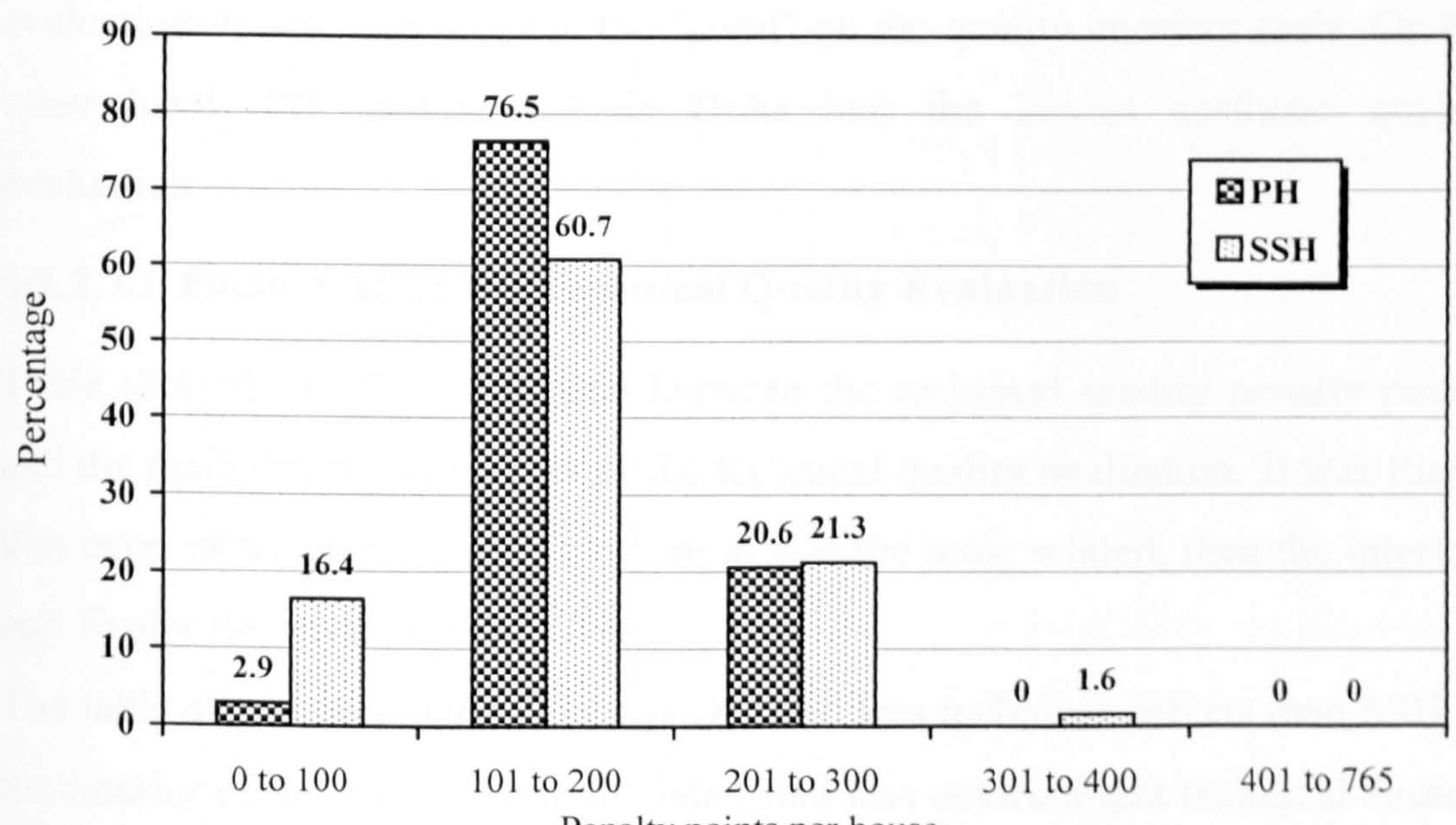


Figure (8.44): Penalty points distribution for PH and SSH

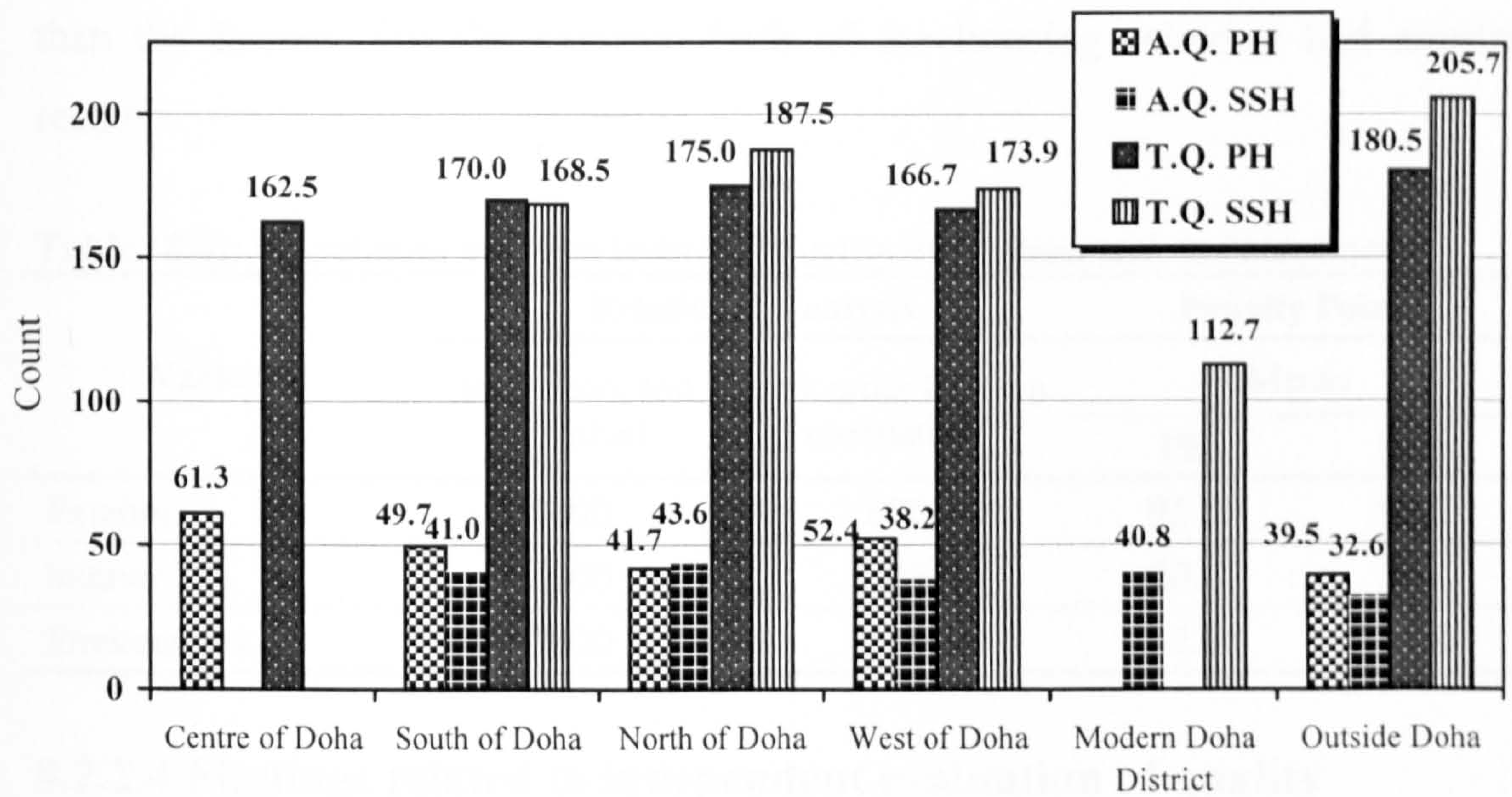


Figure (8.45): Relation between location of house and aesthetic and technical quality evaluation

the lowest technical quality defects from both housing schemes. That is because these houses were built according to higher standards and specifications than those outside this area. On the other hand, the highest technical quality defects was also for SSH, but for those located outside Doha. Most of their defects were related to the infrastructure.

PH in the Centre of Doha obtained the highest marks in the aesthetic quality evaluation. It was very close to the "good" on the quality quotient scale. On the other hand, PH located outside Doha had the lowest aesthetic quality evaluation.

8.2.2.3.1 Factors Affecting Technical Quality Evaluation

Table (8.4) shows the correlation between the technical quality penalty points and the main three components of the technical quality evaluation. It was found that exterior technical quality evaluation was the most related, then the interior, and finally the environment.

The table also shows that on average, PH had less technical defects than SSH in the interior of the house, while the latter had less environment technical defects than the former. For the exterior, both of the housing schemes had similar results.

Table (8.4): Correlation between technical quality evaluation and its components

Variables	Relational Analysis		Penalty Points	
	Significant test (P-value)	Rank order Pearson correlation	Means	
			PH	SSH
Exterior	.000	.870	91.3	91.1
Interior	.000	.701	20.6	25.1
Environment	.000	.399	62.9	54.8

8.2.2.4 Findings related to independent evaluation of quality

In the light of the above analysis some initial findings may be summarised as follows:

In all variables of function, form and economy of the aesthetic quality evaluation PH had higher points than SSH. The means of the quality quotient for both housing schemes fall under the category "fair", with a close rank for SSH to the category "acceptable" in the aesthetic quality evaluation scale.

It was found that the main cause of poor aesthetic quality is due to the architects' lack of experience, lack of knowledge of the local infrastructure and local customs.

For the technical quality evaluation PH had more defects than SSH. Most of the technical quality defects are related to the external factors of the house that are related to the weather condition in Qatar. Most of the clients do not give the affect of high temperature and humidity proper attention.

Inadequate materials used for building in Qatar shorten the life span of the buildings. Most of the cracks inside and outside the buildings are because of using sand and concrete stones which are highly sodium chloride contaminated.

With the exception of SSH houses located in the Modern Doha District, most of the houses from both groups do not use double exterior walls with insulation material in the middle. On the other hand, most of the houses have single glazed windows instead of double glazed windows. This later fact also includes SSH houses located in the Modern Doha District.

Finally, SSH located in Modern Doha District had the lowest technical quality defects from both housing schemes, while PH in the Centre of Doha obtained the highest marks in the aesthetic quality evaluation.

CHAPTER NINE

9 DATA ANALYSIS AND DISCUSSION

9.0 Introduction

This chapter reports the results of the statistical tests undertaken on the data collected; discussion of these results and their implications and relationships to the variables of the model.

The main statistical tools employed are t-test, Mann Whitney test and correlation analysis. Results having a significance level of 5% downwards are assumed to be conclusive. That is, a particular result has a 5% probability, or less, of having occurred by chance and the null hypothesis can be rejected.

The analysis was undertaken on personal computers using SPSS for Windows version 8.0 statistical analysis package.

9.1 Testing the hypotheses

The main hypothesis of this research project is:

> ***"Private Housing projects are more effective than Senior Staff Housing projects."***

This hypothesis is divided into three hypotheses each with sub-hypotheses:

- ***Hypothesis one**: Private Housing projects are more economical than Senior Staff Housing projects.*

- **Sub-hypothesis 1.1**: Private Housing projects have less unit cost than Senior Staff Housing projects.

- **Sub-hypothesis 1.2**: Private Housing projects have less percentage of overrun in cost than Senior Staff Housing projects.

- **Sub-hypothesis 1.3**: Private Housing projects have larger building rate than Senior Staff Housing projects.

- **Sub-hypothesis 1.4**: Private Housing projects have less percentage of overrun in time than Senior Staff Housing projects.

The null hypothesis is that Private Housing (PH) projects are not more economical than Senior Staff Housing projects. The same thing applies to the sub-hypotheses.

Table (9.1): t-tests for economy variables of project

Variable	Housing scheme	N	Mean	S.D.	S.E.	t-test df	t-test Sig. (1-tailed)
Unit cost (QR/m^2)	**PH**	34	1,293.40	345.95	59.33	93	**.024**
	SSH	61	1,443.60	352.84	45.18		
Percentage of cost overrun	**PH**	34	16.94	15.93	2.73	93	**.008**
	SSH	61	28.89	25.57	3.27		
Building rate (m^2/month)	**PH**	34	45.32	26.79	4.59	93	**.000**
	SSH	61	27.36	9.13	1.16		
Percentage of time overrun	**PH**	34	50.66	49.57	8.50	93	**.020**
	SSH	61	79.42	71.88	9.20		

As shown in table (9.1) all of the components of the economy factor are significant at less than 0.05. It was found that Private Housing projects had better values in the economy components than Senior Staff housing projects. Therefore, all of four sub-hypotheses are accepted and the null sub-hypotheses are rejected.

Factor analysis was used to test hypothesis one. But before conducting the analysis certain things needed to be done. First of all, all of the latent variables of the factor need to be in the same direction, either positively or negatively. Factor of economy consists of four latent variables: unit cost, percentage of cost overrun, building rate and percentage of time overrun. It was decided that the larger the figure the better it is. In other words, having higher values for the latent variables mean better performance measure. Therefore, unit cost, percentage of cost overrun and percentage of time overrun were given negative values.

Secondly, three values need to be verified to proceed with the factor analysis. Provided the determinant of the correlation matrix is larger than 0.00001, the matrix can be assumed not to suffer from multicollinearity or singularity (Kinnrear and Gray, 1997). Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy should be greater than or equal to about 0.5. Bartlett test of sphericity must be significant (i.e. its associated probability is greater than 0.05), to avoid the danger that the correlation matrix is an identity matrix (i.e. the diagonal elements are 1 and the off-diagonal elements are 0) and therefore unsuitable for further analysis.

The latent variables for the economy factor analysis are negative unit cost, negative percentage of cost overrun, building rate and negative percentage of time overrun. The determinant of the correlation matrix is 0.459 which is greater than 0.00001. The KMO value is 0.612 and Bartlett test of sphericity value is 71.419 and it is significant at 0.000. Since all of the conditions are met the factor analysis is adequate.

Table (9.2) shows the results of the t-test analysis between the two housing schemes for the factor of economy. Private Housing projects had a higher mean value than Senior Staff Housing projects. The one tailed test is significant at 0.000. Therefore the null hypothesis is rejected and hypothesis one is proven.

Table (9.2): t-test for factor of economy

Variable	Housing scheme	N	Mean	S.D.	S.E.	t-test	
						df	Sig. (1-tailed)
Factor of Economy	PH	34	.4775	1.0164	.1743	93	.000
	SSH	61	-.2662	.8929	.1143		

♦ <u>Hypothesis two</u>: ***Private Housing projects have better quality than Senior Staff Housing projects.***

This hypothesis is divided into two sub-hypotheses:

♦ **Sub-hypothesis 2.1**: Private Housing projects have less technical defects than Senior Staff Housing projects.

Sub-hypothesis 2.1 is also divided into three sub-sub-hypotheses:

♦ 2.1.1: Private Housing projects have less interior technical defects than Senior Staff Housing projects.

♦ 2.1.2: Private Housing projects have less exterior technical defects than Senior Staff Housing projects.

♦ 2.1.3: Private Housing projects have less environmental technical defects than Senior Staff Housing projects.

Table (9.3): t-tests for technical quality of house

Variable	Housing scheme	N	Mean	S. D.	S.E.	t-test	
						df	Sig. (1-tailed)
Interior technical defects	**PH**	34	20.59	16.13	2.77	93	**.156**
	SSH	61	25.08	22.78	2.92		
Exterior technical defects	**PH**	34	91.32	28.85	4.95	93	**.484**
	SSH	61	91.07	31.74	4.06		
Environmental technical defects	**PH**	34	62.94	19.15	3.28	93	**.019**
	SSH	61	54.75	17.57	2.25		
Technical quality (penalty points)	**PH**	34	173.09	38.02	6.52	93	**.418**
	SSH	61	170.90	54.45	6.97		

As shown in table (9.3) only the technical quality of the environment is significant at less than 0.05. It was found that SSH houses have less environmental technical quality defects. Table (9.3) also shows that the overall technical quality is not significant. Therefore, all of sub-hypotheses 2.1 are not proven, except sub-hypothesis 2.1.3.

♦ **Sub-hypothesis 2.2**: Private Housing projects have better aesthetic quality than Senior Staff Housing projects.

Sub-hypothesis 2.2 is also divided into three sub-sub-hypotheses:

- ♦ 2.2.1: Private Housing projects have better aesthetic function than Senior Staff Housing projects.
- ♦ 2.2.2: Private Housing projects have better aesthetic form than Senior Staff Housing projects.
- ♦ 2.2.3: Private Housing projects have better aesthetic economy than Senior Staff Housing projects.

Table (9.4): t-tests for aesthetic quality of house

Variable	Housing scheme	N	Mean	S.D.	S.E.	t-test	
						df	**Sig. (1-tailed)**
Aesthetic Function	**PH**	34	6.17	.66	.11	93	**.020**
	SSH	61	5.84	.80	.10		
Aesthetic Form	**PH**	34	6.07	1.10	.19	93	**.009**
	SSH	61	5.55	.95	.12		
Aesthetic Economy	**PH**	34	5.57	.93	.16	93	**.000**
	SSH	61	4.93	.69	.09		
Aesthetic quality	**PH**	34	46.40	12.36	2.12	93	**.001**
	SSH	61	38.84	10.09	1.29		

As shown in table (9.4) all of the components of the aesthetic quality variable are significant at less than 0.05. It was found that the components scores of aesthetic quality, function, form and economy, for the Private Housing projects were higher than they are for Senior Staff Housing projects. Therefore, all of sub-hypotheses 2.2 are accepted and the null sub-hypotheses 2.2 are rejected.

Factor analysis was used to test hypothesis two. The latent variables for factor of quality are negative technical quality and aesthetic quality. The determinant of the correlation matrix is 0.797 which is greater than 0.00001. The KMO value is 0.500 and Bartlett test of sphericity value is 20.969 and it is significant at 0.000. Since all of the conditions are met the factor analysis is adequate.

Table (9.5): t-test for factor of quality

Variable	Housing scheme	N	Mean	S.D.	S.E.	t-test df	t-test Sig. (1-tailed)
Factor of Quality	**PH**	34	.2314	.9239	.1585	93	**.046**
	SSH	61	-.1290	1.0247	.1312		

Table (9.5) shows the results of the t-test analysis between the two housing schemes for the factor of quality. Private Housing projects had higher mean value than Senior Staff Housing projects. The one tailed test is significant at 0.046. Therefore the null hypothesis is rejected and hypothesis two is proven.

♦ ***Hypothesis three*: Private Housing clients are more satisfied with the performance of their projects than Senior Staff Housing clients.**

This hypothesis is subdivided into four sub-hypotheses:

♦ ***Sub-hypothesis 3.1*:** *Private Housing clients are more satisfied with the total cost of their projects than Senior Staff Housing clients.*

♦ ***Sub-hypothesis 3.2*:** *Private Housing clients are more satisfied with the total time of their projects than Senior Staff Housing clients.*

♦ ***Sub-hypothesis 3.3*:** *Private Housing clients are more overall satisfied with the building process of their houses than Senior Staff Housing clients.*

♦ ***Sub-hypothesis 3.4*:** *Private Housing clients are more satisfied with the quality of their houses than Senior Staff Housing clients.*

As shown in table (9.6) only satisfaction with the total cost is significant at less than 0.05. It was found that Private Housing clients are more satisfied with the final cost of the project than Senior Staff Housing clients Therefore, all of sub-hypotheses 3 are rejected, except sub-hypothesis 3.1. The null sub-hypotheses are accepted.

Table (9.6): Mann-Whitney tests for client satisfaction with the housing projects

Variable	Housing scheme	N	Mean Rank	Sum of Ranks	U	Sig. (1-tailed)
Satisfaction with total cost	**PH**	34	55.93	1901.50	767.50	**.015**
	SSH	61	43.58	2658.50		
Satisfaction with total time	**PH**	34	50.06	1702.00	967.00	**.285**
	SSH	61	46.85	2858.00		
Overall satisfaction	**PH**	34	51.65	1756.00	913.00	**.135**
	SSH	61	45.97	2804.00		
Clients' rating on quality	**PH**	34	49.49	1682.50	987.00	**.330**
	SSH	61	47.17	2877.50		

Factor analysis was used to test hypothesis three. The latent variables for factor of satisfaction are client satisfaction with cost, client satisfaction with time, overall client satisfaction with the project and client rating on the quality of the house. The determinant of the correlation matrix is 0.589 which is greater than 0.00001. The KMO value is 0.464 and Bartlett test of sphericity value is 48.628 and it is significant at 0.000. Although KMO value was 0.464 which very close to 0.5. It was decided that is accepted. Since all of the conditions are met the factor analysis is adequate.

Table (9.7) shows the results of the t-test analysis between the two housing schemes for the factor of satisfaction. Private Housing projects had a higher mean value than Senior Staff housing projects. The one tailed test is not significant at 0.05 or less. Therefore the null hypothesis is accepted and hypothesis three is rejected.

Table (9.7): t-test for factor of satisfaction

Variable	Housing scheme	N	Mean	S.D.	S.E.	t-test df	t-test Sig. (1-tailed)
Factor of Satisfaction	**PH**	34	.1671	1.0592	.1816	93	**.103**
	SSH	61	-.1044	.9615	.1231		

Finally, factor analysis was used to test the main hypothesis. The latent variables for factor of effectiveness are negative unit cost, negative percentage of cost overrun, building rate, negative percentage of time overrun, negative technical quality, aesthetic quality, client satisfaction with cost, client satisfaction with time, overall client satisfaction with the project and client rating on the quality of the house. The determinant of the correlation matrix is 0.09546 which is greater than 0.00001. The KMO value is 0.618 and Bartlett test of sphericity value is 211.026 and it is significant at 0.000. Since all of the conditions are met the factor analysis is adequate.

Table (9.8) shows the results of the t-test analysis between the two housing schemes for the factor of effectiveness. Private Housing projects had a higher mean value than Senior Staff Housing projects. The one tailed test is significant at 0.002. Therefore the null hypothesis is rejected and the main hypothesis of this research is accepted.

Table (9.8): t-test for factor of effectiveness of housing project

Variable	Housing scheme	N	Mean	S.D.	S.E.	t-test	
						df	Sig. (1-tailed)
Factor of Effectiveness	**PH**	34	.3922	1.0570	.1813	93	**.002**
	SSH	61	-.2186	.9036	.1157		

9.1.1 Summary of Hypotheses Tests

Table (9.9) shows a summary of testing the hypotheses of the research The results indicate that PH projects have better performance and are more effective than SSH projects. In contrast, testing the subjective measurements, table (9.9) shows that a significant difference occurs only on satisfaction with the total cost of the project.

