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# **ASSESSING THE SERVICE QUALITY OF BUILDING MAINTENANCE PROVIDERS: MECHANICAL AND ENGINEERING SERVICES**

**Gladys Kim Wan Siu, Adrian Bridge and Martin Skitmore**

School of Construction Management and Property  
Queensland University of Technology  
Gardens Point  
Brisbane Q4001  
Queensland  
Australia

*for Construction Management and Economics*

**Please address all correspondence to:**

**Martin Skitmore  
Queensland University of Technology  
Gardens Point  
Brisbane Q4001  
Queensland  
Australia**

**e-mail: [rm.skitmore@qut.edu.au](mailto:rm.skitmore@qut.edu.au)**

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# ASSESSING THE SERVICE QUALITY OF BUILDING MAINTENANCE PROVIDERS: MECHANICAL AND ENGINEERING SERVICES

## ABSTRACT

This study investigates the service quality in the maintenance of mechanical and engineering services. The determinants of service quality are identified and their means of evaluation are examined. A method of assessment is devised based on the SERVQUAL approach and its use is then illustrated by means of a small empirical survey of clients and service providers and the *Gap* model used to quantify the relationships between customer satisfaction, expected service, perceived service and service quality gap.

**Key Words:** Client, service provider, service quality, expectation, perception, satisfaction.

## INTRODUCTION

Growth in the service sector continues throughout the world in nearly all developed and developing countries (Shugan, 1994). This has been accompanied by a drive towards efficiency involving, for example, the increased 'outsourcing' of 'non-core' supporting services (Then, 1995) on the assumption that outsourcing firms can build cost advantages based on economies of scale, and firms, which are adept at service quality, can build competitive positional advantages (Rapert and Wren, 1998).

Increasingly, however, the provision of services is viewed in terms of the worth that the service brings to customers in terms of increased satisfaction, productivity and motivation (Kennedy, 1996), with customer expectations an important focus for providers (Wisniewski and Donnelly, 1996). In addition, there has also been a growing awareness of the key role of building economics in assisting decision makers achieve economies in their day to day operations involving the built assets under their control (Then, 1989). As a result, maintenance managers increasingly have to substantiate their resource requirements empirically, based on irrefutable facts and figures (Then, 1989).

The predominant amount of research on the empirical measurement of service management quality has taken place in non-construction industries such as retail stores, financial or investment brokerage services, health care. In the construction area, empirical surveys have been conducted concerning the quality of consultant services (Hoxley, 1998; Love *et al* (2000), refurbishment services (Holm, 2000). The research reported in this paper investigates the field of building maintenance (M&E services) using principles developed within the context of other industries. The paper starts by summarising the nature of service and service quality. Then, it introduces the concept of service quality and the *Gap* model developed by Zeithaml *et al* (1990), to help service providers measure their service quality. The use of this is then applied via a small postal questionnaire survey to produce the result that, for the respondents involved, while the providers generally overestimate the expectations of clients, the quality of service provided is below expectations.

## THE NATURE OF SERVICES

Researchers and practitioners have suggested various definitions of service. Gronroos (1990) blends some of the previously suggested definitions in saying that service is “an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems.” Lovelock (1991), referring to marketing aspects of service, defines it as “a task, other than proactive selling that involves interactions with customers in person, by telecommunications, or by mail. It is designed, performed and communicated with two goals in mind: operational efficiency and customer satisfaction.” Both agree that whoever has contact with customers, by whatever means and for whatever purpose, affects the customer’s evaluation of service. They become a part of customer services whether or not they are considered service personnel or essential for service.