Table (9.9): Summary of hypotheses tests

Hypothesis No.	Retain H_0	Reject H_0	Result
1.1		✓	Unit cost of PH projects is less
1.2		✓	% of overrun in cost of PH projects is less
1.3		✓	Building rate of PH projects is higher
1.4		✓	% of overrun in time of PH projects is less
1		✓	PH projects are more economic than SSH projects
2.1.1	✓		No difference in interior technical quality
2.1.2	✓		No difference in exterior technical quality
2.1.3		✓	Environmental technical quality of SSH has less defects
2.1	✓		No difference in technical quality
2.2.1		✓	Aesthetic function of PH is better
2.2.2		✓	Aesthetic form of PH is better
2.2.3		✓	Aesthetic economy of PH is better
2.2		✓	Aesthetic quality of PH is better
2		✓	Quality of PH projects is better
3.1		✓	PH clients are more satisfied with total cost of the project
3.2	✓		No difference in satisfaction with total time of the project
3.3	✓		No difference in overall satisfaction with the project
3.4	✓		No difference in client's rating on quality of the house
3	✓		No difference in client satisfaction with the project
Main		✓	PH projects are more effective than SSH projects

9.2 Correlation tests

This section tests the relationships between the thirty nine independent variables of the research model and the ten main project performance measures used to evaluate housing projects in Qatar. Pearson correlation analysis test was used when the parametric test conditions exist, otherwise Spearman Rho test was used.

9.2.1 Correlation between the main housing project performance measures

Table (9.10) shows the interrelationship between the main variables of the research and factor of effectiveness of the SSH and PH projects. The correlation coefficients of SSH and PH projects are shown separately, and all expressed in the null form.

Results of linking the effectiveness measures together show the following:

1. For both housing schemes, the factor of effectiveness is associated with all of the main variables of the research except with clients' rating on the quality of their houses, technical quality evaluation for both housing schemes, and aesthetic quality evaluation for PH projects. This fact suggests that these three main variables do not influence the factor of effectiveness as the other seven main variables do.
2. The Unit cost of the SSH project is associated with overrun on cost. The correlation also shows that unit cost, for both SSH and PH projects, is associated negatively with building rate and positively with overrun on time suggesting that the higher percentage of time overrun the higher the project will cost. It also indicates that higher building rate can produce lower cost for the SSH and PH projects.
3. Likewise, the building rate of both SSH and PH projects are associated negatively with overrun on time.

4. Overrun on cost is significantly related to overrun on time for SSH projects suggesting that completing the project on time will increase the certainty of the cost of the project.
5. Unit cost is related negatively to the SSH clients' satisfaction with the total cost of the projects, while it is related negatively to the PH clients' satisfaction with the total time of the projects.
6. Percentage of cost overrun is related negatively to the PH clients' satisfaction with the total cost of the projects, while it is not related to the SSH clients' satisfaction. This finding suggests that PH clients are more concerned with the certainty of the cost of the project than SSH clients. It may also suggests that SSH clients had expected to finish their projects with more cost overrun than that expected by PH clients.
7. Building rate of the project and time over run are also related to the satisfaction with the total time for both groups of the clients. The fact that

Table (9.10): Correlation coefficients between the main project performance measures of the

	Mean	SD	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(M1) Unit cost	1443.60	352.84	1.000									
	1293.40	345.95	1.000									
(M2) Cost overrun	28.89	25.57	.400**	1.000								
	16.94	15.93	.116	1.000								
(M3) Building rate	27.36	9.13	-.507**	-.025	1.000							
	45.32	26.79	-.563**	-.104	1.000							
(M4) Time overrun	79.41	71.89	.280*	.343**	-.488**	1.000						
	50.66	49.57	.363*	.298	-.502**	1.000						
(M5) Satisfaction with total cost	3.16	1.07	-.261*	-.035	.063	-.170	1.000					
	3.68	1.17	-.011	-.466**	.317	-.193	1.000					
(M6) Satisfaction with total time	3.31	1.20	-.006	-.251	.342**	-.399**	.162	1.000				
	3.38	1.48	-.380*	-.157	.623**	-.529**	.531**	1.000				
(M7) Overall satisfaction	3.72	0.71	-0.086	-0.218	0.235	-0.360**	0.181	0.575**	1.000			
	3.88	0.77	-0.205	-0.150	0.499**	-0.326	0.055	0.430*	1.000			
(M8) Client rating on quality	3.95	0.56	-.021	.181	.018	.017	.144	.110	.291*	1.000		
	4.00	0.55	.069	-.218	.048	.088	-.030	-.278	.355*	1.000		
(M9) Aesthetic quality	38.84	12.22	0.246	0.121	-0.055	0.182	-0.038	-0.099	-0.154	0.180	1.000	
	46.40	14.70	0.241	-0.058	0.021	-0.087	-0.107	-0.087	0.019	0.094	1.000	
(M10) Technical quality	170.90	54.45	-.210	.177	.251	-.060	-.018	-.004	.036	-.149	-.532**	1.000
	173.09	38.02	-.262	-.255	.012	-.243	.043	-.046	-.064	-.074	-.429*	1.000
Factor of effectiveness	-0.2186	0.9036	-0.593**	-0.483**	0.603**	-0.804**	.454**	.698**	.641**	.093	-0.265*	0.149
	0.3922	1.0570	-0.604**	-0.389*	0.842**	-0.661**	.449**	.797**	.576**	.188	-0.127	0.179

Values inside the double line are Spearman rho test results
Values outside the double line are Pearson test results

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

SSH (unshaded rows)
PH (shaded rows)

the correlation coefficients for the PH group is higher than the coefficients of the SSH group, together with the correlation between PH clients satisfaction with cost and the correlation between the building rate and the overall satisfaction of the PH clients, suggests that PH clients give more weight to the total duration of the project than SSH clients.

8. Overall satisfaction with the project is also related to SSH and PH clients' satisfaction with the time of the project and the clients rating on the quality of their houses. Interestingly, overall satisfaction is not related to cost overrun of the project.
9. Table (9.10) indicates that aesthetic quality evaluation and technical quality evaluation are related negatively for both schemes. In other words, the less technical quality defects a house had the better aesthetic quality quotient it got. On the other hand, aesthetic quality evaluation and technical quality evaluation were not related to the quality rating of the house. This finding suggests that the clients' perception to quality differs from the perception of the independent expert evaluation that is controlled with specific criteria to govern his/her judgement.
10. Finally, the project effectiveness factor is related negatively to unit cost, cost overrun, time overrun for both SSH and PH projects. The factor is also negatively related with the SSH aesthetic quality evaluation. The effectiveness factor is positively related with building rate; satisfaction with cost, time, and overall satisfaction for both SSH and PH projects.

9.2.2 Correlation between the main housing project performance measures and the client characteristics variables

Table (9.11) shows whether the main variables of the effectiveness of the SSH and PH projects are interrelated with the client characteristics. The main correlation was between the educational level of SSH clients on one hand and unit cost, satisfaction with total cost and overall satisfaction on the other hand.

The positive correlation between SSH clients' educational level and the unit cost of the project suggests that SSH clients with a higher level of education tend to build more expensive houses with higher quality finishings. On the other hand, these clients had higher demands and expectations in return for the money they spend and in respect of overall satisfaction with the project.

Negative correlation exists between the importance of quality to SSH clients and the value of technical quality evaluation they had for their houses. This relationship was not significant to the PH clients, which suggests that the SSH clients were more concerned about the quality of their houses than were PH clients.

No correlation was found between previous construction experience and the research main performance measures. This finding suggests that having previous construction experience, alone, is not enough for having more effective projects in Qatar.

Table (9.11): Correlation coefficients between project performance measures and client characteristics

	Mean	SD	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(H1) Age of client	36.20	4.91	.153	.143	.115	-.013	.040	.021	.172	.025	.181	-.201
	38.91	10.67	-.022	.061	.325	-.238	.110	.204	.084	-.046	-.095	-.258
(H2) Educational level	NA	NA	.315*	.126	-.116	-.105	-.252*	-.113	-.268*	.223	.245	-.116
	NA	NA	.102	.037	-.124	.010	-.002	-.078	-.108	-.105	.299	.035
(H3) Monthly income	NA	NA	.160	.111	.000	-.020	-.102	.017	-.075	.171	.245	-.162
	NA	NA	.237	.198	-.001	-.246	.205	.137	-.025	-.031	.088	-.241
(H4) Construction experience	1.52	0.92	.050	.172	-.184	.157	.134	-.125	.052	-.024	.012	-.119
	1.59	1.08	.238	-.026	.037	-.056	.109	.035	.081	.188	.115	-.078
(H5) Previous place of living	NA	NA	.111	-.001	-.097	.035	.022	.018	-.012	.032	-.095	.156
	NA	NA	.020	-.065	.098	.014	.209	.134	.104	-.308	-.048	.148
(H6) Years of marriage	8.19	5.21	.064	.107	.006	-.002	.109	-.039	.008	.025	.249	-.276*
	12.65	12.69	-.054	-.014	.211	-.282	.174	.174	-.060	.087	-.171	-.210
(H7) Family size	2.95	1.76	-.066	.102	.009	.070	.155	-.095	-.009	.135	.290*	-.194
	3.59	2.84	-.128	-.069	.036	-.205	.162	.117	-.168	.032	-.380*	-.050
(H8) Importance of cost	41.79	14.67	-0.075	0.119	0.101	-0.039	-0.027	0.052	-0.024	-0.001	-0.125	0.215
	36.46	16.43	-0.188	0.005	0.021	-0.175	-0.085	-0.088	0.108	-0.007	0.117	0.266
(H9) Importance of time	21.44	11.00	0.128	0.135	-0.102	0.148	0.029	-0.202	-0.117	-0.049	-0.072	0.072
	25.91	11.64	-0.026	-0.153	-0.092	0.091	0.060	-0.062	-0.223	0.166	-0.315	-0.118
(H10) Importance of quality	37.08	13.10	-0.028	-0.232	-0.049	-0.047	-0.003	0.119	0.161	0.037	0.184	-0.359**
	37.62	14.13	0.211	0.085	0.147	0.066	0.091	0.217	0.056	-0.235	0.151	-0.101

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

SSH Spearman's rho values (unshaded rows)
PH Spearman's rho values (shaded rows)

Another negative relationship exists between technical quality evaluation of the SSH scheme and years of marriage of SSH clients. Informal discussion with some designers indicated that SSH clients involved their wives, during the design and the construction phase in taking decisions more than PH clients do.

A correlation was found between size of family of the clients and the aesthetic quality evaluation for both SSH and PH. The relationship is positive for SSH projects and negative for PH projects. All other variables are not significantly related.

9.2.3 Correlation between the main housing project performance measures and the land acquisition variables

Table (9.12) shows whether the main variables of the effectiveness of the SSH and PH projects are interrelated with the land characteristics. Location of land is related negatively with the aesthetic quality evaluation and positively with the technical quality evaluation for SSH scheme while it is related positively with the cost overrun of the PH projects. In other words, SSH built inside Doha was found to have higher aesthetic quality rating and lower technical quality defects than SSH built outside the limits of Doha. It was found that those SSH clients who live inside Doha are better educated and had higher monthly income than those who live outside Doha. On the other hand, PH built outside Doha had higher cost overrun than PH built inside Doha.

Table (9.12): Correlation coefficients between project performance measures and land characteristics

	Mean	SD	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(L1) Way of obtaining land	NA	NA	-0.220	0.096	0.148	0.114	-0.062	-0.193	-0.099	0.195	-0.026	0.264*
	NA	NA	-0.266	0.137	0.076	0.000	-0.100	0.144	0.034	0.152	-0.135	-0.362
(L2) Time for obtaining land	46.33	28.15	-0.087	-0.059	0.197	-0.068	-0.233	0.006	-0.093	0.085	0.135	-0.298
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(L3) Location of land	NA	NA	-.116	0.087	-0.094	-0.050	-0.076	-0.040	0.091	0.089	-.356**	.354**
	NA	NA	0.197	.339*	-0.092	0.003	0.310	0.027	-0.245	-0.125	-0.326	0.106
(L4) Area of land	1330.18	369.24	0.007	-0.175	0.093	-0.057	-0.159	0.026	-0.031	0.004	-0.072	0.104
	1177.03	595.56	0.154	0.246	-0.118	0.211	0.001	0.155	0.022	0.119	-0.187	-0.292

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

NA = Not Applicable

SSH Spearman's rho values (white rows)
PH Spearman's rho values (shaded rows)

Another relationship exists between the way for obtaining land and the technical quality evaluation. It was found that houses that were built on lands distributed by the Lands Department had less technical quality defects that those who bought their land privately. That is because those lands obtained from the Land department had all the infrastructure required. All other variables are not significantly related. Further research is needed to find out reasons for such relationships.

9.2.4 Correlation between the main housing project performance measures and the SSH regulation variables

Table (9.13) shows whether the main variables of the effectiveness of the SSH projects are interrelated with the SSH variables.

Negative association was found between overrun on time and SSH client satisfaction with the amount of SSH loan. This fact suggests that one of the main reasons for having overrun in time with the SSH projects is the mount of the SSH loan. It seems that most of the unsatisfied SSH clients with the amount of the loan did not, or maybe could not, obtain another source for financing their projects, ending up with stopping the construction works on the site until they can afford to pay the contractor and/or the sub-contractor(s).

Client satisfaction with the amount of SSH loan is also associated with satisfaction with the total time of the project but positively. This fact supports

Table (9.13): Correlation coefficients between project performance measures and SSH regulations

	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(S1) Heard of SSH regulations	-0.129	0.010	0.107	-0.090	0.204	0.140	0.167	0.083	0.009	-0.095
(S2) Read SSH regulations	-0.075	-0.001	0.238	-0.133	0.139	0.129	0.097	0.001	0.196	-0.166
(S3) Time for obtaining SSH loan	0.008	-0.110	0.142	-0.024	0.082	0.138	.215	0.194	0.171	-0.184
(S4) Read SSH loan contract	0.056	0.014	0.041	-0.137	0.073	0.020	-0.195	-0.064	0.158	-0.065
(S5) Adequate SSH loan	-0.059	-0.059	-0.139	-0.114	0.108	0.070	0.055	-0.213	0.028	-0.118
Satisfaction with SSH regulations	0.003	-0.128	0.013	-0.011	0.125	0.132	0.107	0.161	-0.027	-0.099
Satisfaction with amount of funds	-0.144	-0.191	0.195	-.404**	-0.002	.310*	0.182	0.098	-0.185	0.051
Satisfaction with the fund process	-0.107	-0.218	0.026	-0.191	-0.041	0.156	0.189	-0.009	-.274*	0.136
Satisfaction with time between payments	0.044	-0.071	0.015	-0.147	0.174	0.242	0.127	-0.140	-0.045	-0.054
Satisafction with contract with the bank	0.095	-0.036	-0.061	-0.141	0.154	0.144	0.144	0.015	-0.042	-0.071

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

SSH Spearman's rho values

the idea that SSH clients who did not obtain another source of finance had to stop construction works till they can afford to pay.

The last two relationships suggest that rising the amount of the SSH loan will decrease the overrun in time of the project and, hence, increase SSH client satisfaction with the total time of the project.

A negative relationship exists between the aesthetic quality evaluation and client satisfaction with the funding process. This suggests that the long process for a new payment approval from the bank affects the final aesthetic quality of the house. As most of the SSH clients rush the process of receiving a new payment of the loan, the designers approve the request without real evaluation of aspects of the design of the house.

9.2.5 Correlation between the main housing project performance measures and the design phase variables

Table (9.14) shows whether the main variables of the effectiveness of SSH and PH projects are interrelated with the design phase variables.

Unit costs of the SSH projects were negatively related to total floor gross area. That is the larger the total gross floor area the less the project will cost in terms of unity. On the other hand, correlation shows that the higher the floor area, the higher the SSH clients will rate the quality of their building, suggesting that space is an important issue to the SSH clients.

Unit cost of SSH projects was also related to whether they had a project manager and whether he/she is the same designer or from the same office. Correlation analysis indicates that employing a project manager in the PH scheme will decrease building speed rate, satisfaction with cost, satisfaction with time and overall satisfaction. This may be because the PH clients employed less qualified project managers than SSH clients, resulting in bad management of the project.

For PH projects total gross floor area was related to percentage of cost overrun indicating that the bigger the size of PH the higher the uncertainty with cost. On the other hand a positive relationship exists between the total floor area and the building rate of both SSH and PH projects.

The way of selecting the designer is related negatively to PH project time overrun and SSH client satisfaction with cost. This suggests that selecting the same designers that the SSH clients had previous experience with increases the level of satisfaction with cost, while for the PH clients increases the uncertainty with time.

Time of the design is related positively to the technical quality evaluation of the SSH. All other variables are not significantly related.

Finally, increasing the percentage of design cost to the final cost of the project for SSH will decrease cost overrun and will increase building rate, client satisfaction with time and overall client satisfaction with the project. That is because more money spent in design will reduce the chances of changing the design or the specification at the time of execution.

Table (9.14): Correlation coefficients between project performance measures and design phase

	Mean	SD	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(D1) Way of selecting designer	NA	NA	0.005	-0.038	0.018	-0.066	-0.277*	-0.039	0.066	-0.068	-.083	-0.148
	NA	NA	0.021	0.2118	0.166	-0.386*	-0.022	0.247	-0.025	-0.136	-.048	-0.179
(D2) Design cost - QR	10,049.18	6241.5	0.044	-0.062	0.226	0.079	0.007	0.115	0.097	0.125	.272	0.052
	9147.06	8216.3	0.163	0.147	0.180	0.025	0.153	0.120	0.017	-0.033	.116	-0.256
(D3) Time of design	5.05	3.47	-0.181	0.086	0.244	0.092	0.139	0.014	-0.172	0.116	-.023	0.329**
	4.79	2.47	-0.032	0.268	0.031	-0.130	-0.291	0.040	-0.277	-0.328	-.126	0.118
(D4) Design domenation	NA	NA	-0.109	-0.172	0.095	-0.045	0.109	0.068	0.166	0.046	.006	-0.038
	NA	NA	0.296	0.125	0.132	0.007	0.232	0.119	0.155	-0.007	.092	-0.204
(D5) Total gorss floor area	804.38	170.58	-0.482**	0.113	0.458**	0.135	0.035	-0.232	-0.158	0.284*	.142	0.077
	713.53	259.65	-0.094	0.487**	0.412*	0.012	-0.073	0.173	-0.013	-0.032	-.107	-0.328
(D6) Had site supervisor engineer	NA	NA	0.253*	0.136	-0.160	-0.090	0.116	0.043	0.087	0.012	-.043	-0.003
	NA	NA	0.100	-0.069	-0.439**	0.326	-0.348*	-0.589**	-0.424*	0.019	-.085	0.255
(D7) Type of site supervisor engineer	NA	NA	0.296*	-0.159	-0.172	-0.156	0.070	0.131	0.115	0.045	.052	-0.210
	NA	NA	-0.025	-0.217	-0.038	0.254	0.123	-0.036	0.053	0.130	.287	-0.204
(D8) Percentage of design cost to total cost	0.88	0.53	-0.211	-.300*	.278*	-0.155	0.105	.275*	.253*	-0.073	-.003	0.146
	1.01	0.6	-0.154	-0.078	0.137	-0.226	0.153	0.183	-0.146	-0.009	.068	0.129

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

NA = Not Applicable

SSH Spearman's rho values (unshaded rows)
PH Spearman's rho values (shaded rows)

9.2.6 Correlation between the main housing project performance measures and the construction phase variables

Table (9.15) shows whether the main variables of the effectiveness of the SSH projects are interrelated with the construction phase variables.

The main relationships are between construction time and construction and between the main variables of project effectiveness. This is because unit cost, cost overrun, building rate and time overrun are all functions of construction time and cost. Positive relationships exist between construction time, construction cost, unit cost, cost overrun (for both SSH and PH projects) and time overrun (for SSH projects only). That is to say that increasing construction time and cost will increase unit cost, cost overrun (for both housing schemes) and time overrun (for SSH projects). On the other hand, building rate of the project will decrease for SSH projects as construction time increases.

As total time of construction increases clients' satisfaction (for both groups) with the total time of the project decreases while only overall satisfaction of SSH clients decrease. Surprisingly, satisfaction of PH clients with total cost of the project increases as the duration of construction increases.

The increase of construction costs for SSH projects will increase SSH clients'

Table (9.15): Correlation coefficients between project performance measures and construction phase

	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(C1) Procurement method	-0.156	0.348*	-0.007	0.277*	0.024	-0.150	-0.037	0.239	0.096	-0.040
	0.057	-0.211	0.081	-0.375*	0.020	0.132	0.034	0.105	0.218	0.147
(C2) Tender type	0.040	0.062	-0.117	0.101	0.140	-0.045	-0.044	0.115	0.235	-0.206
	0.186	-0.204	-0.115	-0.164	0.325	-0.002	0.128	0.035	0.135	-0.076
(C3) Contract form	-0.136	-0.057	0.035	0.021	0.088	0.092	0.022	-0.016	0.023	-0.031
	-0.254	0.042	0.306	-0.238	0.037	0.221	0.124	-0.182	0.036	0.320
(C4) Construction time	.476**	.289*	-.757**	.689**	-.111	-.537**	-.279*	.130	.175	-0.205
	.512**	.456**	-.680**	.486**	.391*	-.531**	-.307	-.171	-.082	-0.188
(C5) Construction cost	.663**	.616**	-.024	.272*	-.240	-.246	-.186	.233*	.383**	-0.114
	.569**	.333	-.086	.156	-.127	-.137	.062	-.086	.054	-.369*

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Values inside the double line are Pearson test results
Values outside the double line are Spearman rho test results

SSH Spearman's rho values
PH Spearman's rho values

rating on the quality of their houses, as well as the aesthetic quality evaluation, while it will decrease the technical quality defects for PH projects.

Finally, the type of procurement method used for building houses in Qatar will affect the certainty of the outcomes of the projects. It was found that selecting construction management or management contracting procurement method, instead of traditional approach, will increase cost and time overrun for SSH projects, but will decrease time overrun for PH projects. The freedom from SSH regulations and procedures that PH has, may explain the latter relationship. All other variables are not significantly related.

9.2.7 Correlation between the main housing project performance measures and dispute variables

Table (9.16) shows whether the main variables of the effectiveness of the SSH projects are interrelated with any disputes that may occurred during the different phases of the project.

Disputes with the main contractor and total number of disputes are the main related vaiables with the main project effectiveness variables. They are related negatively with building rate of the projects, clients' satisfaction with total time

Table (9.16): Correlation coefficients between project performance measures and disputes

	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(P1) Dispute with the Land Department	0.183	0.296*	-0.034	0.058	-0.321*	-0.167	-0.209	-0.044	-0.100	0.066
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(P2) Dispute with the bank	0.007	-0.073	-0.060	0.013	-0.164	-0.026	-0.159	-0.029	0.041	-0.136
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(P3) Dispute with the designer	-0.046	0.008	-0.090	0.187	0.064	-0.229	-0.097	-0.060	0.199	0.082
	0.115	-0.115	-0.080	-0.081	0.028	0.037	0.098	-0.195	0.222	0.240
(P4) Dispute with the Planing Department	-0.088	-0.044	0.088	-0.183	0.108	0.070	0.099	0.180	0.129	-0.169
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(P5) Dispute with the Contractor	0.062	0.139	-0.264*	0.428**	-0.0312	-0.421**	-0.328**	0.102	0.158	-0.067
	0.028	0.205	-0.318	0.465**	-0.322	-0.480**	-0.499**	0.081	0.014	-0.043
(P6) Dispute with any subcontractor(s)	0.078	0.232	-0.031	0.245	-0.107	0.122	-0.100	0.049	0.052	-0.028
	0.301	0.225	-0.536**	0.177	-0.116	-0.284	-0.351*	-0.283	0.207	-0.065
(P7) Dispute with any utility department	-0.031	0.063	0.010	0.008	0.058	-0.052	0.024	0.183	0.220	-0.223
	0.153	0.382*	-0.242	0.032	-0.013	-0.178	-0.319	-0.255	0.025	0.224

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

SSH Spearman's rho values (unshaded rows)
PH Spearman's rho values (shaded rows)

and overall satisfaction of the project. They are also related positively with time overrun of the projects.

Disputes with the Lands Department and with total number of disputes are related positively with cost overrun of SSH projects. Another positive relationship exsits between disputes with the utility depatments and cost overrun for PH projects.

SSH clients' satisfaction with total cost of the project is related negatively with disputes with the Land Department. This relationship, as well as the negative relationship with cost overrun may have occurred by coincidence. All other variables are not significantly related.

9.2.8 Correlation between the main housing project performance measures and the independent quality evaluation components

Finally, table (9.17) shows whether the main variables of the research are interrelated with the aesthetic and technical quality evaluations variables.

It is obvious to say that the main relationships are between the components of the aesthetic and technical quality evaluations on one hand and with the aesthetic and technical quality evaluations on the other. This is obviously because these evaluations depend on their components.

Table (9.17): Correlation coefficients between project performance measures and components of independent quality evaluations

	Mean	SD	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
Aesthetic function	7.00	0.80	0.255*	0.137	-0.026	0.220	-0.149	-0.145	-0.145	.276*	0.846**	-0.531**
	7.31	0.67	0.090	0.071	0.066	0.036	-0.223	-0.101	0.046	0.203	0.765**	-0.289
Aesthetic form	6.55	0.95	0.181	0.095	-0.070	0.162	-0.030	-0.022	-0.083	0.198	0.927**	-0.508**
	6.97	1.11	.361*	-0.038	-0.094	-0.061	-0.102	-0.154	-0.030	0.075	0.939**	-0.438**
Aesthetic economy	6.18	0.69	0.211	0.044	-0.012	0.065	0.068	-0.029	-0.096	-0.024	0.846**	-0.392**
	6.78	0.91	0.130	-0.105	0.130	-0.193	-0.008	0.018	0.116	0.100	0.897**	-0.353*
Interior tech. quality	25.08	22.78	-0.108	0.069	0.117	-0.140	-0.041	-0.025	-0.005	-0.092	-.485**	.769**
	20.59	16.13	-0.032	-0.032	-0.231	-0.217	-0.085	0.041	-0.049	-0.159	-.287	.479**
Exterior tech. quality	91.07	31.74	-0.046	0.186	0.138	0.067	0.013	0.041	-0.119	-0.066	-.434**	.897**
	92.21	28.95	-0.228	-0.010	-0.020	-0.122	0.237	0.118	0.092	-0.197	-.541**	.816**
Environmental tech. quality	54.75	17.57	-0.257	0.151	0.270	-0.038	0.029	-0.066	-0.068	-0.156	-.108	.482**
	63.24	19.02	-0.109	-0.334	0.102	-0.155	-0.211	-0.148	-0.254	-0.058	.318	.245

Values inside the double line are Spearman rho test results
Values outside the double line are Pearson test results

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

SSH (unshaded rows)
PH (shaded rows)

A positive relationship exists between unit cost of the project and aesthetic function of SSH and aesthetic form of PH. Another positive relationship exists between aesthetic function and SSH clients' rating on the quality of their houses. In other words, the variables of the independent evaluation of aesthetic and technical quality of housing in Qatar do not relate to SSH and PH clients' rating on quality, except for the aesthetic function of the SSH buildings. All other variables are not significantly related.

9.2.9 Summary of the Correlation Tests

Table (9.18) illustrates a summary of the correlation test between the main performance measures of the research and variables of the research model.

Thirty nine factors were identified as independent variables and measured in the 95 cases studied. Correlation analysis was applied to determine the relationships between these underlying factors and the ten project performance indicators. The performance variables tested were unit cost; percentage of cost overrun; building rate; percentage of time overrun; client's satisfaction on cost, time, and overall satisfaction; client's rating on quality; aesthetic quality evaluation and technical quality evaluation.

Twenty one factors were found to have significant association with the ten project performance variables, nineteen for SSH project and eleven for PH projects. The ways in which each of those factors affect the performance measures are summarised as follows:

1. Higher educational level of the SSH clients means higher expectations of value for money, and hence, less satisfaction with the total cost of the project.
2. More involvement of both wife and husband in the design process leads to a better technical quality house.

3. Larger family size will increase the aesthetic quality for SSH projects, but will do the opposite for PH projects.
4. SSH client's greater emphasis on quality will lead to reduce technical quality defects of the house.
5. Obtaining land from the government will reduce technical quality defects for SSH projects.

Table (9.18): Summary of correlation coefficients between the main performance measures and variables of the research model

		(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)	(M9)	(M10)
(H2) Educational level	SSH					-.252*					
	PH										
(H6) Years of marriage	SSH										-.276*
	PH										
(H7) Number of children	SSH									.290*	
	PH									-.380*	
(H10) Importance of quality	SSH										-.359**
	PH										
(L1) Way of obtaining land	SSH										.264*
	PH										
(L3) Location of land	SSH									-.356**	.354**
	PH		.339*								
(S7) Satisfaction with amount of SSH loan	SSH				-.404**		.310*				
	PH										
(S8) Satisfaction with the fund process	SSH									-.274*	
	PH										
(D1) Way of selecting the designer	SSH					-.277*					
	PH				-.386*						
(D3) Design duration	SSH										.329**
	PH										
(D5) Total gross floor area	SSH	-.482**		.458**					.284*		
	PH		.487**	.412*							
(D6) Had site supervisor	SSH	.253*									
	PH			-.439**		-.348*	-.589**	-.424*			
(D7) Type of site supervisor	SSH	.296*									
	PH										
(D8) Percentage of design cost to final cost	SSH		-.300*	.278*			.275*	.253*			.372**
	PH										
(C1) Procurement method	SSH		.348*		.272*						
	PH				-.375*						
(C4) Construction duration	SSH	.476**	.289*	-.757**	.689**		-.537**	-.279*			
	PH	.512**	.456**	-.680**	.486**	.391*	-.531**				
(C5) Construction cost	SSH	.663**	.616**		.272*				.233*	.383**	
	PH	.569**									-.369*
(P1) Dispute with the Land Department	SSH		.296*			-.321*					
	PH										
(P5) Dispute with the contractor	SSH			-.264*	.428**		-.421**	-.328**			
	PH				.465**		-.480**	-.499**			
(P6) Dispute with any sub-contractor	SSH										
	PH			-.536**				-.351*			
(P7) Dispute with any utilities department	SSH										
	PH		.382*								

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

SSH
PH

6. Having a house far from the City of Doha will decrease the aesthetic quality and will increase the technical quality defects for SSH, and will increase cost uncertainty for PH projects.
7. Higher amount of the SSH loan will decrease time overrun, and hence, will increase SSH client's satisfaction with the total time of the project and increase project effectiveness.
8. Appointing a designer from past experience will increase SSH client's satisfaction with cost but will increase uncertainty with time for PH projects.
9. Longer design duration will increase technical quality defects for SSH projects.
10. Higher gross floor area will decrease unit cost, increase building rate and increase client's rating on quality for SSH projects.
11. Higher gross floor area for PH projects will increase building rate but it will also increase cost overrun.
12. For SSH projects appointing a site supervisor engineer will increase unit cost even if the engineer is from the same designer office.
13. For PH projects appointing a site supervisor engineer will decrease the building rate; decrease client's satisfaction with, cost, time and overall satisfaction; and will decrease the effectiveness of the project performance.
14. Higher percentage of design cost in relation to final cost of the project for SSH will decrease cost overrun and will increase building rate, client satisfaction with total time and overall satisfaction of the project. It will also increase the effectiveness of the SSH projects.
15. Using construction management or management contracting will increase uncertainty with total cost and time of the project for SSH but will decrease uncertainty with total time for PH projects.

16. Higher construction duration will increase unit cost, and time and cost overrun, and will decrease building rate and client's satisfaction with total time of the projects, and hence, will decrease the effectiveness of both SSH and PH projects.

17. Higher construction duration will also increase PH client's satisfaction with total cost of the project, but will decrease SSH client's overall satisfaction with the project.

18. Higher construction cost will increase unit cost; cost and time overrun; client's quality rating; and aesthetic quality evaluation for SSH projects.

19. Higher construction cost will increase unit cost but will decrease technical quality defects for PH projects.

20. Higher construction cost will decrease effectiveness of project performance for both SSH and PH.

21. Disputes with the Land Department will increase cost overrun and will decrease client's satisfaction with total cost of the SSH projects.

22. Disputes with the main contractor will increase time overrun, decrease client's satisfaction with total time and overall satisfaction for both SSH and PH projects. Furthermore, disputes with the main contractor will decrease the effectiveness of project performance.

23. Disputes with the main contractor will decrease building rate for SSH projects.

24. Disputes with sub-contractor(s) will decrease building rate and overall client's satisfaction for PH projects.

25. Disputes with utility department will increase cost overrun for PH projects.

The major variables that affect project performance were found to be variables related to the construction phase of the project. It was found that construction duration and construction cost for both housing schemes are related to most of the project performance measures of the research, and hence, affected the effectiveness of the project.

Disputes with the contractor and with the sub-contractor(s) had also affected the effectiveness of the project.

Client characteristic variables were found to be related to the aesthetic and technical quality evaluations.

Having a project manager for a PH project had negatively affected the performance of the project, suggesting that PH clients do not employ qualified project managers.

Finally, the amount of the SSH loan had affected the performance of the SSH projects, suggesting that the amount of the loan is not enough to produce a house with the required standard and it should be increased to improve the effectiveness of the SSH projects.

9.3 Discussion of the results

The main comment on the reliability of the selected variables for measuring the effectiveness of housing projects in Qatar, is the inconsistency between the objective measurements and the subjective measurements. Although statistical tests show that SSH projects have a greater unit cost, a lower speed of building and more overrun in cost and time compared with PH projects, the results of client satisfaction shows no difference between the two approaches, except with the satisfaction on cost. Correlation analyses also show no relationships between the components of the independent aesthetic and technical evaluation, and the clients' rating on the quality of their houses. This raises a number of important questions: Is client satisfaction a reliable project performance measure? How reliable is client feedback when rating their satisfaction with project performance? Are we measuring client satisfaction in the right way?

And can one conclude that client satisfaction, as a subjective measurement of project performance, is equal in weight to any other objective measurement such as time or cost?

9.4 Review of Client Satisfaction Measurements and Scales

In chapter 4, studies of client satisfaction and its measurement techniques used in the construction industry were reviewed. Following these studies the same approach for measuring client satisfaction and client quality rating was used in this study resulting with inconsistency between the subjective and objective measurements. Therefore, a review of the studies of client satisfaction, its measurement and scales used for measurement outside the construction industry may give a better understanding of the achieved results and answer the questions raised on section 9.4.

9.4.1 Client satisfaction measurements (CSM)

The literature on customer satisfaction/dissatisfaction suggests that satisfaction is an overall post-purchase (service) evaluation. However, there is no consensus on how it is to be measured. Hausknecht (1990) identifies more than 30 different measures that have been used in previous research. Customer satisfaction is defined as a function of three indicators that are allowed to be measured:

- General satisfaction (e.g. Moore and Shuptrine, 1984; Oliver and Bearden, 1983; Westbrook, 1980).
- Confirmation of expectations (e.g. Oliver, 1977; Swan, *et al.*, 1981).
- The distance from the customer's hypothetical ideal product (e.g. Tse and Wilton, 1988; Sirgy, 1984).

Fornell (1992) established a national customer satisfaction barometer (CSB) which attempts to capture the degree of the above three indicators. An advantage over traditional approaches to satisfaction measurement is that causes of satisfaction are not confounded with the phenomenon itself. Other advantages are that the fallibility of measures is acknowledged and taken into account, and that the indicators defining customer satisfaction can be weighted such that their composite (i.e., CSB) has maximal impact on loyalty and customer retention.

9.4.2 Difficulties with client satisfaction measurement tools

Kumaraswamy and Thorpe (1996) also criticised the current methods for measuring subjective indicators. Table (9.19) illustrates just one aspect of how unsystematic evaluations can yield misleading verdicts. In this case an "average" performance level of a project can well be misinterpreted to be at any point ranging from "exceptionally bad" to "exceptional good." Such varying perceptions arise from different combinations of the differences in target levels arbitrarily set by the respondent; and the variability in the subjective standards that eventually be used by the evaluator (Kumaraswamy, 1991).

Table (9.19): Average project performance as perceived under different circumstances

Performance Evaluation (1)	Target Set				
	Very high (2)	High (3)	Realistic (4)	Low (5)	Very low (6)
Very strict	Extremely bad	Very bad	Bad	Poor	Ok
Strict	Very bad	Bad	Poor	Ok	Fair
Fair	Bad	Poor	Ok	Fair	Good
Generous	Poor	Ok	Fair	Good	Very good
Very generous	Ok	Fair	Good	Very good	Extremely good

Source: Kumaraswamy (1991).

Taking an example from the table, if a "very high" quality target had been set and a "strict" performance evaluation was carried out, the verdict of "very bad" (as in column 2, row 2) would be very different from the "very good" verdict (as in column 5, row 5) in the case where a "low" quality target had been set by the client and a "very generous" evaluation of the project outcomes made.

Galletta and Lederer (1989) have identified some difficulties when dealing with client satisfaction measurement tools. These potential difficulties include difficulties with scale units and origins, item heterogeneity, parametric statistical analysis, and overall instrument reliability.

Scale unit and origins: Using Likert-type scales, it is impossible to ascertain if subjects interpret the meanings of the adjective pairs consistently. This might be problematic when averaging across individuals or re-testing the same individual.

Torgerson (1967) discussed the difficulty of averaging across individuals. His work implies that some subjects may give higher satisfaction ratings than others. The differences in the individuals' response sets may overshadow actual differences in the systems themselves. According to Torgerson, this phenomenon occurs because subjects approach the attitude objects with their own scales.

The problem is particularly serious in evaluating construction projects because respondents with unknown scales approach questionnaire items that are very subjective. Therefore, Galletta and Lederer (1989) conclude that the meaning of the item or total score for one person is very difficult to compare with that of another person.

Torgerson, however, stated that the problem is not as serious when replication covers more than one trial for a single subjects since subjects responding to a reliable instrument usually settle down quickly to relatively constant scale units and origins. Still, comparisons within subjects are suspect until evidence of test/retest reliability has been established.

Item heterogeneity: Tests such as satisfactions with the building process employ multiple items for various reasons. A detailed questionnaire of client satisfaction of the building process phases can be used as an illustration. The instrument contains 20 items. Summing the items derives totals for each phase of the project. Summing all phases derives an overall score. Use of factor analysis implies that the resultant scales are homogeneous within each phase and that their heterogeneity implies independence between factors (phases); therefore, as Allen and Yen (1979) stated it is

> ***"difficult ... if not impossible ... to interpret a sum of all items."*** p.224

The empirical support for totalling the individual items appears to be the high internal consistency and reliability, as reported by Cronbach's alpha (Ives, *et al*, 1983). However, Allen and Yen stated that

> ***"alpha ... should be used only for homogeneous tests since the formula assumes item homogeneity ... If the test measures a variety of traits, coefficient alpha is not a suitable measure."*** p.88

Parametric statistical analysis: Client satisfaction measurement requires the use of nonparametric statistical analysis. Instead of means, standard deviations, or product moment correlations, the only "permissible statistics" for ordinal measures, like client satisfaction, are nonparametric (medians, percentile, and order correlations), but many client satisfaction researchers use parametric tests and do not acknowledge the potential misfit.

Reliability: The reliability of a scale is an important consideration because the scale must be internally meaningful before it can be externally meaningful. That is, reliability is generally a necessary condition for validity because lack of reliability of a scale would seriously impair the scale's ability to detect true measurement of client satisfaction. Reliability is estimated by repeating a test to yield a test/retest reliability score, administrating two very similar sets of items to a single subject to yield a parallel reliability score, or by correlating the items in a test with the total test score to yield an internal consistency score (Allen and Yen, 1979). These methods are neglected most of the time by the researchers of the client satisfaction in the construction industry. In our case the test-retest reliability (coefficient of stability) of the client satisfaction scale was 0.83 which is reasonably high suggestion that the questionnaire was reliable. Leaving the doubts around the validity of the client satisfaction scale used in the questionnaire. In this matter Bell (1993) states:

> ***"If an item is unreliable, then it must also lack validity, but a reliable item is not necessarily also valid. It could produce the same or similar responses on all occasions, but not be measuring what it supposed to measure."*** p. 65

Therefore, more consideration has to be taken regarding the scale of client satisfaction.

9.4.3 Client satisfaction scales

One of the more recent debates has been on the choice of rating scales for use in customer satisfaction measurement. Articles have been written on satisfaction scales, expectation scales, performance scales, and requirement scales. Also covered have been two-point, five-point, and ten point scales.

Waddell (1995) criticised these measurement scales. He mentioned that ordinary scales used in measuring client satisfaction have the following deficiencies:

Loss of predictive value: Consider the satisfaction and performance scales (see table (9.20)). Waddell states that experience with these scales has shown that many customers tend to be overly generous in their evaluations of a product or service. This positive response bias often happens when respondents know they have no anonymity, or when they perceive that a well-meaning employee's job may be on the line. Positive response bias is also common when the rating scale has no neutral position, forcing those who are neutral to take a position artificially, which more often than not, will be on the positive side. Consequently, when using these scales, average scores tend to be high, and problem areas may not be clearly identified. When that happens, the survey loses its predictive value. This becomes too clear when customers switch to a competitor's product or service soon after reporting they were "completely satisfied" with the product they were using.

Table (9.20): Examples of measurement scales

Satisfaction Scale	**Expectation Scale**
♦ Very satisfied ♦ Satisfied ♦ Neither satisfied nor dissatisfied ♦ Dissatisfied ♦ Very dissatisfied	♦ Much better than expected ♦ Better than expected ♦ About as expected ♦ Worse than expected ♦ Much worse than expected
Performance Scale	
♦ Superior ♦ Excellent ♦ Good ♦ Fair ♦ Poor	
Requirement Scale No. 1	**Requirement Scale No. 2**
♦ Exceeded my requirements ♦ Met my requirements ♦ Nearly met my requirements ♦ Failed to met my requirements	♦ Always meets my requirements ♦ Usually meets my requirements ♦ Occasionally meets my requirements ♦ Rarely meets my requirements ♦ Never meets my requirements

Source: Waddell (1995).

Expecting the worse: The expectation scale was once thought by many to be the only way to measure customer satisfaction. How could performance that was better than expected be anything but good, experts argued, one answer, of course, is when the expectations are not very high to begin with. Perhaps the most serious problem associated with using the expectation scale is the fact that the term "expectations" and "requirements" are ambiguous to respondents and can introduce significant measurement error in the data. In using the expectation scale, a respondent could indicate that the performance on an attribute was "much better" than expected. But this rating could take on the following interpretations: the performance is "much better" because the forecasted performance exceeded historical performance, or may be the current performance is "much better" because actual performance exceeded the minimal performance level required by the customer. The expectation scale brings problems when rating change over time. It is difficult to know whether performance has changed, expectation has changed, or they both have changed. One other problem is that the expectations of a new customer may be quite different from those of a very content, long-time customer who is receiving no more or less than he or she expects. One can imagine a variety of scenarios in which the interpretation of such survey results would lead to erroneous conclusions about customer satisfaction. This emphasises that the characteristics of the customers, or clients, (such as previous experience, education level, income level) have a major influence in rating their response.

No room for improvement: Waddell also stated that researchers commonly use two types of requirements' scales. The first scale in table (9.20) does not make good sense for evaluating attributes. Also, a requirements' scale of this type is not suitable for evaluating levels of performance that are subject to day-to-day variability. The second requirements' scale might work better for variable factors, but it would be inappropriate for factors that are generally fixed. The same problem of the ambiguity of the expectations' scale applies to the requirements scale. Assume we are asking respondents whether a certain contractor's performance on attribute X exceeded, met, or missed their requirements. In this situation, researchers have found that the term "requirements" can mean: "What customers feel they deserve," "minimal acceptable performance," or "ideal performance."

Irrespective of the differences in these various rating scales, all of them ask the customer the same question: "How am I doing?" or " how was it?" Instead, Waddell (1995) suggests the question that is asked, is: "How can I improve?"

or "how it could be improved?" The answer to this question leaves much less room for interpretation.

The "improvement needed" scale had three points: none, some, and considerable. This type of scale offers numerous advantages. It is simple for the respondent to understand the scale and use. The scale fits a wide variety of service or product characteristics, yet it does not have the shortcomings of the expectations scale. The scale does not invite charitable response, and most importantly, the scale elicits responses that do not require inference or interpretation by the researcher.