Four major characteristics of services are evident:

- *Intangibility.* Services are activities or benefits that are essentially intangible, cannot be prefabricated in advance, and do not involve ownership or title (York, 1993). They may include the traditional personal assistance service, for instance, baby-sitter, gardener, etc., the fix-it service such as mechanic, repairman, etc., and finally the value-added service as the least tangible of all (Cotter, 1993). Because service is not an object but a phenomenon, it is difficult for customers to evaluate the quality of services as they evaluate physical goods. Most services cannot be counted, measured, inventoried, tested and verified in advance of sale to assure quality. Because of its intangibility, firms may find it difficult to understand how customers perceive their services and evaluate service quality (Zeithaml, 1981)
- *Inseparability of Production and Consumption.* Services involve simultaneous production and consumption. Inseparability implies that service is simultaneously produced and consumed while physical goods are first produced, then sold and finally consumed. Inseparability of production and consumption often forces the involvement of the customer in the production process. Inseparability also means that the producer and vendor often compromise one economic entity (York, 1993). In this situation, the customer’s input becomes critical to the quality of service performance.
- *Perishability.* The inseparability of production and consumption in turn results in an inability to store service capability. Perishability means that services cannot be produced in advance, inventoried, and later made available for sale. Services are performances that cannot be stored (Zeithaml, 1988). It is often difficult to adequately match up with demand and supply such as those corrective maintenance works, for instance, heating and cooling repairs.
- *Heterogeneity.* Services, especially those with a high labour content, are heterogeneous. Because of the personal involvement of both service producers and customers, services are difficult to standardise. Services are considered to be heterogeneous in that variations in performance can occur from producer to producer, customer to customer, and from day to day (Parasuraman et al., 1985).

In general, service quality is whatever the customers say it is and whatever the customer perceives it to be (Buzzel and Gale, 1987). It involves a comparison between expectations and performance (Parasuraman et al, 1985) - the degree to which the previously agreed standard of performance and the expectations of the internal or external customer are met (Everards, 1996). Three underlying themes emerge (Parasuraman et al, 1985):

- Service quality is more difficult for the consumer to evaluate than the quality of goods.
- Service quality perceptions result from a comparison of consumer expectations with actual service performance.

- Quality evaluations are not made solely on the outcome of a service; they also involve evaluations of the process of service delivery.

Three different dimensions of service performance have been identified, comprising: levels of material, facilities and personnel (Sasser et al, 1987). This implies that service quality involves more than just outcomes; it also included the manner in which the service was delivered.

The process by which customers perceive satisfaction and overall service quality is regarded by many as the key to understanding service quality. The major theories of customer satisfaction in previous research comprise: disconfirmation model (Anderson, cited in Jayanti and Jackson, 1991; Oliver, cited in Jayanti and Jackson, 1991; Gronroos, cited in Cotter, 1993; Parasuraman et al, cited in Cotter, 1993; Zeithaml et al., 1990), equity theory (Oliver and Swan, cited in York, 1993; Fisk and Coney, cited in York, 1993; Mowen and Grove, cited in York, 1993), performance (Oliver, cited in Jayanti and Jackson, 1991; Churchill and Surprenant, cited in Jayanti and Jackson, 1991; Zeithaml, cited in Jayanti and Jackson, 1991), and cognition/affection theories (Pfaff, cited in Cotter, 1993). Of these, a large proportion of the literature draws on the Parasuraman et al's (1985) disconfirmation model-based *gap theory*, developed and presented as a result of their exploratory qualitative studies. Here they propose a model in which service quality perceived by customers is a function of different gaps between expectations and performance. "Perceived service quality is therefore viewed as the degree and direction of discrepancy between customers' perceptions and expectations" (Zeithaml et al, 1990) with customers' expectations being determined primarily by word-of-mouth communications, the personal needs of the customers, the customers' past experience of service providers and external communications (from the service provider and others). Initially, they identified ten major determinants of perceived service quality: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding the customer and tangibles. Following the analysis of empirical data across a variety of industry settings, these determinants were consolidated into their SERVQUAL instrument.

As a result of their studies, Parasuraman et al (1985) argue that, although any service industry is unique in some aspects, there are five broad dimensions of service quality that are applicable to any service organisation, comprising:

- Tangible: physical facilities, equipment, appearance of personnel, communication material.
- Reliability: ability to perform the promised service dependably and accurately.
- Responsiveness: the willingness to help customers and provide prompt service.
- Assurance: the knowledge and courtesy of employees and their ability to inspire trust and confidence.
- Empathy: the caring, individualised attention provided to customers

In the context of the construction industry, Hoxley (1998) has used the SERVQUAL method in an empirical survey of the effects of fee tendering on the quality of consultant services, to show that quality is perceived to be higher when clients take care with the pre-selection of tenders and when adequate weighting is given to ability in the final selection process.

## QUESTIONNAIRE SURVEY

The questionnaire comprised a general information section and the service evaluation section that applied the SERVQUAL instrument, suitably modified to suit the building maintenance field. This provided measures for five specific dimensions (tangibles, reliability, responsiveness,

assurance and empathy) of service quality considered to be applicable to all service-providing organisations.

There were two sets of questionnaires. Questionnaire Form A was aimed at eliciting **clients'** expectations and perceptions of service quality and level of satisfaction. Questionnaire Form B dealt with the **service providers'** perceptions of clients' expectations and perceptions of service quality. Each comprised 22 statements related to one of the five major dimensions - 22 items to measure customers' expected level of service for a particular services industry in general (expectations) and a corresponding 22 items to measure customers' perception of the present level of service of a particular organisation. Both sets of items were presented on a Likert rating scale of 1 to 7 with terminal anchors of 'strongly agree' to 'strongly disagree'.

The perceived service quality (denoted as SQ) is computed along the five dimensions by subtracting expectations scores from perception scores, giving a SQ score for each statement ranging between -6 and +6. A negative SQ score indicates that the level of the provider's service quality is below customer expectations. Similarly, a positive SQ score indicates that the service provider is exceeding customer expectations in that particular area.

The evaluation section also included questions related to information concerning the relative importance of the five dimensions by weighting each dimension out of a total of 100 points and the level of satisfaction of the service on a 10-points scale.

The service quality gap (denoted as G) is the gap between customer expectations and management perceptions of customer expectations. The measurement of G requires a comparison of responses pertaining to expectations from two different samples – services providers and customers. The service quality gap is computed along the five dimensions by subtracting customers' expectations score from service providers' perceptions of clients' expectations. A negative G score indicates that the service providers underestimate customer's expectations. A positive G score indicates that service providers overestimate customers' expectations.

The population was divided into two groups - clients using M&E services and providers of M&E services. The clients' group and the service providers' group were then subdivided into various categories and a random sample was selected from the telephone directory. Fifty questionnaires (Form A) were issued to client organisations and fifty questionnaires (Form B) were issued to service providers' organisations.

## RESULTS

A satisfactory 21 (42%) and 13 (26%) responses were obtained for form A and B respectively. The majority of responses were from commercial organisations (6 firms or 28%), followed by education organisations, three from government departments, two from health organisations, two from industrial companies, one from a hotel and two others. The 'others' group included one financial firm and an airport authority. The majority of the M&E services providers who responded were from electrical firms, followed by plumbing firms and air-conditioning firms. The majority service users in the sample were from the commercial sector.

The mean number of properties maintained by the client respondents was 143 (range 1-2500) with the maximum number of properties maintained by providers for principal clients was 51 (range 6-200). 18 (out of 21) client organisations occupy and maintain the properties, with 13 client organisations being responsible for the maintenance of the properties only and 11 being the single

user of the properties. There was an even spread of clients over the various sectors (commercial, retail, hotel, industrial, etc).

The statements (in both the expectations and perceptions sections of questionnaires Form A and Form B) were grouped into the five dimensions as shown in Table 1. The mean, variance and standard deviations of the expectations and perceptions for the five dimensions of service quality for both clients and service providers groups are tabulated in Table 2. All scores are based on a 7-point Likert scale.

The SERVQUAL values for the five dimensions were obtained by average the respondents' scores. This overall measure, however, does not take into account the relative importance of the various dimensions to the clients. The overall weighted SERVQUAL score taking into account the relative importance of the dimensions is summarised and tabulated in Table 3. This shows the overall expectation scores of the clients and service providers group to be 5.87 and 6.08 respectively. The overall perception scores of the clients and service providers group are 5.11 and 5.81 respectively.