CHAPTER TEN

10 CONCLUSIONS AND RECOMMENDATIONS

10.0 INTRODUCTION

The opening chapter of this thesis discussed problems facing the construction industry in Qatar in general and the housing projects in specific. The aim of this research has been to:

1. Explore the construction industry in Qatar.
2. Identify the problems that face the SSH and PH projects in Qatar.
3. Build a model to determine the effectiveness level of SSH and PH projects in Qatar in relation to several variables including economy, quality and satisfaction.
4. Identify and measure the relationship between client's satisfaction, economy and quality of SSH and PH projects in Qatar.
5. Identify factors that affect effectiveness and their implications for future housing policies, programmes, and research in Qatar.
6. Produce procurement guidelines for constructing houses more effectively in Qatar.

The second chapter of this thesis investigated the construction economy in Qatar. Chapter three presented housing schemes that have been implemented in Qatar. Chapter four reviewed and analysed previous studies related to the evaluation of construction projects. Chapter five designed the research model for assessing effectiveness. The variables were discussed under three main headings:

1. Client characteristics.
2. Project characteristics.
3. Project performance.

The central hypothesis was drawn as:

> ***"Private Housing projects are more effective than Senior Staff Housing projects."***

Thirty nine independent variables were identified and measured against ten performance indicators.

The research model was applied over 95 case studies to test the main hypothesis and two sets of measures have been used: objective measures (quantitative approach); and subjective measures of client satisfaction and client quality rating (qualitative approach). The analysis of the collected data was presented in chapter seven, eight and nine.

The following chapter sets out the conclusions of the research and the recommendations for future housing projects and programmes in Qatar. This includes procurement guidelines for constructing houses more effectively.

10.1 RESEARCH FINDINGS

In general, the ten project performance measures adopted in this research have been effective in analysing project performance. The use of quantitative and qualitative types of measures has been useful in determining the variables that affect different aspects of performance.

10.1.1 Test for the Research Main Hypothesis

Results of hypotheses tests in section 9.1 clearly support the assumption of the main hypothesis of the research, that is PH projects are more effective than SSH projects.

This research started with the assumption that the main reasons for having less effective SSH projects were the SSH regulations implemented on these housing schemes. But this study found that these regulations are not the main obstacles to achieving better project performance. As most of the SSH clients feel that the house that they want to build is for a lifetime, they tend to design it as large as possible, so it can accommodates family expansion in the future. The idea is sound but most of these SSH clients do not have the financial capabilities and at the time of executing the project they can not fulfil their financial obligations.

Therefore, the first main reason for having less effective project performance for SSH projects was found to be designing and building a house beyond the financial capabilities of the clients. Most of SSH respondents stated that the amount of the loan is not sufficient to fulfil their needs and asked for it to be increased.

Although the research hypothesis was proven it does not mean that PH projects finished as great successes. Both housing schemes have had some serious setbacks in terms of the main performance measures of the research. It was found that SSH and PH projects had finished with 28.9% and 16.9% cost overrun respectively. It was also found that SSH and PH projects ended with an average of 79.4% and 50.7% time overrun respectively. As far as quality, on average SSH and PH had 170.9 and 173.1 technical quality penalty points respectively. This is considered to be high defects for upper class housing. For aesthetic quality, SSH and PH had 38.8 and 46.4 quality quotient respectively, which is in the range of fair aesthetic quality.

The other main reasons for having less effective project performance are identified in the following sections. They can be summarised as: the improper decisions made by clients in relation to selecting the right designer and contractor; not appointing a qualified quantity surveyor and/or project manager; not appointing a qualified site supervisor; and use of unskilled labour.

10.1.2 The Current Situation of the Construction Industry

The construction industry in Qatar is immature and still developing. There are no laws made specifically to regulate consultant and construction activities in Qatar.

This study revealed some major problems related to the construction industry in Qatar. The study reveals poor quality workmanship, old construction techniques and the use of inadequate construction materials. Also, a lack of, proper contract forms and means of dispute resolution. There are no unions, nor institutions for consultants or contractors and a lack of training and development. Together, these factors contribute to the client's poor image of the industry.

The above points emphasise the immediate need to reorganise and restructure the whole construction industry in Qatar. That is, to issue laws made specifically to regulate the practises of consultant offices, contractors and sub-contractors firms. As well as to enforce stricter specification and use of construction materials.

10.1.3 Senior Staff Housing Scheme

The government housing schemes implemented in Qatar serve most of the Qatari citizens, including senior staff, limited income, elderly and widowed families. Though the procedure is very long and bureaucratic.

Of the above housing provisions, the Senior Staff Housing programme is the most important one, yet the least organised. There is no government body to plan, organise and manage the whole procurement system for SSH projects. Whereas the Department of Housing is managing and controlling Public and Free Housing schemes from application of benefit until handing in the keys of the house.

Because revenues have decreased owing to the current low level of oil prices, the Government of Qatar is in a very serious financial situation. Thus, as applicants to SSH loan scheme increases with a decrease in the budget assigned to the SSH housing scheme, the waiting list will lengthen and the duration for obtaining the loan will increase.

10.1.4 Client Characteristics

Most of the clients are university educated, married and in the economically active age group. In general, the family size of PH clients is larger than SSH clients. Up to one fifth of the SSH respondents were holding post-graduate degrees. The majority of the clients had no previous construction experience.

Design briefing is rarely used on housing projects in Qatar. Therefore, a large minority of the clients, from both housing schemes, did not have a clear vision of their needs. This fact impacted upon the client's demands and expectations and has affected client's decisions regarding the size of the house, the layout and the form of the building, variation orders and indeed the final cost of the project.

Following this experience, clients wish to make different decisions about their houses, if they had the chance to build them again. These decisions include reducing the size and the cost of the house, having different house layout, Islamic architectural style and changing the procurement method used. These changes prove the earlier finding that most of the clients did not have a clear vision of what their real needs were and whether they could afford them.

The research found that previous construction experience is not associated with the project performance measures. It was found that if husband and wife of SSH clients participated positively toward the design of their house, less technical quality defects would occur to their house.

10.1.5 Land Characteristics

SSH clients expressed their dissatisfaction with the long waiting periods for land acquisition, as well as, for obtaining the SSH loan. The research found that obtaining land from the Lands Department is time consuming, but reduces the technical quality defects of the building in the future, especially the environmental technical quality. To overcome the long waiting periods SSH clients tend to accelerate the acquisition of their land by buying them privately and applying for the SSH loan directly. At the same time they would apply for compensation for the cost of the land from the government. This approach also gives the SSH clients more choice about the location of their land and its size.

SSH clients are willing to pay in order to obtain the land that satisfies their requirements, as the amount of land compensation is, in general, less than the actual cost of the land.

The research also revealed that there is a relationship between location of a senior staff house and the independent quality evaluation. The closer the house is to Doha city centre, the better aesthetic and technical quality achieved.

10.1.6 SSH Regulations

The Senior Staff Housing scheme was a very good programme when it started in 1977. At the time the number of eligible people benefiting from the scheme was very low and the government revenues were very high. Over the duration of this research the number of eligible Qatari citizens had grown whereas government resources allocated to SSH shrunk due to the fall of oil prices. Although monthly instalments from previous beneficiaries return to the pool for new beneficiaries, the government has to provide another budget to fill in the shortfall for new loans.

Most of the SSH clients have not read the SSH regulations prior to wanting to build. Indeed many had not heard of them. Furthermore, most SSH clients had not read the loan contract with the bank. These things increased disputes with the bank at the time of executing the projects.

Provision of the loan in twelve payments over a period of three years also causes an escalation of costs as construction materials costs rise due to inflation. The study revealed that the SSH funding process affects aesthetic quality negatively.

SSH clients also showed their dissatisfaction with the current SSH regulations regarding the restriction of procurement method they could choose for executing their housing projects, as well as, the length of time for obtaining the payments. The time for obtaining the SSH loan is affected by the economic situation of the country. The amount of SSH loan at present (Q.R. 600,000) is not enough for building houses that fulfil the needs of SSH clients. The cost of building a house has increased through the years, while the amount of SSH loan has been fixed since 1982. Thus, SSH clients level of satisfaction with the amount of SSH loan was found to be related with time overrun, as well as, with satisfaction with total time of the project. Furthermore, the finding of SSH clients' obtaining additional loans from other sources indicates that they are willing to pay higher amounts if the SSH loan was higher.

SSH clients are keen to build their house to the highest standards with the highest quality, even if they have to cover the cost by additional borrowing and accept higher psychological pressures. Most SSH clients are dissatisfied with the amount of the SSH loan, they think it is inadequate to fulfil their needs and are willing to pay larger instalments for a higher SSH loan.

Finally, a large minority of SSH clients believe that the SSH regulations are not adequate for the present situation and they need to be amended.

10.1.7 Design Phase

It was found that the number of quantity surveyors in Qatar is very low in comparison to the number of architects and civil engineers. Both groups, SSH and PH clients, give little consideration to the role of the quantity surveyor during the design phase of the project, because of a general unawareness of the role of quantity surveyors. The research also revealed that both groups did not employ a project manager.

The PH clients were keener to design their houses to a lower cost than the SSH clients, while the latter are keener to have a good design. In order to achieve good designs, SSH clients employ more consultants during the design phase.

Clients giving less weighting to the importance of selecting qualified designers led to the dissatisfaction with the designers at the time of executing as design deficiencies emerged. It was found that investing more money in designing SSH will lead to less cost overrun, higher building rate, and more client satisfaction with time and overall satisfaction of the project.

Not all of the SSH clients who are eligible to benefit from the free cost of design used this service, as they believe that going to the private sector will produce better designs for their houses.

10.1.8 Construction Phase

The study revealed that factors related to the construction phase have a major influence on the performance of housing projects in Qatar.

The research found that the overall level of satisfaction of the housing project is contingent upon, in order of importance, main contractor, subcontractor(s) and procurement method.

SSH clients put more weight on the quoted price of the project and on the reputation of the contractors, while PH clients put greater weight on the experience of the contractor. A very high percentage of clients in both groups used direct negotiation for appointing the different parties involved in the construction phase.

The main contractor for the project is an important variable that influences the client's level of satisfaction with the project in high income housing schemes in Qatar. It was found that the main reasons for dissatisfaction with the main contractors were: the insincerity of the contractors to fulfil their obligations, the poor quality of their workmanship, using old construction techniques, and fearing that contractors will cheat them. Clients did not state that the cost of the project as a reason for their dissatisfaction with the main contractor.

Disputes with the main contractor increase the time overrun, decrease client's satisfaction with total time and overall satisfaction, for both SSH and PH projects. Furthermore, disputes with the main contractor decrease the effectiveness of project performance. Disputes with the main contractor will decrease the building rate for SSH projects.

The subcontractor variable is the second most important variable that affects the level of satisfaction with the housing projects in Qatar. The reasons for the dissatisfaction with the subcontractor are the same as for main contractor. Disputes with sub-contractor(s) decrease both the building rate and overall client's satisfaction for PH projects.

The study also showed that the procurement method was the third most related variable to overall client satisfaction for the housing projects in Qatar. The study showed that PH clients were more satisfied with their selected procurement method, simply because they had more options to choose from, than did SSH clients. PH clients used procurement methods other than the traditional approach, such as construction management and design/build. Whereas, SSH clients are not allowed to use design/build procurement method, owing to the SSH regulations. Thus, the SSH regulations should allow SSH clients to have a choice of procurement method if the level of satisfaction is important. Using construction management or management contracting increases uncertainty with total cost and time of the project for SSH but decreases uncertainty with total time for PH projects. That is because SSH clients do not always have the financial capabilities to finish building their houses.

Most of the projects under investigation from the two housing schemes ended with a cost and time overrun. More than one fifth of the SSH projects took more than three years to construct. On the other hand, none of them ended in less than one year. This is due to the way the bank applies the payment procedure. Clients believe this is owing to additions to the initial design, as well as the contractors failure to carry out the works expeditiously.

The study found that longer construction duration will increase unit cost, and time and cost overrun, and will decrease building rate and client's satisfaction with total time of the projects, and hence, decrease the effectiveness of both SSH and PH projects. Longer construction durations also increase PH client's satisfaction with total cost of the project, but decrease SSH client's overall satisfaction with the project.

None of the SSH projects cost QR600, 000 or less.. The mean actual cost of the SSH projects is almost double the amount of the SSH loan. The study also found that higher construction cost increases unit cost; cost and time overrun; client's quality rating; and aesthetic quality evaluation for SSH projects. Higher construction costs increase unit cost but decrease technical quality defects for PH projects. Higher construction costs decrease the effectiveness of project performance for both SSH and PH.

10.1.9 Quality

In investigating the quality of SSH and PH this research used two approaches, client's rating on quality, that is to measure clients' perception towards the quality of their houses and an independent quality evaluation carried out by the researcher. The independent evaluation involved an aesthetic quality evaluation and a technical quality evaluation.

10.1.9.1 Clients' Rating on Quality

In general, the study revealed that clients were biased when evaluating the quality of their houses. Almost all the clients, from both groups gave good quality ratings for all the quality variables of their houses. 23.5% of the PH clients rated the environmental quality of their houses as poor quality. This is due to the bad odour and noise. This was the only large minority that gave a poor quality rating.

In most items, both SSH and PH clients, gave almost identical ratings for quality. This is very clear with items that are difficult to judge, such as the aesthetic quality of the interior, the aesthetic quality of exterior, and relationship of spaces to layout.

There were different ratings when clients were asked to rate the quality of items that are easier to account for, such as the quality of floor finishings, wall finishings, ceiling finishings, building materials and the surrounding environment of the house.

All of the thirteen variables used to measure the client's attitudes toward the quality of their houses were significantly associated with the overall rating of quality.

10.1.9.2 Independent Quality Evaluation

This research adopted the mathematical formula technique used by BDP (1980) for assessing the aesthetic quality of housing projects and Duncan's method of assessing the technical quality of housing in Qatar. The researcher found these two quality evaluation techniques to be very useful and at the same time very practical.

The research revealed that in all variables of function, form and economy of the aesthetic quality evaluation, PH had higher scoring points than SSH. The means the quality quotient for both housing schemes falls under the category "fair", with a close rank for SSH to the category "acceptable" in the aesthetic quality evaluation scale. Both housing schemes have similar balance between the three factors of the aesthetic quality evaluation. Furthermore, for both housing schemes the highest score given was for function, followed by form, and economy.

It was found that the main cause of poor aesthetic quality is due to the architect's lack of experience, lack of knowledge of the local infrastructure and local customs.

For the technical quality evaluation, the study found PH had more defects than SSH. Most of the technical quality defects are related to external factors of the house that are related to the weather conditions in Qatar. Most of the clients do not give the affects of high temperature and humidity proper attention.

Inadequate materials used for building in Qatar shortens the life span of the buildings. In fact, most of the cracks inside and outside the buildings are because of using sand and concrete stones which are highly contaminated with chloride. In the recent years, contractors started to use washed sand as a way of reducing the amount of salts in the sand. People also started to use red faced bricks instead of concrete blocks. The facing brick is much better than concrete blocks as it has no salts in it and has less weight and a higher insulation factor.

With the exception of SSH houses located in the Modern Doha District, most of the houses from both groups do not use double exterior walls with insulation material in the middle. However, most of the houses have single glazed windows instead of double glazed windows. This latter fact also includes SSH houses located in the Modern Doha District. SSH located in Modern Doha District had the lowest technical quality defects of all houses in the six regions, while PH in the centre of Doha obtained the highest marks in the aesthetic quality evaluation.

10.2 RECOMMENDATIONS

This research study has direct and important recommendations in relation to the construction industry, clients and those considering possible directions for further research. These recommendations are drawn in the light of the exploratory interviews and the results of the analysis of data obtained.

10.2.1 Recommendations for Improving the Senior Staff Housing Scheme

There are at least six options available for the government to choose regarding the future of SSH scheme:

1. Keep it as it.
2. Keep it with some changes in its regulations and its procurement.
3. Cancel it.
4. Reduce the amount of the loan.
5. Build large amounts of SSH by large contractors under the supervision of the government and then distribute them among the beneficiaries.

6. Find other ways for providing real estate loans, such as establishing a bank specialised in proving housing loans on a trading basis.

Keeping the scheme as it is clearly is not the right one. This study had proven that SSH projects are not effective compared to PH projects. Cancelling the scheme is a very difficult step for the government to take as it knows that it is very difficult for its citizens to own houses without its support. Secondly, cancelling the scheme will also lead the government to loose its fragile popularity. The fourth option is not practical as the findings from sections 3.5, 7.3.4 and 7.5.5 show that the current amount of loan, QR 600,000, is not adequate for the required standard.

Building large amounts of SSH under the supervision of the government and then distributing them has potential and requires further research.

The establishment of a Bank of Housing supported by the government is another potential area of research for consideration by the policy makers. This idea requires the government to provide a significant amount of capital for establishing such a bank, if it is to be successful, but this capital is not available at present.

This leaves the final option, keeping the scheme, temporarily until the Bank of Housing can be established, but at the same time making some adjustments. This research found no evidence that SSH regulations affect the project performance negatively. The main reason was that clients were inclined to build large houses without having the capability to pay the rest of the costs. In order to avoid this situation, the bank should estimate the cost of building the house when the client submits the drawings. This can be done by the bank's quantity surveyors. After estimating the amount of construction costs, the bank should ask the client to provide at least 50% of the amount above the loan as a guarantee, which should be reserved by the bank for the client and paid to the contractor according to the contract.

This suggestion will insure that only serious clients will apply for the loan, which will reduce the list. It will also ensure contractors that they will receive their payments on time, so they will not put in high margins and, hence, will reduce the cost of the building.

The findings of section 7.1.8, 7.5.7 and 7.5.10 suggest, as mentioned earlier in section 10.1.1, SSH clients have to have better understanding of the construction process and the strategic decisions they need to take for having a success project. In this stream, a suggestion for improving the effectiveness of the SSH projects is to organise a seminar for the applicants on how to manage a successful construction project. This seminar should be client oriented. That is to help clients in showing how, to select the project manager, to choose the right procurement method, to appoint the right designer, to identify their needs, to appoint the right contractor and to manage the budget of the project. Every new applicant should attend this seminar and get a certificate upon attending. This certificate should be one the applicant's requirements for the loan. The seminar would increase the clients' awareness of the construction process and its procurement and will help by avoiding bad decisions.

The government should also create a council called "the Housing Council". The members of the council to consist of a representative from the Ministry of Finance, a representative from the Lands Department, a representative from the Planning Department, a representative form Qatar National Bank, a representative from the Ministry of Public Services and Housing a representative from the Planning Council. The aims of this council are to draw a long-term plan for housing in Qatar, to re-evaluate the current housing scheme and to co-ordinate the relevant departments to enhance the procurement of housing projects.

10.2.2 Recommendations for Clients

This study found that the main obstacle for achieving high project performance was improper decision taking by the clients. Clients, especially SSH ones, have to determine their needs according to the amount of money they can afford. Since most of the clients have no clear understanding of the construction process, even those with previous construction experience, should appoint a project manager and/or quantity surveyors to guide them.

Clients who want to accelerate the land acquisition process can purchase the land and ask for government compensation, but these clients should look for land that has all of the infrastructure facilities, otherwise the technical quality defects of their houses are likely to increase.

The findings of section 9.2.5 indicate that clients should also give more weight to the design phase. That is, to appoint more qualified consultants, even if they cost more. Design briefing should be a matter of high importance. The design of the house should be integrated into the surrounding environment. The aim at the design phase should be to come out with the best possible design, with drawings and specifications as detailed as possible. This will avoid many problems they may face during the rest of the building process, as well as, reducing the cost of the construction phase.

Clients should also involve their wives during the design phase. After all they are the ones who will spend most time in their future homes and will know their needs more than their husbands will.

Clients should only appoint qualified contractors who have the financial capabilities, the skilled labour and good past records. The same thing applies when appointing sub-contractors.

10.2.3 Recommendations for the Construction Industry

From the evidence available, we must conclude that neither of the two housing schemes, Senior Staff Housing nor Private Housing, is effective. That is, because of the major problems that face the industry (see sections 2.5 and 10.1.2. Thus, in order to reduce, and possibly, overcome these problems radical changes must be introduced.

- Issuing laws that regulate and control the practice of construction and consultant services in Qatar.
- Forming an accredited professional institution for engineers in Qatar. The objectives could include:
- To contribute to the construction, industrial and agriculture development in Qatar by co-ordinating with the specific authorities.
- To organise the basis of the profession's practises and to increase its efficiency.
- To protect the rights of engineers in Qatar.
- To ensure that engineers can implement their duties by co-operation with the specific authorities.
- To protect the ethics of the profession and its moral practises.
- To strengthen the co-ordination with academic and scientific bodies in Qatar so as to elevate the professional level of its members.
- To elevate the technical and managerial qualification of engineers by organising training programmes, symposia and seminars.
- To organise and encourage the scientific and professional communication and co-operation between engineers in Qatar and their colleagues in other countries.
- To organise national and international conferences to discuss the problems that face professional practice in Qatar.
- To provide consultant services and to resolve disputes when required.

- To contribute to setting engineering standards and specifications and to arabicising the engineering terminology and expression.
- To contribute to the scientific development and to propagate the engineering awareness of the public by organising lectures, symposia, research, publications and scientific trips.
- To transfer technology.

- Formation of professional institutions for contractors and labourers with objectives similar to the above with the necessary modifications for each group.
- In order to improve the output of the construction industry, increase competitiveness and client satisfaction, authorities in Qatar should encourage consultant offices and contractors to implement total quality management. This will also reduces waste and improves the working lives of employees.
- Formation of the "Construction Industry Council". The members of this council should include representatives from all government departments that are concerned with the construction activities and representatives from the private sectors, and should be headed by the Head of the Municipality Council. The aim of this council is to draw up policies and future plans for the construction industry in Qatar, as well as, to monitor its situation and develop plans for improving its productivity.
- The government should create a new body of advisory planning services for helping construction clients. The aim of this body is to aware construction clients of the full process of building. This advisory body will provide the necessary advises and recommendations for the construction clients during the different phases of all types of projects.
- Re-evaluation of the criteria for awarding licensing for consultant and construction practice in Qatar and re-evaluation of the grading system in order to respond to changes in the construction economy.

- Development and training should be the key issue for all participants, designers, contractors, sub-contractors and Planning Department staff; and at all levels.
- More fair treatment and rights should be given to foreign construction labourers. These include: the right of having their allowances on time, adequate housing, adequate health services, safety work environment, holidays, and set of minimum wages. These will increase their morale, and consequently, will increase their productivity and efficiency.
- More emphasis should be given to quantity surveying practice in Qatar. Laws should require every consultant office to have at least one qualified quantity surveyor, and building permission should not be granted unless bills of quantities are attached with the drawings.
- Provide national forms of contracts that can be used for all construction types. These new contracts should be written in a simple language, both Arabic and English, and should protect the rights of all parties involved. These contracts should also include specific clauses about changes, differing site conditions, scheduling, time extensions, disputes, liquidated damages, termination, and exculpatory language.
- Develop stricter use of materials' specifications and to widen the use of quality control. This includes ensuring that every new building should have double wall insulation, roof insulation, double glazing, and use environmental friendly materials.
- More emphasis should be given to the planning of new cities, as shortage of planned lands will escalate in the near future. These new cities should be close to the industrial city of Ras Laffan where new natural gas and petrochemical industrial plants being built. This will increase the available land for building and reduce the current population congestion in the capital Doha, consequently, it will reduce the overuse of the capital infrastructure.
- More emphasis should be given to research and innovation. The government with the collaboration of the private sector should establish a national

research centre for the construction industry in Qatar. The research centre should research issues that concern the current situation of the industry with a view to improving output.

10.2.4 Recommendations for Other Researchers

This study presented evidence challenging the reliability of using client satisfaction as a project performance measure. Client satisfaction is an important performance measure as it gives the qualitative part of analysing the project outcomes. However, the study highlighted important issues when measuring client satisfaction. The study also provides several implications for researchers.

First, there is a need for more reliable measures of client satisfaction in the construction industry. Researchers in the construction industry need to look at other industries' studies in order to benefit from their experience when dealing with measuring the attitudes of individuals, in general, and clients/customers satisfaction, in particular.

Second, researchers in the construction industry should give careful attention when structuring their scales and measurements. This includes using a scale that leaves less room for interpretation, using homogenised scale items, validating the satisfaction scale before applying it, and testing the reliability of the scale.

In short, client satisfaction is an important project performance indicator, but more emphasis should be given to its construction and evaluation, if it is to be meaningful.

The model used in this research was found to be very useful for identifying those variables that had to be measured and controlled in data collection and control. The research, however, although immediately applicable to housing projects can also be used to compare other types of buildings with the necessary modifications to some variables and the technical quality technique.

The methodology used in this research was a cross sectional one and has provided a sound basis for comparing the performance of two different housing procurement systems. The author suggests the use of a longitudinal study as another useful means of collecting information on the difference between the housing schemes. This is useful in understanding the environment and the relationships between team members. Client satisfaction can also be measured more effectively during the different phases of the project and patterns of satisfaction can be obtained.

Mathematical models for housing projects can also be obtained for predicting project performance by using regression analysis. This approach can help the client in decision making.

Further research is essential for innovating more objective techniques for the evaluation of aesthetic quality.

Finally, it is better to use continuous measurements for all variables, at least for project performance measures, such as client satisfaction. The use of continuous measurements gives more choice in the use of statistical methods for the analysis of data.

REFERENCES

A

Ahmed, S.M. and Kangari, R. (1995) "Analysis of client-satisfaction factors in construction industry," *Journal of Management in Engineering, ASCE*, Vol. (11), No. (2), pp 36-44.

Al-A'bed, A.M. (1996) "*Housing Provision and Evaluation: Effectiveness of low-incomepuplic housing in Sana'a (Rep. Of Yemen)*, unpublished PhD, School of the Built Environment, University of Glamorgan, Pontypridd, UK.

Al-A'dhami, M.B. (1998) "*Housing Policy in Qatar*," Seminar at Qatar University, 30th, April, Doha, Qatar.

Al-Derham, H., Hibberd, P. and Mustapha, F. (1997) "A model for assessing the performance of Senior Staff housing scheme in Qatar", in Proceedings of CIB-W92 Conference: *Procurement: Key to innovation*, Davidson, C.H. and Abdul Meguid, T.A. (eds.), 20th to 23rd May, Montreal, Canada, pp 11-20.

Al-Kuwari, S.M. (1999) "An interview with the Estate Loans Manager of Qatar National Bank," *Arrayah Newspaper*, 6th February, Doha, Qatar.

Allen, M.J. and Yen, W.M. (1979) "*Introduction to measurement theory*," Brooks/Cole, Monterey, CA., USA.

Allport, G.W. (1935) "Attitudes," in *A Handbook of Social Psychology*, Murchison, C. (ed.), Clark University Press, Worcester, MA., USA.

Ashley, D.B., Lurie, C.S. and Jaselskis, E.J. (1987) "Determinants of Construction Project Success," *Project Management Journal*, Vol. 18, No. 2, pp 69-79.

Avots, I. (1969) "Why does project management fail?," *California Management Review*, Vol. 12, No. 1, pp 77-82.

B

Baker, B.N., Murphy, D.C. and Fisher, D. (1983) "Factors Affecting Project Success," in *Project Management Handbook*, Cleland, D.I. and King, W.R. (eds.), Van Nostrand Reinhold, Princeton, N.J.

Baker, M. and Orsaah, S. (1985) "How Do the Customers Choose a Contractor," *Building*, 31 May 1985, pp 30 –31.

Barrie, D.S. (1980) "Guidelines for successful construction management," *Journal of the Construction Division ASCE*, Vol. 3, pp 237-245.

Beamish, N.T. (1982) "*Statistical Background on the Duration Times of Industrial Sector Construction Process*," N42/82, Building Research Establishment, Garstang.

Beardsley, M.C. (1958) "*Aesthetics: Problems in the Philosophy of Criticism,*" Brace and World, Harcourt, New York.

Beaumont, A.G. and Libiszewski (1993) "A prescription for quality," *Management Services*, March, pp. 18-23.

Becker, F., and W. Sims (1990) "Assessing Building Performance", in *The Total Workplace,* Becker, Franklin (ed), Van Nostrand Reinhold, New York.

Bedell, R.J. (1983) "Terminating R&D projects prematurely," *Research Management*, Vol. 26, No. 1, pp 32-35.

Bell, J. (1993) "*Doing Your Research Project: a guide for first time researchers in education and social science,*" 2nd ed., Open University, Buckingham, UK.

Betts, M. (1991) "The economic evaluation of public housing projects," *Proceedings of European Symposium on Management, Quality and Economics in Housing and Other Building Sectors: Management, Quality and Economics in Building*, 30 September – 4 October, E & FN Spon, London, pp 987-997.

Bogdan, R.C. and Biklen, S.K. (1992) "*Qualitative Research for Education: an introduction to theory and method,*" Allyn & Bacon, Needlham Heights, MA, USA.

Bolton, R.N. and Drew, J.H. (1991) "A longitudinal analysis of the impact of service changes on customer attitudes," *Journal of Marketing*, Vol. 55, January, pp 1-9.

Borg, W.R. (1987) "*Applying Educational Research: a practical guide for teachers,*" 2nd ed., Longman, London.

Bowler, R.J., Hughes, T.B. and Jones, T.B. (1996) "User Satisfaction in Public Healthcare Buildings," *Proceedings of COBRA conference*, Royal Institute of Chartered Surveyors, London, UK.

Brandon, P.S. and Powell, J.A. (1984) "*Quality and Profit in Building Design,*" E. & F.N. Spon Ltd., London, UK.

Bresnen, M.J. and Haslam, C.D. (1991) "Construction Industry Clients: A Survey of their attributes and Project Management Practices," *Construction Management and Economics*, Vol. 9, pp 327-342.

Bresnen, M.J., Haslam, C.O., Beardsworth, A.D., Bryman, A.E. and Hell, E.T. (1990) "Performance on Site and the Building Client," *Occasional Papers No. 42*, Chartered Institute of Building, Ascot, UK.

Bromilow, F.J. (1970) "The Nature and Extent of Variations to Building Contracts," *The Building Economist*, Vol. 9, No. 3, November 1970, pp 93-104.

Bromilow, F.J. (1974) "Measurement and Scheduling of Construction Time and Cost Performance in the Building Industry," *The Chartered Builder*, Vol. 10, June-July 1974.

Bromilow, F.J. and Henderson, J.A. (1977) "*Procedures for Reckoning and Valuing Performance of Building Contracts,*" Commonwealth Scientific and

Industrial Research Organisation, Division of Building Research, Highett, Australia.

Bromilow, F.J., Hinds, M.F. and Moody, N.F. (1980) "AIQS Survey of Building Contract Time Performance," *The Building Economist*, Vol. (19), pp 79-82.

Brown, S.W. and Swartz, T.A. (1989) "A gap analysis of professional service quality," *Journal of Marketing*, Vol. 53, April, pp 92-8.

Building Design Partnership (1980) "*Quality Appraisal*," Quality of Products Steering Group Publication No. 80.

Building Research Establishment (1978) "*A Survey of quality and value in buildings*," London.

Bulmer, M. and Warwick, D.P. (1993) "*Social Research in Developing Countries: surveys and censuses in the third world*,"' UCL Press, London.

C

Cadotte, E.E., Woodruff, R.B. and Jenkins, R.L. (1987) "Expectations and norms in models of customer satisfaction," *Journal of Marketing Research*, Vol. 24, August, pp 305-314.

Campell, A. (1976) "*The Quality of American Life*," Russell Sage, New York.

Cantacuzino, S. (1994) "*What Makes a Good Building?*," The Royal Fine Arts Commission, HMSO, London.

Central Statistical Organisation (1995) "*Annual Statistical Abstract*," No. 15, July, Al-Ahleia Press, Doha, Qatar.

Central Statistical Organisation (1996) "*Annual Statistical Abstract*," No. 16, July, Al-Ahleia Press, Doha, Qatar.

Central Statistical Organisation (1997) "*Annual Statistical Abstract*," No. 17, July, Al-Ahleia Press, Doha, Qatar.

Central Statistical Organisation (1998) "*Annual Statistical Abstract*," No. 18, July, Al-Ahleia Press, Doha, Qatar.

Central Tendering Committee (1998) "*Grading of construction firms*," Ministry of Finance, Economy and Trading, Doha, Qatar.

Central Unit on Procurement (1993) "Project Evaluation," *C.U.P. Guidance*, H. M. Treasury, London, No. 43, November.

Chan, A.P.C. (1996) "*Determinants of Project Success in the Construction Industry of Hong Kong*," Unpublished PhD Thesis, University of South Australia.

Cherns, A.B. and Bryant, D. (1984) "Studying the Client's Role in Construction Management," *Construction Management and Economics*, Vol. 2, No. 2, pp 177-184.

Chinyio, E.A., Olomolaiye, P.O. and Corbett, P. (1998) "An evaluation of the project needs of UK building clients," *International Journal of Project Management*, Vol. 16, No. 6, pp 385-391.

Churchill, G.A. and Surprenant (1982) "An investigation into the determinants of customer satisfaction," *Journal of Marketing Research*, Vol. 19, November, pp 491-504.

CIOB (1994) "*Membership and Guidance Notes on the Professional Interview*," Chartered Institute of Building, UK.

Cleland, D.I. and Kerzner, H.A. (1985) "*A Project Management Dictionary of Terms*," Van Nostrand Reinhold, New York, pp. 166-184.

Cohen, L. and Holliday, M. (1982) "*Statistics for Social Scientists*," Paul Chapman Publishing Ltd., London.

Cohen, L. and Manion, L. (1989) "*Research Methods in Education*," 3rd ed., Routledge, London.

Consultant Offices Registration Committee (1996) "*Qatar Consultants Offices Directory*," Ministry of Municipal Affairs and Agriculture, New Printing Co., Doha, Qatar.

Cossack, M.M. (1991) "Construction Management: The Way Forward," in *Investment Procurement and Performance in Construction*, Venmore-Rowland, P, Brandon, P. and Mole, T. (eds), E & FN Spons, London, pp 242-255.

Czepiel, J. A. *et al.* (1985) "Service encounters: an overview", *Service encounters*, Lexington Books, Lexington, Mass., 13.

D

D.H.S.S. (1986) "*Management Contracting for Health Building: A comparative Study*," Study for Department of Health and Social Security by Martin Barnes and Partners, London.

Dane, S.C. (1990) "*Research Methods*," Brooks/Cole, California, USA.

deCottis, T.A. and Dyer, L. (1979) "Defining and measuring project performance," *Research Management*, January, pp 17-22.

Department of Environment (1982) "*A Guide to Methods of Obtaining a New Industrial Building in the UK*, September, London, UK.

Department of the Environment, Transport and Regions (1999) "New steps to measure housing quality," *Housing Signpost*, Issue no. 3, February, London, UK.

Djebarni, R. (1993) "*Leadership patterns in the Construction Industry in Algeria,*" unpublished PhD thesis, University of Reading, UK.

Ducasse, C.J. (1929), "Introductory readings in aesthetics," in *The Philosophy of Art*, Hospers, J. (ed), Macmillan Publishing Co., New York.

Duncan, T.L.C. (1971) "Measuring housing quality," *Centre for Urban and Regional Studies*, The University of Birmingham, UK, Occasional paper no. 20.

E

Echenique, M. (1970) "Models, a discussion," Art, May 1970.

Emmerson, Sir H. (1962) "*Survey of Problems before the construction industries,*" HMSO, London.

F

Fellows, R. and Liu, A. (1997) "Research methods for construction," Blackwell Science, London.

Ferry, D.J. and Brandon, P. (1986) "*Cost Planning of Buildings,*" 5th Ed., Granada, London.

Fornell, C. (1992) "A national customer satisfaction barometer: the Swedish experience," *Journal of Marketing*, Vol. 56, No. 1. pp 6-21.

France, G. (1993) "Plan it sweet," *Building*, 10 September, pp 58.

G

Gaddis, P.O. (1959) "The project manager," *Harvard Business Review*, Vol. 35, No. 3, pp 89-97.

Galletta, D.F. and Lederer, A.L. (1989) "Some cautions on measurement of user information satisfaction," *Decision Sciences*, Vol. (20), pp 419-438.

Gallup Survey (1995) "Customer Survey," *Building*, 28 July, pp 26-27.

Gay, L.R. (1992) "*Educational Research Competencies for Analysis and Application,*" 4th ed., Macmillan, New York, N.Y.

Gibbons, J.D. (1976) *Nonparametric Methods for Quantitative Analysis,*" Rinehart and Winston, Holt, New York.

Graves, F. (1978) "*Construction for Industrial Recovery,*" National Economic Development Office, London, UK.

Griffith, A. (1986) "Buildability: The Effect of Design and Management on Construction Management," *Proceedings of the 10th Triennial Congress of the International Council for Building Research, Studies and Documentation*, Washington, USA, Vol. 8, pp 3504-3512.

Gronlund, N.E. (1976) "*Measurement and Evaluation in Teaching*," Macmillan, New York, N.Y.

H

Halstead, D., Hartman, D. and Schmidt, S.L. (1994) "Multi-source effects on the satisfaction formation process," *Journal of the Academy of Marketing Science*, Vol. 22, No. 2, pp 114-129.

Handa, V. and Adas, A. (1996) "Predicting the level of organisational effectiveness, a methodology for construction firm," *Construction Management and Economics*, Vol. 14, No. 5, pp 341-352.

Hashim, Maizon (1996) "The Effects of Procurement Systems on Performance of Construction Projects in Malaysia," In: Taylor, Rob (ed.), *Proceedings of CIB-W92: North Meets South*, Durban, South Africa.

Hausknecht, D.R. (1990) "Measurement scales in consumer satisfaction/dissatisfaction," *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behaviour*, Vol. 3, No. 1. pp 1-11.

Heijden, R.E. (1991) "Multicriteria evaluation methods: attractive tools for the support of decision making on building projects," *Proceedings of European Symposium on Management, Quality and Economics in Housing and Other Building Sectors: Management, Quality and Economics in Building*, 30 September – 4 October, E & FN Spon, London, pp 681-692.

Higgin, G. and Jessop, N. (1965) "*Communications in the Building Industry*," Tavistock Institute, London.

Higgin, G. and Jessop, N., Bryant, D.T., Luckman, J. and Stinger, J. (1966) "*Interdependence and Uncertainty*," Tavistock Institute, London.

Holgate, A. (1992) "*Aesthetics of Built Form*," Oxford University Press, Oxford.

I

Ireland, V. (1983) "*The Role of Managerial Actions in the Cost, Time and Quality Performance of High-Rise Commercial Building Projects*," PhD. Thesis, University of Sydney, Australia.

Ives, S., Olson, M.H. and Baroudi, J.J. (1983) "The measurement of user information satisfaction," *Communications of the ACM*, Vol. (26), No. (10), pp 785-793.

K

Kemmies, S. and McTaggart (1988) "*The Action Research Planner,*" 3rd ed., Deakin University Press, Victoria.

Kinnear, P.R. and Gray, C.D. (1997) "*SPSS for Windows Made Simple,*" 2nd ed., Psychology Press, East Sussex, UK.

Kumaraswamy, M.M. (1991) "*Evaluating the Management of Construction Projects,*" PhD thesis, Loughborough University of Technology, Leicestershire, UK.

Kumaraswamy, M.M. and Chan, D.W.M. (1998) "Contributors to construction delays," *Construction Management and Economics*, Vol. 16, No. 1, pp 17-29.

Kumaraswamy, M.M. and Thorpe, A. (1996) "Systematizing construction project evaluations," *Journal of Management in Engineering ASCE*, Vol. 12, No. 1, pp 34-39.

L

Landy, F.J. (1989) "*Psychology of work behaviour,*" Wadsworth, Belmont, CA.

Latham, Sir M. (1993) "*Trust and Money: Joint Review of Procurement and Contractual Arrangements in the United Kingdom Construction Industry,*" Interim Report, Department of the Environment, London.

Latham, Sir M. (1994) "*Constructing the Team: Joint Review of Procurement and Contractual Arrangements in the United Kingdom Construction Industry,*" Final Report, Department of the Environment, London.

Lim, C.S. and Mohamed, M.Z. (1999) "Criteria for project success: an exploratory re-examination," *International Journal of Project Management*, Vol. (17), No. (4), pp 243-248.

Lim, E.C. and Price A.D.F. (1995) "Construction productivity measurements for residential buildings in Singapore," *Proceedings of First International Conference on Construction Project Management*, Singapore, January, pp 605-612.

Liu, A.M. and Walker, A. (1998) "Evaluation of project outcomes," *Construction Management and Economics*, Vol. 16, pp. 209-219.

Lock, D. (1994) "The nature and purpose of project management," in *Project Management Handbook*, Lock, D. (ed), 2nd ed., Gower, Hampshire, UK, pp 3-13.

Love, P.E.D., Skitmore, R.M. and Earl, G. (1998) "Selecting a suitable procurement method for a building project," *Construction Management and Economics*, Vol. (16), No. (2), pp 221-233.

M

Maloney, W.F. (1983) "Productivity improvement: the influence of labour," *Journal of Construction Engineering and Management ASCE*, Vol. 109, No. 3, pp 321-334.

Masterman, J.W.E. (1994) "*A study of the bases upon which clients of the construction industry choose their building procurement system*," Unpublished PhD thesis, UMIST, Manchester, UK.

Masterman, J.W.E. and Gameson, R. N. (1994) "Client characteristics and needs in relation to their selection of building procurement systems," in *Proceedings of W-92 International Procurement Symposium, East Meets West, Department of Surveying*, University of Hong Kong, 4-7 December, pp 79-88.

Might, R. (1984) "An Evaluation of the Effectiveness of Project Control Systems," *Transactions on Engineering Management IEEE*, Vol. 12, No. 3, pp 243-273

Miller, J.A. (1977) "Studying satisfaction, modifying models, eliciting expectations, posing problems and making meaningful measurements," *Conceptualization and Measurement of Consumer Satisfaction and Dissatisfaction*, Hunt, H.K. (ed), School of Business, Indiana Univ., IN, USA, pp 72-91.

Mobbs, G.N. (1976) "*Industrial Investment: A Case Study in Factory Building*," Slough Estate Limited, Slough.

Mohsini, R. and Davidson, C.H. (1986) "Procurement, Organisational Design and Building Team Performance: A Study of Inter-Firm Conflict," *Proceedings of the 10th Triennial Congress of the International Council for Building Research, Studies and Documentation*, Washington, USA, Vol. 8, pp 3548-3555.

Moore, E.M. and Shuptrine, F.K. (1984) "Disconfirmation effects on consumer decision making processes," *Advances in Consumer Research*, (ed. T.C. Kinnear), Association for Consumer Research, Ann Arbor, MI. USA, Vol. 11, pp 299-304.

Morledge, R., Bassett, M.D., and Sharif, A. (1996) "Client Time Expectations and Construction Industry Performance," *Proceedings of COBRA conference*, Royal Institution of Chartered Surveyors, London, UK.

Morris, E. *et al* (1972) "Measuring housing quality," *Land Economics*, Vol. 48, pp 383-387.

Morris, P.W.G. and Hough, G.H. (1986) "Preconditions of success and failure in major projects," *Major Project Management Association Technical Paper*, No. 3, September, Oxford, UK.

Morris, P.W.G. and Hough, G.H. (1987) *The Anatomy of Major Projects*, Major Projects Association, Oxford, UK.

Mustapha, F.H., Al-A'bed, A. and Wild, S. (1995) "A model for assessing the effectiveness of public housing in Sana'a (Republic of Yemen)," *Construction Management and Economics*, Vol. (13), pp 457-465.

N

Nachmias, C.F. and Nachmias, D. (1992) "*Research Methods in the Social Sciences*," 4th ed., Edward Arnold, Sevenoaks, UK.

Nahapiet, H. and Nahapiet, J. (1985a) "A comparison of contractual arrangements for building projects," *Construction Management and Economics*, Vol. 3, No. 3, pp 217-231.

Nahapiet, H. and Nahapiet, J. (1985b) "*The Management of Construction projects: Case Studies from the USA and UK*," C.I.O.B., Ascot, England.

Naoum, S.G. (1989) "*An Investigation into the Performance of Management Contracts and the Traditional Methods of building Procurement*," Unpublished PhD Thesis, Department of Mechanical Engineering, Brunel University, UK.

Naoum, S.G. (1991) "*Procurement and Project performance: A comparison of management and traditional contracting*," Chartered Institute of Building, Occasional Paper No. 45, February, UK.

Naoum, S.G. (1994) "Critical Analysis of Time and Cost of Management and Traditional Contracts," *Journal of Construction Engineering and Management ASCE*, Vol. 120, No. 4, pp 687-705.

Naoum, S.G. and Mustapha, F.H. (1994) "Influences of the client, designer and procurement methods on project performance," *Proceedings of CIB W92 Symposium: East meets West*, Rowlinson, S. (ed.), The Department of Surveying, Hong Kong University, December, Hong Kong.

Ndekugri, I. and Turner, A. (1994) "Building procurement by design and build approach," *Journal of Construction Engineering & Management, ASCE*, Vol. (120), No. (2), pp 243-256.

NEDO (1983) "*Faster Building for Industry*," Building Economic Development Committee, National Economic Development Office, London UK.

NEDO (1985) "*Thinking About Building*," Building Economic Development Committee, National Economic Development Office, London, UK.

Njoh, A.J. (1996) "Interorganisational Relations and Effectiveness in a Developing Housing Policy Field", *Habitat International*, 20:2, 253-264.

Nkado, R.N. (1992) "Construction time information system for the building industry," *Construction Management and Economics*, Vol. 10, pp 489-509.

Nkado, R.N. (1995) "A model for predicting and planning construction times at early design stages," *Proceedings of Eleventh Annual ARCOM Conference*, ARCOM, September, pp 298-307.

O

Oliver, R.L. (1977) "Effect of expectation and disconformation on post-purchase product evaluations: an alternative interpretation," *Journal of Applied Psychology*, Vol. 62, No. 4. pp 480-6.

Oliver, R.L. (1980) "A cognitive model of the antecedents and consequences of satisfaction decisions," *Journal of Marketing Research*, Vol. 17, November, pp 460-469.

Oliver, R.L. and Bearden, W.O. (1983) "The role of involvement in satisfaction processes," *Advances in Consumer Research*, (eds. R.P Bagozzi and A.M. Tybout), Association for Consumer Research, Ann Arbor, MI. USA, Vol. 10, pp 250-5.

Oliver, R.L. and DeSarbo, W.S. (1988) "Response determinants in satisfaction judgements," *Journal of Consumer Research*, Vol. 14, March. pp 495-507.

Olsen, R.P. (1971) "Can project management be defined?," *Project Management Quarterly*, Vol. 2, No. 1, pp 12-14.

Oppenhiem, A. (1992) "*Questionnaire Design, Interviewing and Attitude Measurement*," Pinter Publisher Ltd., London, UK.

Ormerod, Marcus (1995) "Aesthetic judgement in multi-parameter bidding strategies," *Proceedings of International Financial Management of Property and Construction*, Northern Ireland, UK, pp 129-134.

Ormerod, Marcus (1996). "Subjective Quality Decisions in Multi-Parameter Bidding Procurement Systems," In: Taylor, Rob (ed.), *Proceedings of CIB-W92: North Meets South*, Durban, South Africa.

Overseas Development Administration (1988) "*Guidelines for the Preparation of Evaluation Studies*," London, UK.

P

Parasuraman, A., Berry, L.L. and Zeithaml, V.A. (1991) "Understanding customer expectation of service," *Sloan Management Review*, Vol. 32, No. 3, pp 39-48.

Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1988) "SERVQUAL: a multiple-item scale for measuring consumer perception of service quality," *Journal of Retailing*, Vol. 64, No. 1, pp 12-40.

Phillips, B.S. (1967) "*Social Research; Strategies and Tactics*," Macmillan, New York, USA.

Pinto, J.K. and Slevin, D.P. (1988a) "Critical success in effective project implementation, in *Project Management Handbook*, Cleland D.I. and King W.R. (eds), 2nd ed., Van Nostrand Reinhold, New York, pp 479-512.

Pinto, J.K. and Slevin, D.P. (1988b) "Project success implementation and measurement techniques, *Project Management Journal*, Vol. 19, No. 1, pp 67-75.

Prakash, V. (1984) "Validity and reliability of the conformation of expectations paradigm as a determinant of consumer satisfaction," *Journal of Academy of Marketing Science*, Vol. 12, No. 4, pp 63-76.

Preiser, Wolfgang F. (1994) "Built Environment Evaluation: Conceptual Basis, Benefits and Uses," *Journal of Architecture and Planning Research*, Vol. 11, No. 2, Chicago.

Preiser, Wolfgang F. (1995) "Post-Occupancy Evaluation: how to make buildings work better," *Facilities*, Vol. 13, No. 11, Oct. 1995, pp 19-28.

Preiser, Wolfgang F., Rabinowitz, H.Z. and White, E.T. (1988) *"Post-Occupancy Evaluation,"* New York, Van Nostrand Reinhold.

R

Rapoport, A. (1981) "Identity and environment: a cross-cultural perspective," *Housing and Identity*, Croom Helm, London.

Roscoe, J.T. (1975) *"Fundamental Research Statistics for the Behavioral Sciences,"* 2nd ed., Holt, New York, USA.

Rowlinson, S.M. (1988) *"An Analysis of Factors Affecting Project Performance in Industrial Building,"* PhD Thesis, Uxbridge, Brunel University, UK

S

Sanvido, V., Parfitt, K. Guvenis, M. and Coyle, M. (1992) "Critical success factors for construction projects," *Journal of Construction Engineering and Management ASCE*, Vol. 118, No. 1, pp 94-111.

Schewe, C.D. (1976) " The Management Information System User: An exploratory behavioural analysis," *Academy of Management Journal*, Vol. 19, pp. 577-590.

Seymour, D.E. and Fellows, R.F. (1999) "Towards a culture of quality in the UK construction," in *Proceedings of CIB-W92 and CIB-TG23 Joint Symposium: Profitable Partnering in Construction Procurement*, Ogunlana, S.O. (ed.), E & FN Spon, London, pp. 511-521.

Sidwell, A.C. (1982) *"A Critical Study of Project Team Organisational Forms within the Building Process,"* PhD. Thesis, Department of Construction and Environmental Health, The University of Aston in Birmingham.

Sirgy, J.M. (1984) "A social cognition model for consumer satisfaction/dissatisfaction," *Psychology and Marketing*, Vol. 1, No. 2. pp 27-43.

Slavin, R.E. (1984) "*Research Methods in Education: a practical guide*," Printice Hall, Englewood Cliffs, N.J.

Smith, H.W. (1981) "*Strategies for Social Research*," 2nd ed., Prentice-Hall, New Jersey, USA.

Spon's (1994) "*Spon's Asia Pacific Construction Costs Handbook*," Davis Langdon & Seah International (ed.), E & FN Spon, London.

Spreng, R.A. MacKenzie, S.B. and Olshavsky, R.W. (1996) "A re-examination of the determinants of customer satisfaction," *Journal of Marketing*, Vol. 60, July, pp 15-32.

Steiner, G.A. (1969) "*Top Management Planning*," MacMillian, New York.

Supreme Planning Council (1993) "*A report Regarding Government Housing Projects and a Suggestion to Establish Housing Bank*," May, Doha, Qatar.

Swan, J.E. and Trawick, E.I.F. (1980) "Satisfaction related to predictive vs. desired expectations," *Refining Concepts and Measures of Consumer Satisfaction and Complaining Behavior*, Hunt, H.K. and Day, R.L. (eds), School of Business, Indiana Univ., IN, USA, pp 7-12.

Swan, J.E., Trawick, F. and Carroll, M.G. (1981) "Effect of participation in marketing research on consumer attitudes toward research and satisfaction with service," *Journal of Marketing Research*, Vol. 18, August, pp 356-363.

T

Torgerson, W.S. (1967) "*Theory and Methods of Scaling*, Wiley, New York, USA.

Trauner, T.J. (1983) "*Managing the Construction Project: A Practical Guide for the Project Manager*, Wiley, New York.

Tse, D.K. and Wilton, P.C. (1988) "Models for customer satisfaction formation: an extension," *Journal of Marketing Research*, Vol. 25, May, pp 204-212.

Tuman, G.J. (1988) "Development and implementation of project management system," in *Project Management Handbook*, Cleland D.I. and King W.R. (eds.), 2nd ed.,Van Nostrand Reinhold, New York, pp. 652-691.

V

Voogd, H. (1983) "*Multicriteria Evaluation for Urban and Regional Planning*," Pion, London.

Vroom, V.H. (1971) "*Methods of Organizational Research*," University of Pittsburgh Press, USA.

W

Waddell, H. (1995) "Getting a straight answer," *Journal of Marketing Research*, Vol. 7, No. 3. pp 5-8.

Walker, A. (1996) "*Project Management in Construction*," 3rd ed., Blackwell Science, London.

Walker, D.H.T. (1995a) "An investigation into construction time performance," *Construction Management and Economics*, Vol. 13, No., 3, pp 263-274.

Walker, D.H.T. (1995b) "The influence of client and project team relationships upon construction time performance," *Journal of Construction Procurement*, Vol. 1, No., 1, pp 4-20.

Ward, S.C., Curtis, B. and Chapman, C.B. (1991) "Objectives and performance in construction projects," *Construction Management and Economics*, Vol. 9, pp 343-353.

Warwick, R. (1983) "On Methodological Integration in Social Research," in *Social Research in Developing Countries*, M. Bulmer and D. Warwick (eds.), John Wiley, Chichester.

Westbrook, R.A. (1980) "A rating scale for measuring product/service satisfaction," *Journal of Marketing*, Vol. 44, Fall, pp 68-72.

Wiersma, W. (1986) "*Research Methods in Education: an introduction*," 4th ed., Allyn & Bacon, Mewton, MA., USA.

Wilemon, D.L. and Baker, B.N. (1983) "Some major Research Findings Regarding the Human Element in Project Management," in *Project Management Handbook*, Cleland D.I. and King W.R. (eds), Van Nostrand Reinhold, Princeton, N.J., pp 623-641.

Williams, T.M. (1993) "Risk management infrastructure," *International Journal of Project Management*, Vol. 11, No. 1, pp 5-10.

Winch, G. and Schneider, E. (1993) "The strategic management of architectural practice," *Construction Management and Economics*, Vol. 11, pp 467-473.

Winch, G., Usmani, A. and Edkins, A. (1998) "Towards total project quality: a gap analysis approach," *Construction Management and Economics*, Vol. 16, pp 193-207.

Wood, K.B. (1975) "*The public client and the construction industries*," National Economic Development Office, London, UK.

Y

Yi, Y. (1990) "A critical review of consumer satisfaction," *Review of Marketing*, Zeithaml, V.A. (ed), American Marketing Assoc., Chicago, USA, pp 68-123.

Yin, R.K. (1994) "*Case Study Research: design and methods*," 2nd ed., Sage, London, UK.

Z

Zeithaml, V.A., Berry, L.L. and Parasuraman, A. (1993) "The nature and determinants of customer expectations of service," *Journal of the Academy of Marketing Science*, Vol. 21, No. 1, pp 1-12.

Zimring, C. M. and Reizenstein, J. E. (1980) "Post Occupancy Evaluation: An Overview," *Environment and Behaviour*, Vol. 12, No. 4, Dec. 1980, pp 429-450.

APPENDICES

APPENDIX A

Client Questionnaire

THE QUESTIONNAIRE

Date / / 1997

Dear Sir;

I am carrying out a PhD research at the University of Glamorgan. My research investigates the influence of the Senior Staff Housing regulations and funding regulations on the overall project performance.

Please participate in this research by answering this questionnaire as thoughtfully and as frankly as possible. I understand that some of the questions may be sensitive, but they are very important for achieving the objectives of the research. I would like to assure that your responses would be held in the strictest confidence, as they will be used only for research purposes.

Thank you for your helpful participation and cooperation.

Yours sincerely;

Hassan Al-Derham

PhD. Candidate

University of Glamorgan

Section 1. General Information:

1. Name of the householder: ______________________________
2. Address of the householder: ______________________________
3. Name of the main designer: ______________________________
4. Name of the main constructor: ______________________________
5. Type of your house:

☐ Private House ☐ Senior Staff House

Section 2. Land Acquisition:

1. How did you obtain your land ?
   - ☐ Grant from the Government
   - ☐ Private purchase (with government compensation)
   - ☐ Private purchase (without government compensation)
   - ☐ Other (please specify): ______________________________

If the answer to the previous question "Grant from the Government", please answer the next questions, otherwise go to question no. 5.

2. **Have you applied to the Lands Department for a land ?** ☐ Yes ☐ No
3. **If the answer to the previous question is yes,**
   When did you apply for a land ? month _____ year ______
4. **When did you obtain the land ?** month _____ year ______
5. **In which area is your land ?** ______________________
6. **What is the total area of your land ?** __________ m^2

Section 3. Housing and Funding Regulations:

1. **Did you hear about the Senior Staff Housing (SSH) regulations (Decree No. 7 of 1977) ?** ☐ Yes ☐ No
2. **If the answer to the previous question is yes, have you read it ?** ☐ Yes ☐ No
3. **Have you applied for SSH funds?** ☐ Yes ☐ No

Case No. _____

If the answer to the previous question is "yes", answer the following questions, otherwise go to question no. 12.

4. When did you apply for SSH funds? month ______ year ______
5. When did you get the SSH funds? month ______ year ______
6. When did you sign the funding contract with the bank? month ______ year ______
7. Did you read carefully the funding contract? ☐ Yes ☐ No
8. If the answer to the previous question is "no", what was the reason?
   - ☐ I did not have time to read the contract
   - ☐ There is no use of reading the contract because I have no choice
   - ☐ It is difficult for me to understand the contractual phrases
   - ☐ Others (please specify): ______________________________
9. Was the SSH fund adequate to build your house? ☐ Yes ☐ No
10. If the answer to the previous question is "no", what was the reason? (you may choose more than one):
    - ☐ The rising cost of the building materials
    - ☐ The contractors' exaggeration of their net profit
    - ☐ The size of the house was very big
    - ☐ The quality of finishing materials was very high
    - ☐ Others: ______________________________
11. Did you obtain other funds? ☐ Yes ☐ No
12. How did you obtain other funds? (choose as applicable)

☐ Gift or charity ☐ Own money (savings)

☐ Borrowed from relatives or friends ☐ Loan from an ordinary bank

☐ Loan from an Islamic bank ☐ Others (please specify) ____________

Section 4. Design phase:

1. How did you choose your designer?

   ☐ Through an advertisement ☐ Through past experience

   ☐ Through friends ☐ Others (please specify) ______________

2. Please indicate the following criteria in order of importance when choosing your designer?

   ___ Price ___ Design ___ Credibility

   ___ Experience ___ Reputation

   ___ Others (please specify): ______________________________

3. In designing your house, which of the following you employed or used? (choose as applicable)

   ☐ Architect ☐ Structural engineer

   ☐ Mechanical engineer ☐ Electrical engineer

   ☐ Quantity surveyor ☐ Interior designer

   ☐ Others (please specify): ______________________

4. When did you appoint the designer? month ______ year ______
5. What was the total cost of the design? ______________ Q.R.
6. When did you obtain the building permission from the Planning Department? month ______ year ______
7. Who was the dominant of obtaining the design?

   ☐ The designer ☐ The client

8. What is the total gross floor area of the building? __________ m^2
9. Have you had a site supervisor engineer during the construction of the project?

   ☐ Yes ☐ No

10. If the answer is "yes", who was the site supervisor engineer ?

    ☐ The same designer

    ☐ Another engineer

Section 5. Construction Phase:

1. What basis was the contract let by?

   ☐ Traditional method ☐ Management Contracting

   ☐ Construction Management ☐ Others (please specify): ______________

2. Please indicate the following criteria in order of importance when choosing your contractor?

   ___ Price ___ Consultant's advice

   ___ Experience ___ The ability to deliver the works on time

   ___ Reputation ___ The financial status of the contractor

   ___ Others (please specify): ____________________________

3. What was the dominant approach for appointing the different parties which are involved in the construction phase?

   ☐ Open Tender ☐ Selected Tender

   ☐ Direct Negotiation ☐ Others (please specify): ____________

4. What form of contract was used? ☐ Contractor's Own

   ☐ Client's Own ☐ Others (please specify) ____________

5. Date the contract was signed: month ______ year ______
6. Date of the start of construction on site: month ______ year ______
7. Please tell us the overall estimating price of the project before the start of the construction on the site? Q.R. ______________
8. Please tell us the actual price of the project when completed? Q.R. ______________
9. If the final cost of the project was more than the estimated cost, please state the reasons?

   ☐ Additions ☐ Changes in the specifications

   ☐ Cost rising ☐ Variation orders

   ☐ Others (please specify): ______________________

10. What was the initial agreed duration of construction of the project?

    (In months) __________

Case No. _____

11. If there was overrun on time please state reasons?

- ☐ Additions
- ☐ The contractor failed to carryout the works
- ☐ The owner failed to pay
- ☐ The bank failed to pay on time
- ☐ Variation orders
- ☐ Delays in connecting the services
- ☐ Others (please specify): ____________________

12. Completion date of the project: month ______ year ______

Section 6. Disputes:

Please tell us if you had any disputes that led to the delay of executing or handling the project (if applicable) with the following:

Choose as applicable	Please state out the reasons:
☐ Dispute with the Lands Department	____________________
☐ Dispute with the Bank	____________________
☐ Dispute with the Designer	____________________
☐ Dispute with the Planning Department	____________________
☐ Dispute with the Contractor	____________________
☐ Dispute with any sub-contractor	
(please specify: ____________)	____________________
(please specify: ____________)	____________________
☐ Dispute with any utility department	
(please specify: ____________)	____________________
☐ Dispute with any other party	
(please specify: ____________)	____________________

Case No. _____

Section 7. Client Satisfaction with the Building Process:

1. Please rank your satisfaction with the following items (please circle the appropriate number):

	Very satisfied	satisfied	neutral	dissatisfied	Very dissatisfied
a) Satisfaction with total cost of the project	5	4	3	2	1
b) Satisfaction with total time of the project	5	4	3	2	1
c) Satisfaction with obtaining the land	5	4	3	2	1
d) Satisfaction with location of the land	5	4	3	2	1
e) Satisfaction with water connection services	5	4	3	2	1
f) Satisfaction with electricity connection services	5	4	3	2	1
g) Satisfaction with telephone connection services	5	4	3	2	1
h) Satisfaction with road and drainage services	5	4	3	2	1
i) Satisfaction with obtaining the building permission	5	4	3	2	1
j) Satisfaction with contractual procedures	5	4	3	2	1
k) Satisfaction with contract forms	5	4	3	2	1
l) Satisfaction with procurement method	5	4	3	2	1
m) Satisfaction with tender procedure	5	4	3	2	1
n) Satisfaction with payment process	5	4	3	2	1
o) Satisfaction with managing the project	5	4	3	2	1
p) Satisfaction with the main contractor	5	4	3	2	1
q) Satisfaction with the sub-contractors	5	4	3	2	1
r) Satisfaction with the designer	5	4	3	2	1
s) Satisfaction with the site supervisor engineer	5	4	3	2	1
t) Overall satisfaction with the project	5	4	3	2	1
For SSH clients only:					
u) Satisfaction with the SSH regulations	5	4	3	2	1
v) Satisfaction with the amount of funds provided	5	4	3	2	1
w) Satisfaction with the funding process	5	4	3	2	1
x) Satisfaction with time between payments	5	4	3	2	1
y) Satisfaction with contract with the bank	5	4	3	2	1

2. If some of the items of the previous question were answered "dissatisfied" or "very dissatisfied", please state the items' numbers and the reasons for the dissatisfaction:

Item No.	Reason for dissatisfaction
______	______________________________
______	______________________________
______	______________________________
______	______________________________

Section 8. Client Rating on Quality of the House:

1. Please rate the overall quality of the following items (please circle the appropriate number):

	Excellent quality	Good quality	Fair quality	Poor quality	V. Poor quality
a) Aesthetic quality of interiors	5	4	3	2	1
b) Aesthetic quality of exteriors	5	4	3	2	1
c) Relationship of spaces/layout	5	4	3	2	1
d) Floors finishing	5	4	3	2	1
e) Walls finishing	5	4	3	2	1
f) Ceilings finishing	5	4	3	2	1
g) Quality of building materials	5	4	3	2	1
h) Water heating and cooling system	5	4	3	2	1
i) Air cooling system	5	4	3	2	1
j) Lighting system	5	4	3	2	1
k) Environmental quality (odour, acoustics…)	5	4	3	2	1
l) Security	5	4	3	2	1
m) Privacy	5	4	3	2	1
m) Overall quality of the house	5	4	3	2	1

Section 9. Client Characteristics:

1. Age (in years): __________

2. Education level:

☐ Less than Secondary ☐ Secondary ☐ First degree ☐ Post graduate

3. Monthly income when you build your house (in thousands QR):

☐ < 7 ☐ 7 to < 10 ☐ 10 to <13 ☐ 13 to < 16 ☐ 16 or more

4. Before building this house, have you carried out any construction work?

☐ Non ☐ Once ☐ Twice ☐ 3 or more

5. Where did you live before building this house?

☐ In a rented house ☐ In another owned house

☐ In my father house ☐ Others (please specify): ________________

If married, how long since you got married before you build your house?

(in years) ________

7. What is the size of your family at the outset of the project? ________

8. If you have the chance to build your house again, what are the major things that you will do other than what you did at your current house? and why?

☐ Cost: ______________________________

☐ Form: ______________________________

☐ Size: ______________________________

☐ Layout: ______________________________

☐ Location: ______________________________

☐ Others: ______________________________

9. Do you live in your Senior Staff House? ☐ Yes ☐ No

10. If the answer to the previous question is "No", would you state the reasons?

____

11. What is the importance of the following at the outset of the project? (in % and it must add up to 100%) Cost ☐ Time ☐ Quality ☐

Thank you for your cooperation

Case No. _____

بسم الله الرحمن الرحيم

السـيد / المحـترم

السلام عليكم ورحمة الله وبركاته ، أما بعد ،

يهدف هذا البحث إلى قياس انجازية مشاريع إسكان كبار الموظفين مقارنة بمشاريع الإسكان الخاصة في دولة قطر.

أرجو منكم المشاركة في هذه الدراسة وذلك من أجل الوصول إلى أهداف البحث ، كما أود أن أؤكد هنا على أن جميع المعلومات والبيانات التي تعطى سوف تعالج بسرية تامة ولأغراض البحث العلمي فقط.

وتفضلوا بقبول فائق التقدير والاحترام شاكرا لكم حسن تعاونكم...

الباحث / حسن راشد الدرهم

جامعة قطر

كلية الهندسة

قسم الهندسة المدنية

القسم الأول : معلومات عامة

١) اسـم رب البيـت : ______________________
٢) عنوان رب البيت : ______________________
٣) اسم المصمم الرئيسي : ______________________
٤) اسم المقاول الرئيسي : ______________________
٥) نوع السكـن :
☐ سكن خاص
☐ سكن كبار الموظفين

القسم الثاني : اكتساب الأرض

١) كيف حصلت على الأرض ؟
☐ هبة من الدولة
☐ شراء خاص (مع تعويض من الدولة)
☐ شراء خاص (دون تعويض من الدولة)
☐ غير ذلك (يرجى الإيضاح) : ______________________

إذا كانت الأرض "هبة من الدولة " يرجى الإجابة على الأسئلة التاليـة وإلا انتقـل مباشرة إلى السؤال رقم (٥) ......

٢) هل تقدمت بطلب الحصول علـى أرض مـن "إدارة الأراضي " ؟
☐ نعم ☐ لا

٣) إذا كانت الإجابة بنعم، متى تقدمت بطلب للحصول على الأرض؟
شهر ______ سنة ______

٤) متى حصلت على الأرض ؟ شهر ______ سنة ______
٥) أين تقع الأرض الخاصة بك ؟ ______________________
٦) ما هي المساحة الإجمالية للأرض ؟ ______ م٢

القسم الثالث : لوائح السكن والتمويل

١) هل سبق أن تعرفت على لوائح إسكان كبار الموظفين {المرسوم رقـم (٧) لسـنة ١٩٧٧} ؟
☐ نعم ☐ لا

٢) في حالة الإجابة على السؤال السابق بنعم ، فهل قرأت تلك اللوائح ؟
☐ نعم ☐ لا

٣) هل سبق أن تقدمت للحصول على قرض (إسكان كبار الموظفين)؟
☐ نعم ☐ لا

في حالة الإجابة بنعم ، الرجاء الإجابة على الأسئلة التالية و إلا انتقل مباشرة إلى السؤال رقم (١٢).

٤) متى تقدمت بطلب للحصول على قرض (إسكان كبار الموظفين) ؟
شهر ______ سنة ______

٥) متى حصلت على القرض (إسكان كبار الموظفين)؟
شهر ______ سنة ______

٦) متى وقعت على عقد القرض مع البنك ؟
شهر ______ سنة ______

٧) هل اطلعت بعناية على بنود عقد القرض ؟
☐ نعم ☐ لا

٨) في حالة الإجابة بلا، الرجاء تحديد الأسباب (ويمكنك اختيار أكثر من سبب):
☐ ليس لدي وقت لقراءة العقد
☐ ليس هناك جدوى من قراءة العقد حيث أنى مجبر عليه
☐ يصعب على فهم الصيغ القانونية للعقود
☐ غير ذلك : ______________________

٩) هل كان قرض (إسكان كبار الموظفين) كافيا لبناء منزلك ؟
☐ نعم ☐ لا

١٠) في حالة الإجابة بلا، الرجاء تحديد الأسباب (ويمكنك اختيار أكثر من سبب):
☐ ارتفاع تكاليف مواد البناء
☐ مبالغة المقاولين في هامش الربح
☐ كبر حجم السكن الذي صممته
☐ نوعية التشطيبات التي اخترتها (حمامات - مطابخ - رخام - الخ ..)
☐ غير ذلك : ______________________

١١) هل حصلت على مبالغ أخرى ؟
☐ نعم ☐ لا

١٢) في حالة الإجابة بنعم كيف حصلت على المبالغ الأخرى ؟ (اختر مما يلي)
☐ هبة أو منحة
☐ من مدخرات خاصة
☐ اقترضت من أقاربي أو أصدقائي
☐ قرض من بنك
☐ غير ذلك (يرجى الإيضاح) : ______________________

حالة رقم: (______)

القسم الرابع : مرحلة التصميم

١) كيف اخترت مصممك (المكتب الاستشاري) ؟

☐ عن طريق أحد الإعلانات ☐ عن طريق الخبرة السابقة

☐ عن طريق الأصدقاء

☐ غير ذلك (يرجى الإيضاح) : ____________

٢) أيا مما يلى شارك فى تصميم منزلك ؟ (ضع علامة على ما تختار)

☐ مهندس معماري ☐ مهندس إنشائى

☐ مهندس ميكانيكى ☐ مهندس كهربائى

☐ محاسب كميات ☐ مصمم ديكور

☐ غير ذلك (يرجى الإيضاح): ____________

٣) رتب المعايير التالية وذلك من حيث الأهمية والتي على ضوئها تم اختيار المصمم؟

___ السعر ___ السمعة ___ المصداقية

___ الخبرة ___ التصميم

___ غير ذلك (يرجى الإيضاح): ____________

٤) متى عينت المصمم ؟ شهر ________ سنة ________

٥) ما هى إجمالى تكاليف التصميم ؟ ________ ر.ق.

٦) متى حصلت على رخصة البناء ؟ شهر ________ سنة ________

٧) من كان الغالب على اختيار التصميم ؟ ☐ المصمم ☐ المالك

٨) ما هى إجمالى مساحة البناء ؟ ________ م^2

٩) هل كان لديك مهندس يشرف على تنفيذ البناء ؟ ☐ نعم ☐ لا

١٠) في حالة الإجابة بنعم . على أي أساس تم اختيار المشرف ؟

☐ نفس المصمم ☐ مهندس آخر

☐ غير ذلك (يرجى الإيضاح): ____________

القسم الخامس : مرحلة الإنشاء

١) ما هى طريقة إنجاز البناء ؟

☐ الطريقة التقليدية : عقد مع مصمم ثم عقد مع مقاول ينفذ كل مراحل البناء

☐ إدارة عقــود : عدة عقود مع مقاولين مختلفين لإنجاز كل مرحلة من مراحــل البناء (عظم) .

☐ إدارة بنـــــاء : إدارة كاملة لأعمال ومتطلبات البناء (عقود مـــع عمـــال - أدوات بناء - مقاولين متخصصين - مواد بناء ...)

☐ غير ذلك (يرجى الإيضاح) : ____________

٢) رتب المعايير التالية وذلك من حيث الأهمية والتي على ضوئها تم اختيار المقاول؟

___ السعر ___ السمعة

___ الخبرة ___ المصمم

___ الوضع المالى للمقاول

___ قدرة المقاول على تسليم أعمال البناء فى الموعد المحدد

___ غير ذلك (يرجى الإيضاح): ____________

٣) ما هو المدخل السائد لتعيين مختلف الأطراف بمرحلة الإنشاء ؟

☐ مناقصة مفتوحة ☐ عطاء مختار

☐ تفاوض مباشر

☐ غير ذلك (يرجى الإيضاح) : ____________

٤) ما هو نوع العقد المستخدم ؟

☐ عقد المقاول

☐ عقد المالك

☐ غير ذلك (يرجى الإيضاح) : ____________

٥) ما هو تاريخ تعيين المقاول الرئيسي؟ شهر ________ سنة ________

٦) ما هو تاريخ بداية الإنشاء بالموقع ؟ شهر ________ سنة ________

٧) ما هي التكلفة التقديرية للمشروع قبل الشروع في البناء ؟ ________ ر.ق

٨) ما هي التكلفة الحقيقية للمشروع بعد انتهاء التنفيذ ؟ ________ ر.ق

٩) في حالة تجاوز التكلفة المتوقعة .. الرجاء ذكر الأسباب ؟

☐ إضافات ☐ تغيير المواصفات

☐ ارتفاع الأسعار ☐ تعديل فى التصميم

☐ غير ذلك(يرجى الإيضاح): ____________

١٠) ما هى مدة العقد الأساسية المتفق عليها لإنشاء المشروع ؟ (بالشهور) ____________

١١) فى حالة تجاوز الوقت المحدد , الرجاء ذكر الأسباب ؟

☐ إضافات ☐ تخلف المقاول عن التنفيذ

☐ تخلف المالك عن الدفع ☐ تخلف البنك عن الدفع في الوقت

☐ تأخر وصول الخدمات للمبنى ☐ تعديلات على التصميم

☐ غير ذلك(يرجى الإيضاح): ____________

١٢) ما هو تاريخ انتهاء المشروع ؟ شهر ________ سنة ________

حالة رقم: (______)

القسم السادس : الرضا عن عملية الإنشاء

١) الرجاء حدد رضائك عن البنود الآتي ذكرها (ضع دائرة حول الرقم):

	راضي جدا	راضي	محايد	غير راضي	غير راضي على الإطلاق
أ) الرضا عن الزمن الإجمالي للمشروع	٥	٤	٣	٢	١
ب) الرضا عن التكلفة الإجمالية للمشروع	٥	٤	٣	٢	١
ت) الرضا عن الحصول على الأرض	٥	٤	٣	٢	١
ث) الرضا عن موقع الأرض	٥	٤	٣	٢	١
ج) الرضا عن خدمات توصيل المياه	٥	٤	٣	٢	١
ح) الرضا عن خدمات توصيل الكهرباء	٥	٤	٣	٢	١
خ) الرضا عن خدمات توصيل الهاتف	٥	٤	٣	٢	١
د) الرضا عن خدمات الطرق	٥	٤	٣	٢	١
ذ) الرضا عن الحصول على رخصة البناء	٥	٤	٣	٢	١
ر) الرضا عن إجراءات التعاقد	٥	٤	٣	٢	١
ز) الرضا عن أشكال العقود	٥	٤	٣	٢	١
س) الرضا عن طريقة إنجاز البناء	٥	٤	٣	٢	١
ش) الرضا عن إجراء العطاء	٥	٤	٣	٢	١
ص) الرضا عن طريقة الدفعات المالية	٥	٤	٣	٢	١
ض) الرضا عن طريقة إدارة المشروع	٥	٤	٣	٢	١
ط) الرضا عن المقاول الرئيسي	٥	٤	٣	٢	١
ظ) الرضا عن مقاولي الباطن	٥	٤	٣	٢	١
ع) الرضا عن المصمم	٥	٤	٣	٢	١
غ) الرضا عن المهندس المشرف	٥	٤	٣	٢	١
ف) الرضا العام عن المشروع	٥	٤	٣	٢	١
بالنسبة لعملاء إسكان كبار الموظفين فقط					
ق) الرضا عن لوائح إسكان كبار الموظفين	٥	٤	٣	٢	١
ك) الرضا عن قيمة القرض	٥	٤	٣	٢	١
ل) الرضا عن عملية الاقتراض	٥	٤	٣	٢	١
م) الرضا عن الوقت بين الدفعات	٥	٤	٣	٢	١
ن) الرضا عن صيغة التعاقد مع البنك	٥	٤	٣	٢	١

٢) إذا كانت بعض الإجابات على السؤال السابق بغير راضي أو غير راضي على الإطلاق، الرجاء تحديد رقم البند وسبب عدم الرضا:

رقم البند	سبب عدم الرضا
______	______________________________
______	______________________________
______	______________________________
______	______________________________
______	______________________________

القسم السابع : تقييم المالك لجودة المبنى

يرجى تقييم معيار الجودة للبنود التالية (ضع دائرة حول الرقم المناسب):

	جودة ممتازة	جودة مرتفعه	جودة معقولة	جودة سيئة	جودة سيئة جدا
أ) الجودة الجمالية للمبنى من الداخل	٥	٤	٣	٢	١
ب) الجودة الجمالية للمبنى من الخارج	٥	٤	٣	٢	١
ج) علاقة المساحات مع توزيع الغرف	٥	٤	٣	٢	١
د) تشطيب الأرضيات	٥	٤	٣	٢	١
ه) تشطيب الجدران	٥	٤	٣	٢	١
و) تشطيب الأسقف	٥	٤	٣	٢	١
ز) جودة مواد البناء	٥	٤	٣	٢	١
ح) نظام تبريد و تسخين الماء	٥	٤	٣	٢	١
ط) نظام تكييف الهواء	٥	٤	٣	٢	١
ى) نظام الإضاءة	٥	٤	٣	٢	١
ح) الجودة البيئية (الرائحة ، الضوضاء،...)	٥	٤	٣	٢	١
ط) الأمن	٥	٤	٣	٢	١
ي) الخصوصية					
ى) الجودة العامة للمسكن	٥	٤	٣	٢	١

حالة رقم: (______)

القسم الثامن : الخلافات

أذكر الخلافات التي أدت إلى تأخير تنفيذ أو انتهاء المشروع (في حالـــة وقوعــها) مــع الأطراف التالية:

(اختر مما يلي) (الرجاء ذكر الأسباب)

أ) ☐ خلاف مع إدارة الأراضي ____________

ب) ☐ خلاف مع البنك ____________

ج) ☐ خلاف مع المصمم ____________

د) ☐ خلاف مع إدارة التخطيط العمراني ____________

هـ) ☐ خلاف مع المقاول الرئيسي ____________

و) ☐ خلاف مع مقاول باطن

(الرجاء الإيضاح :________) ____________

(الرجاء الإيضاح :________) ____________

ز) ☐ خلاف مع إدارة خدمات

(الرجاء الإيضاح :________) ____________

ح) ☐ خلاف مع أي طرف آخر

(الرجاء الإيضاح :________) ____________

القسم التاسع : خصائص رب المنزل

١) العمر (بالسنوات) : ________

٢) المستوى التعليمي :

☐ أقل من ثانوي ☐ ثانوي

☐ جامعي ☐ دراسات عليا

٣) الدخل الشهري عند بناء المنزل بآلاف الريالات القطرية :

☐ أقل من ٧ ☐ ٧ – أقل من ١٠ ☐ ١٠ – أقل من ١٣

☐ ١٣– أقل من ١٦ ☐ ١٦ أو أكثر

٤) قبل بناء منزلك ، هل قمت بتنفيذ أية أعمال إنشاء ؟

☐ لا ☐ مرة واحدة

☐ مرتين ☐ ٣ مرات أو أكثر

٥) أين كنت تسكن قبل بنائك المنزل ؟

☐ في منزل مؤجر

☐ في منزل آخر مملوك لك

☐ في منزل والدك

☐ غير ذلك (الرجاء الإيضاح) : ____________

٦) في حالة الزواج، كم مضى على زواجك قبل بناء المـــنزل ؟ (بالســنوات) ________

٧) كم يبلغ عدد أفراد أسرتك عند بدء العمل بالمشروع ؟ ________

٨) إذا كانت لديك الفرصة لبناء منزل مرة أخرى ....ما هي الأشياء التي ســوف تقوم بها خلافا لما قمت به عند بنائك منزلك الحالي ؟ ولماذا ؟

☐ التكلفة : ____________

☐ الشكل: ____________

☐ الحجم: ____________

☐ التوزيع: ____________

☐ الموقع: ____________

☐ غير ذلك: ____________

٩) **هل تقيم بمنزل كبار الموظفين التابع لك ؟ ☐ نعم ☐ لا**

١٠) **في حالة الإجابة على السؤال السابق بلا ... فهلا ذكرت الأسباب ؟**

____

____

١١) **ما هي أهمية التالي؟ (بالنسبة المئوية، ويجب أن يكون المجموع ١٠٠%)**

التكلفة ☐ **الوقت** ☐ **النوعية** ☐

شكرا على حسن تعاونكم ..

حالة رقم: (______)

APPENDIX B

Aesthetic Quality Evaluation

AESTHETIC QUALITY EVALUATION

Case No.: __________

Date: ____________

Name of client: ___________________________

Juror: _____________________________

Characteristics	Value
Perfect	10
Excellent	9
Very Good	8
Good	7
Fair	6
Acceptable	5
Poor	4
Far below acceptable	3
Critically bad	2
Complete failure	1

Characteristics		**Juror's Score**
Concept	A	
Relationships	B	
Circulation	C	
Space	D	
Growth/Change	E	
Environment	F	
a = Function	Total = divided by 6 =	
Form on Site	G	
Form and Space	H	
Integration	I	
Image	J	
b = Form	Total = divided by 4 =	
Technical Means	K	
Balance/Value	L	
In Use Studies	M	
Programme/Methods	N	
c = Economy	Total = divided by 4 =	
	ab =	
	bc =	
	ca =	
	y = (ab + bc + ca) =	
Quality Quotient of Juror = (0.433) * (y)		

Juror's Statement

GUIDELINES FOR AESTHETIC EVALUATION

FUNCTION

1. **Concept**

   Is there a clear concept arising from the main functional determinants?

2. **Relationships**

   Are the interior and exterior spaces grouped, sized, and shaped to satisfy the detailed functional relationships, and to reinforce the basic concept?

3. **Circulation**

   Does the circulation pattern allow people and things to flow efficiently?

4. **Space Provision**

   Is space provision adequate and properly disposed both for function and effect?

5. **Growth and Change**

   Have ideas for future growth and change informed the concept in a controlled way?

6. **Physical Environment**

   Will the physical environment envisaged continue to give comfort in thermal, aural, and visual terms?

FORM

7. **Relationship to Site**

   Is the relationship to site and its surroundings well exploited in the positioning, approach, massing, and expression of the building and its landscaping?

8. **Form and Space**

   Is the handling of form and space an imaginative and meaningful expression of functions and of the spirit of the times?

9. **Integration: Structure and Services**

   Is there a creative integration of structure and services?

10. **Expression**

    Does the design express the right image?

ECONOMY

11. Economy of Means

Is there a simplicity and restraint in planning and technology suggesting an effective economy of means?

12. Balance and Value

Has balance and value been achieved in the handling of spaces, and in the choice of forms, systems, and materials for present functions and future changes?

13. Operation and Maintenance

Have operation and maintenance considerations been fully considered in the concept and its details?

14. Construction

Have construction programme and methods been considered in the design?

APPENDIX C

Technical Quality Evaluation

TECHNICAL QUALITY EVALUATION

Case No.: ________ Date: _____________

Name of Client: ______________________________

Name of Juror: ________________________________

(1) House Interior Schedule

Item	Description	Score
1. Instability	(a) Serious cracks present in wall or ceiling (b) Minor cracks present in wall or ceiling (c) This defect not apparent	a 30 b 20 x 0
2. Dampness	(a) Signs of dampness visible, no successful remedial action having been taken (b) Dampness claimed to be present at certain times (c) No signs of or reported dampness	a 30 c 10 x 0
3. Air cooling & ventilation system	(a) There is a room (or more) lacking an air conditioning system (b) There is a room (or more) lacking air ventilation (c) These deficiencies not present	a 30 b 20 x 0
4. Water supply	(a) Supply of water is by water tankers only (b) Public supply is available inside the house	c 10 x 0
5. Electricity system	(a) Short break or electric fault occurs from time to time (b) This defect not present	c 10 x 0
6. Hot water	(a) There is a toilet (or more) does not have a water heater (b) This defect not present	b 20 x 0
7. Water closet	(a) There is a WC (or more) not ventilated to outside air (b) There is a water leakage from pipes or pipe connections (c) These deficiencies not apparent	b 20 c 10 x 0
8. Drainage	(a) House has a private water-borne system (b) House is connected to a public system	c 10 x 0
9. Kitchen	(a) Kitchen does not have an air ventilation fan (b) Kitchen does not have a refrigerator (c) These deficiencies not present	b 20 b 20 x 0
10. Occupancy	(a) Room crowding: 3 persons (or more)/room (b) 2 persons/room (c) 1 person/room	b 20 c 10 x 0
Total Score		

(2) House Exterior Schedule

Item	Description	Score
1. Progressive instability in structure	(a) Surface material contains open cracks (b) Door/window surrounds deformed; lintels out of line (c) These defects not apparent	b 20 b 20 x 0
2. Wall surfaces	(a) Walls do not have temperature insulation (b) Holes or gaps in wall surface (c) Masonry or wall material flaking or parts missing (d) Wall surface e.g. harling contains superficial cracks (e) Wall requires repainting (f) These defects nor apparent	a 30 b 20 b 20 c 10 c 10 x 0
3. Roof	(a) Roof has no temperature insulation (b) Roof visibly sagging (c) Cracks on cement layer (d) Part of flashing cement haunching missing (e) These defects not apparent	a 30 b 20 b 20 c 10 x 0
4. Down pipes	(a) Visible holes, sections missing or discontinuous (b) Visibly rusting, requiring painting (c) These defects not apparent	b 20 c 10 x 0
5. Doors & windows	(a) Windows are not double glazed (b) Panes or panels missing, frames rotting (c) Pane cracked, handle missing (d) These defects not apparent	a 30 b 20 c 10 x 0
6. External paint	(a) Badly peeled, bare wood exposed (b) Signs of peeling visible, painting required (c) Stones or marbles are missing (d) Stones or marbles are badly peeled, need to be replaced (e) These defects not apparent	c 10 d 5 c 10 d 10 x 0
7. Access & Precinct	(a) House accessible only from unmade road (b) External yards surface uneven (c) These defects are not apparent	c 10 c 10 x 0
8. Court yard	(a) Green spaces not found (b) No car parking in the house court yard (c) These defects not apparent	c 10 c 10 x 0
9. Age	(a) Two years or less (b) Four years (c) Six years	b 20 c 10 x 0
Total Score		

(3) Environment Schedule

Item	Description	Score
1. Parking	(a) Off-street parking for at least 1 car per house lacking (b) Frontage of zone subject to use for public parking or to parking restrictions (c) These defects not present	c 10 c 10 x 0
2. Traffic	(a) Large amount of traffic (b) More than normal residential traffic (c) Normal residential standard	b 20 c 10 x 0
3. Noise & Odour	(a) Industrial/commercial noise e.g. main street standard (b) Noise is above residential but not industrial/commercial standard (c) Odour emanating from the surrounding environment (d) These defects are not apparent	b 20 c 10 c 10 x 0
4. Land use: Character & quality	(a) Zone adjacent to or opposite industrial premises (b) No grass or trees visible from curtilage (front or rear) of zone (c) Derelict land/beings visible from curtilage (front or rear) of zone (d) Curtilage prejudiced by chalk marks et. on wall or unsightly litter lying about (e) These defects not present	c 10 c 10 c 10 c 10 x 0
5. Facilities	(a) No park or public open spaces within 1/2 mile radius of zone centre (b) No primary school within 1/2 mile radius of zone centre (c) Not at least 6 shops (or co-operative supermarket) within 1/2 mile radius of zone centre (d) No mosque within ½ mile radius of zone centre (e) These deficiencies not present	c 10 c 10 c 10 c 10 x 0
Total Score		

APPENDIX D

Designers/Contractors

Interview Questions

Interview's questions for Designers and Contractors

1. What are the characteristics of SSH and PH clients in terms of:

Income: ____________________

Education: ____________________

Experience: ____________________

Others: ____________________

Others: ____________________

2. How do SSH and PH clients select their designers (experience, cost, prestige, etc.)?

SSH: ____________________

PH: ____________________

3. What form of contract(s) do you use for SSH and PH projects? Why?

____

____

____

____

4. How do you determine the design requirements of the SSH and PH clients?

____

____

____

____

5. What are the problems that cause delays in pre-build time (design phase)?

____

____

____

____

6. What are the problems that cause the overrun in building time?

____

____

____

____

____

7. What are the problems that cause the overrun in building cost?

8. What are the reasons that cause poor quality in design?

9. Do you think that quality of design could be improved? If yes, how? (for the designers)

10. What are the problems that cause the poor quality in design? (for the contractors)

11. What are the problems that cause the poor quality in building? (for the designers)

12. What are the advantages and disadvantages of both SSH and PH procurement approaches?

	Advantages	Disadvantages
SSH		
PH		

13. Which clients (SSH or PH) would you prefer to work with? and why?

14. Have you experienced disputes between the different parties which are involved in the building process? How they were solved?

15. In your opinion, how can the SSH be improved?

16. In your opinion, how could the construction industry in Qatar be improved?

APPENDIX E

Policy Makers/Implementers

Interview Questions

GROUP A - POLICY MAKERS:

♦ **Former minister of Labour, Social Affairs and Housing**

1. What is the housing policy of the Government of Qatar?
2. What are the existing housing schemes in Qatar?
3. How are these schemes been implemented?
4. How are these schemes been procured?
5. What is the historical background of the SSH?
6. What are the main objectives of the SSH?
7. What are the criteria for the eligible client to the SSH?
8. What are the advantages of the SSH?
9. What are the disadvantages of the SSH?
10. What is the experience of the other Gulf States in housing?
11. How do you see the SSH compared with the other schemes available in the other Gulf States?

♦ **The Deputy Minister of Finance, Trade and Economy**

1. What are the issues that govern the amount of budget assigned to SSH every year?
2. What are the issues that govern the amount of budget assigned to planning and distributing the lands among the Qataris?
3. How does Qatar National Bank represent the Government in the SSH contracts?
4. Why did the Government chosen this type of contractual arrangements?
5. Since 1977 the cost of construction has increased due to many issues, why does not the Government increase the amount of loan to the clients?
6. Why not establish a bank specialised in real estate loans and transfer the SSH and every other scheme to it?

♦ **A member of the Municipality Council**

1. What are the types of contracts available to the different parties involved in the building process to adopt?
2. What is the Government policy in land planning?
3. What are the issues that govern land planning?

4. What is the experience of the other Gulf States in planning and contractual arrangements?

GROUP B - DIRECT POLICY IMPLEMENTERS:

- **Manager of the Estate Loans Department at Qatar National Bank**

1. What is the historical background of the SSH?
2. What are the main objectives of the SSH?
3. What are the criteria for the eligible client to the SSH?
4. What are the advantages of the SSH?
5. What are the disadvantages of the SSH?
6. What is the process of building a house in the SSH?
7. What are the SSH regulations?
8. What are the reasons behind the SSH regulations?
9. What is the SSH funding procedure?
10. What are the reasons behind the SSH funding procedure?
11. How are the disputes between the Bank and clients been solved?
12. In your opinion, how can the SSH be improved?

- **Manager of the Public Housing Department at the Ministry of Public Service and Housing**

1. What are the different types of housing scheme available at the Public Housing Department?
2. What is the historical background for these housing schemes?
3. How are these schemes been implemented?
4. How are these schemes been procured?
5. What are the advantages of these schemes?
6. What are the disadvantages of these schemes?

- **Manager of the Lands Department at the Ministry of Municipality Affairs.**

1. What are the issues that govern the planning of lands?

2. What are the requirements that must be met by the clients in order obtain land from the Government?
3. Is there a way to over come the problems of delay in obtaining land?

- **Manager of the Municipality of Doha**

1. What are the types of contracts available to the different parties involved in the building process to adopt?
2. What are the criteria of the SSH clients?
3. What are the criteria of the PH clients?
4. What are the advantages and disadvantages of both SSH and PH?
5. What are the design requirements of the Planing Department?
6. What are the reasons that cause delays in obtaining the building permission?

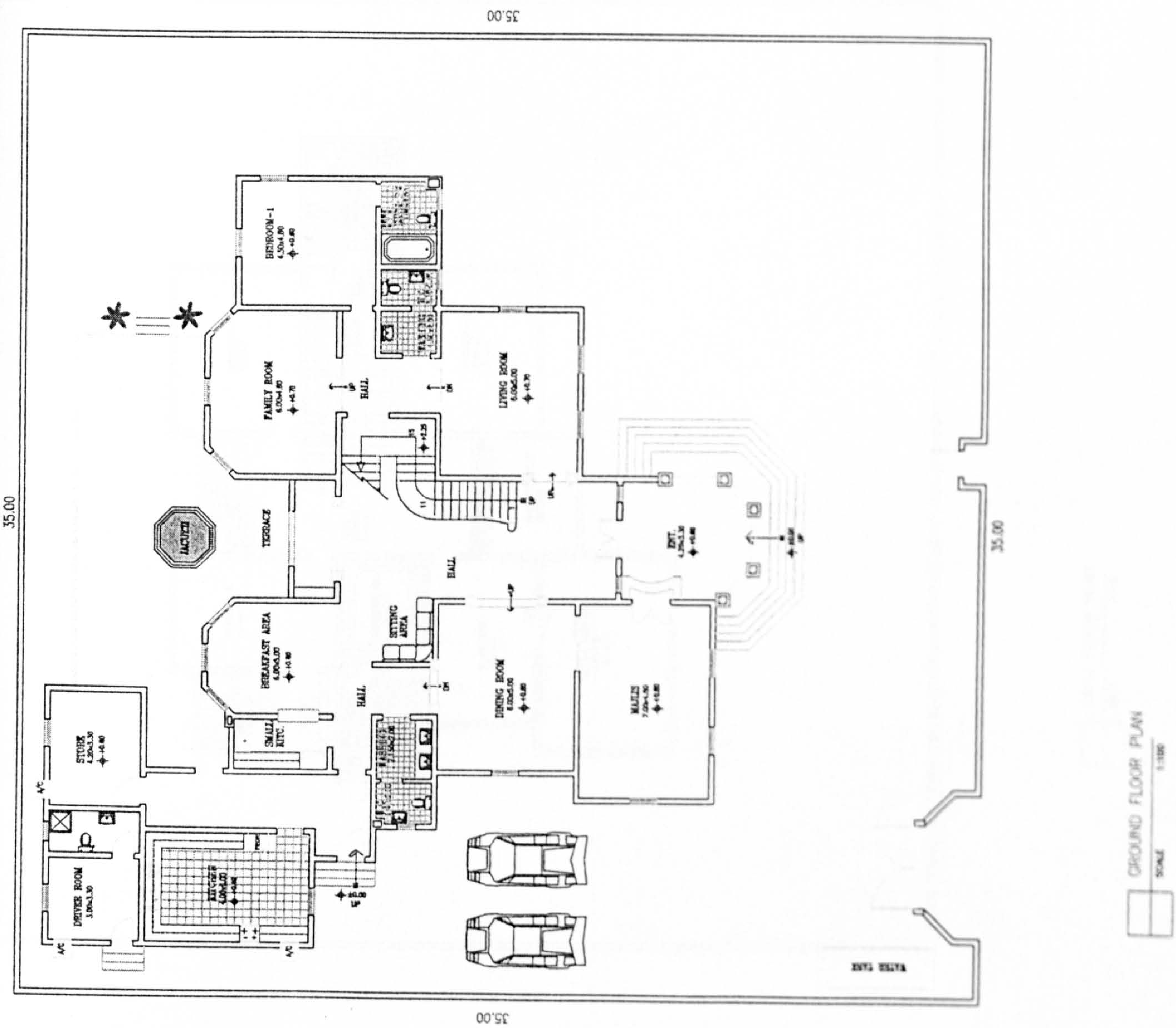
- **Manager of the Senior Staff Housing Project at the district of Modern Doha**

1. What is the background behind of implementing SSH Project at the district of Modern Doha?
2. What are the advantages of implementing SSH Project at the district of Modern Doha?
3. What is the process of obtaining a senior staff house?
4. What are the problems that face your department in implementing SSH?
5. What are the problems that face the clients of SSH?
6. How could we come over these problems?

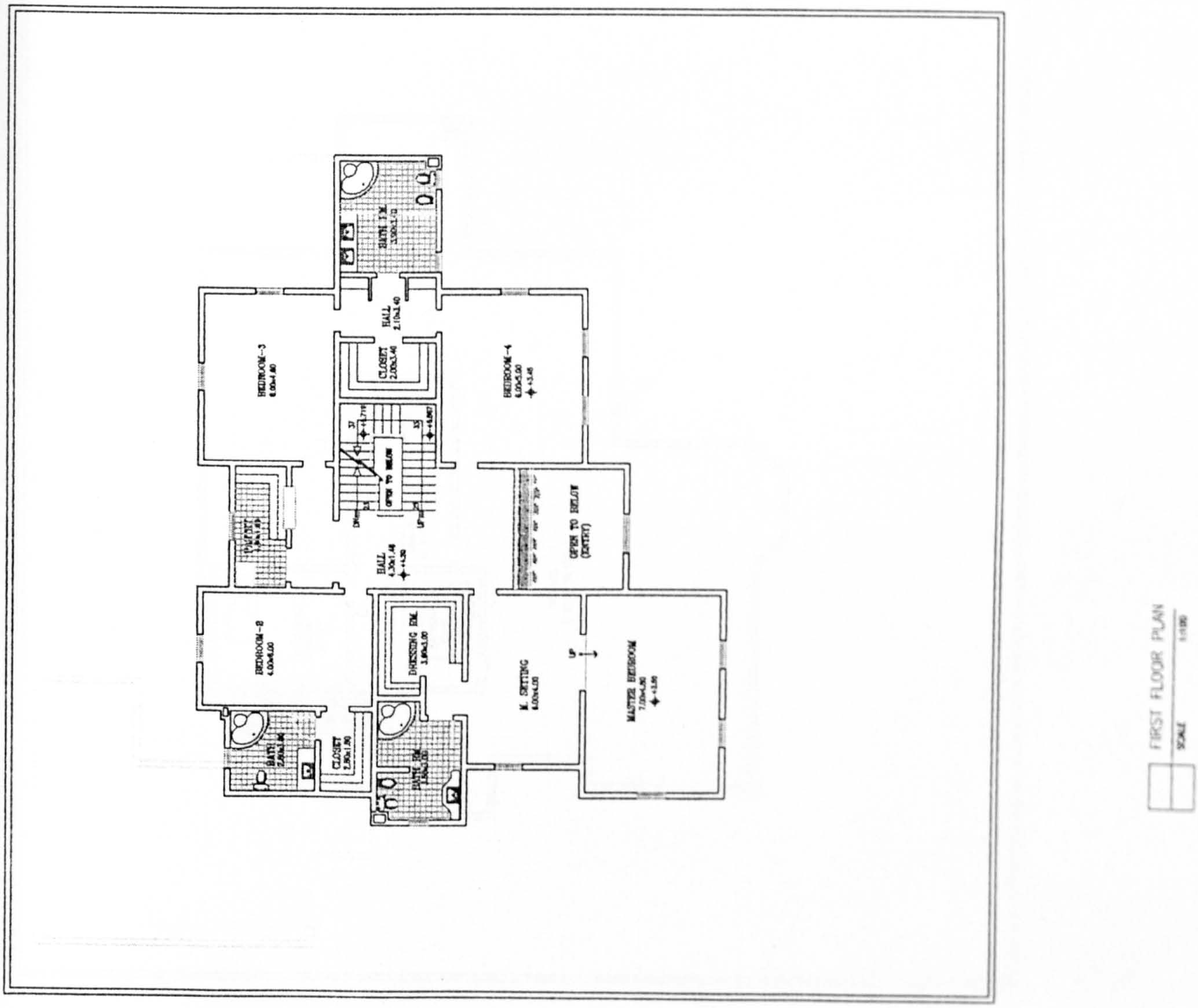
APPENDIX F

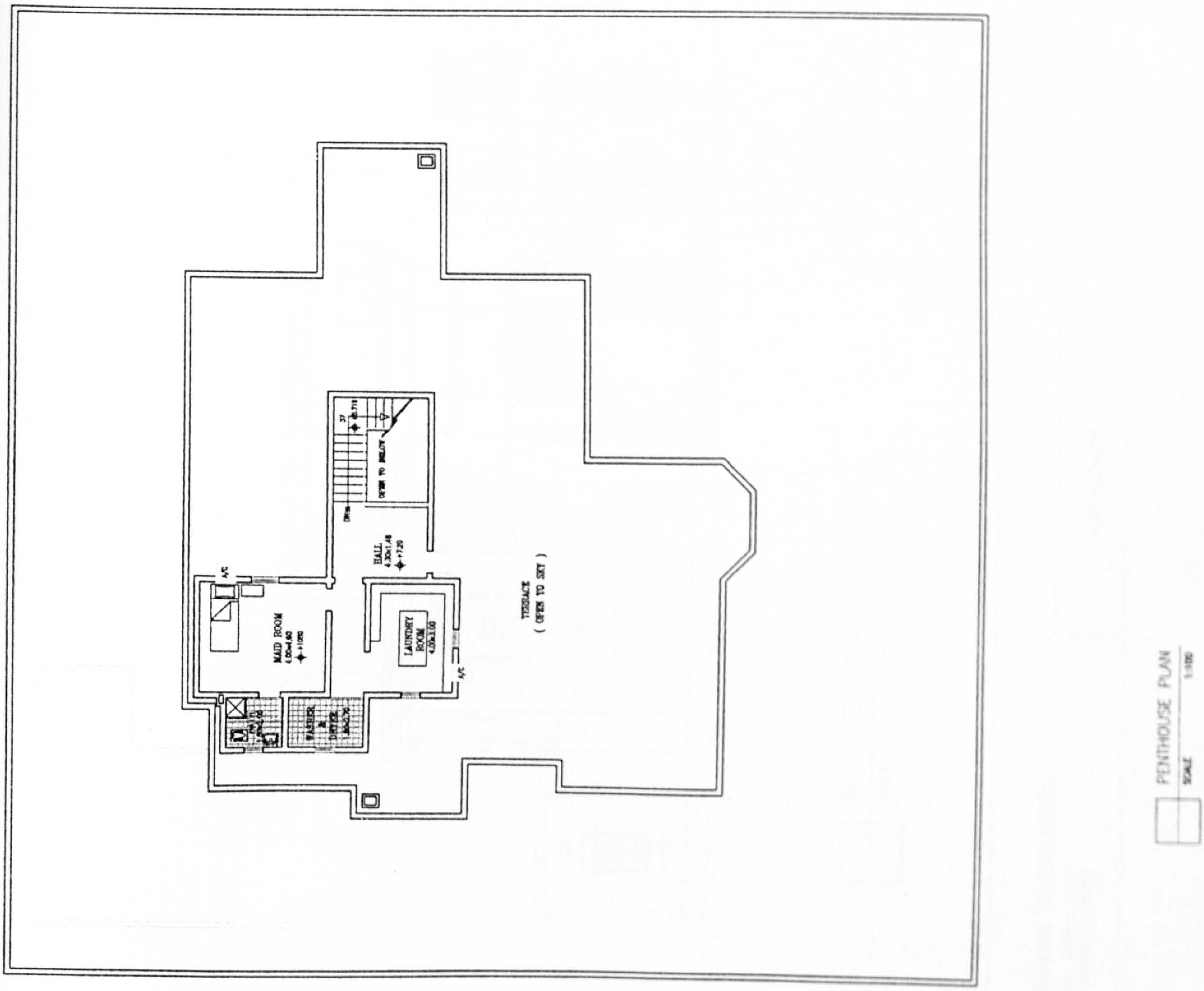
Plans and Specifications

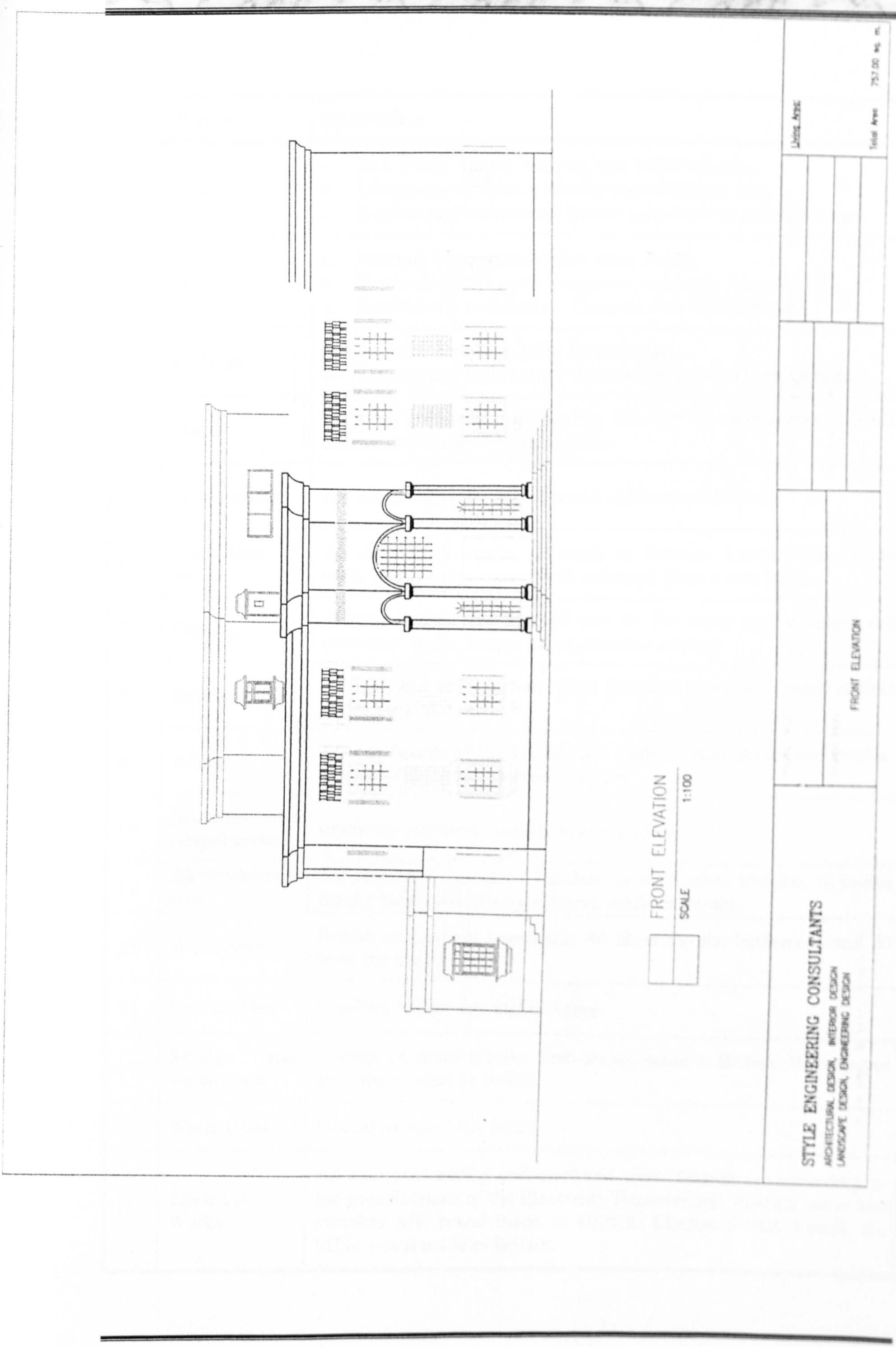
of a Typical Senior Staff House in Qatar



Note: Drawings are the property of Style Engineering Consultants, Doha, Qatar.


BEDROOM-3
BEDROOM-4
HALL
CLOSET
BATH RM
OPEN TO BELOW
OPEN TO BELOW
(ENTRY)
DRESSING RM
M. SITTING
MASTER BEDROOM
FIRST FLOOR PLAN
SCALE


MAID ROOM
HALL
LAUNDRY ROOM
WASHER & DRYER
OPEN TO BELOW
TERRACE
(OPEN TO SKY)
A/C
PENTHOUSE PLAN
SCALE
1:100


FRONT ELEVATION
SCALE
1:100
FRONT ELEVATION
STYLE ENGINEERING CONSULTANTS
ARCHITECTURAL DESIGN, INTERIOR DESIGN
LANDSCAPE DESIGN, ENGINEERING DESIGN
Living Area:
Total Area 757.00 sq. m.

No.	Works	Description
1	Floors	a. Bed rooms' floors: terrazzo size 300X300 mm. b. Living rooms' floors: Marble size 400X400 mm. c. Kitchen and bathrooms' floors: ceramic size 200X200 mm.
2	Walls	a. Internal: Vino-mastic paint Juton brand. b. External: Santix paint dampness resistance Juton brand. c. Kitchen and bathrooms': Ceramic size 300X200 mm.
3	Ceilings	a. Internal: Emulsion paint Juton brand. b. Kitchen and bathrooms': Aluminium panels (Inter-Douglas).
4	Stairs	All steps are made from marble. Banister of internal stair is made of teak and finished with oil paint.
5	Wood works	All wood works are Mobil brand and made in Britain.
6	Aluminium works	All Aluminium works are made in Bahrain, 2 mm thick, 10 cm wide, and powder coated with reflected glass 6 mm thick.
7	Skirting	Skirting boards size 25X100 mm for the lower part of rooms and corridors' walls, except bathrooms and kitchen.
8	Bath and sinks	All bath and sinks sets are Ideal Standard brand with wood cabinet under the sinks.
9	Kitchen	All cup boards of the kitchen are made of Aluminium and marble. Kitchen sink is Italian stainless steel.
10	Intercom and central aerial	Intercom and aerial sockets in every room.
11	Air ventilation fans	Air ventilation fan size 12 inches for the kitchen and size 10 inches for the bathrooms Xplayer brand, made in Britain.
12	Water heaters	Britain or German brand size 40 litres for the bathrooms and 80 litres for the kitchen.
13	Outside tiles	Interlock bricks size 200X75 mm.
14	Sewage and water pipes	Sewage pipes are plastic, Tran brand, made in Britain. Water pipes are copper made in Britain.
15	Water tanks	Fibreglass size 1500 litres.
16	Electrical Works	All electrical wiring and electrical switchboards are according to the specifications of the Electricity Departments. Electric wires and switches MK brand made in Britain. Electric switch boards are MEM brand made in Britain.