Fig 1 shows the level of satisfaction of overall service quality obtained from the clients regarding current building maintenance (M&E services) indicating, with a mode of 8, that a generally high level of satisfaction exists. Table 4 summarises the perceived importance of the determinants of service quality, showing a preponderance of clients (41%) and service providers (32%) favouring "The company's ability to perform the promised service dependably and accurately".

According to Parasuraman et al (1985), quality is a comparison between expectation and performance. Therefore, assessing the quality of service (SQ) by using SERVQUAL developed by Zeithaml et al (1990) involves computing the differences between the ratings customers assign to the paired expectation/ perception statements. Table 5 is the analysis of service quality, which is computed by:

$$\text{SERVQUAL Score} = \text{Perception Score} - \text{Expectation Score}$$

This is shown in Table 5 both unweighted and weighted to take into account the relative importance that clients attach to the various dimensions.

The discrepancy between clients' expectations and service providers' perceptions of those expectations (G) is computed by:

$$\text{Gap Score} = \text{Provider's Perception of Client's Expectation Score} - \text{Client's Expectations Score}$$

Table 6 provides the weighted score of service quality gap (G) which captures the discrepancies between clients and service providers on both expectations along the five dimensions of the relative importance of the dimensions.

Table 7 gives the matrix of correlations between overall expectations, overall perceptions, level of satisfaction and overall service quality, while Fig 2 provides a plot of the service quality and service gap values together with their trend line, indicating quite a high degree of correlation ( $r=0.43$ ).

## INTERPRETATION AND DISCUSSION

The results show that there are discrepancies in expectations and perceptions between service users and service providers. Both the clients' group and the service providers' group perceived service quality to be below expectations. However, it is surprising to find that the levels of expectations and perceptions obtained from service providers were generally higher than those from service users – indicating that the providers generally over-estimated customers' expectations.

Both the clients' group and the service providers' group rated reliability as the most significant variable out of the five determinants of service quality. Clients' group weighed importance of reliability at 41 percent out of 100 percent while service providers' group evaluated reliability at 32 percent out of 100 percent. However, the scores for this dimension given by clients were more varied – as indicated by the larger standard deviation.

Responsiveness was the second important factor in the evaluation of service quality. The providers have a better prediction of clients' expectations in this dimension. From Table 3, it can be seen that tangibles and empathy are of lesser importance to the clients' group, while the service providers' group considered all other determinants: tangibles, responsiveness, assurance and empathy, to be similarly important.

Tangibles and empathy were the least important dimensions. It is noted that the service providers' group weighted the tangibles 5 percent more than the clients' group. However, the scores of responsiveness, tangibles and assurance dimensions obtained from service providers' group were very close. These results are consistent with question 2 and 4 – Expectations and Perceptions sections.

The result of overall service quality score is generally consistent with the result of the level of satisfaction. The overall service quality is  $-0.64$  (unweighted) and  $-0.75$  (weighted) which implies that the perception of service is below clients' expectation. However, all dimensions except reliability are potentially close to clients' expectations.

From Table 5, the gap score between dimensions varies from  $-0.45$  (empathy) to  $-0.99$  (reliability). Reliability and responsiveness dimensions incurred greater negative SQ scores. Reliability is directly affected by the organisation's resources base in terms of budgets and systems while responsiveness is directly affected by commitment and professionalism.

It is also noted that from Table 5 that the unweighted scores for reliability and responsiveness are  $-0.99$  and  $-0.85$  respectively. However, the weighted scores for reliability and responsiveness are  $-0.41$  and  $-0.16$ . Therefore, reliability is the most important dimension which providers should look into and improve in order to meet clients' expectations since clients put substantial weighing on that dimension. From Table 5, it can also be seen that expectations for all dimensions except reliability are below six (on a scale from 1 to 7). It indicates that clients' expectations are generally low.

The amount of discrepancy between the providers' perception of expectations and clients' expectation indicates the level of understanding and knowledge the providers have about their clients' expectation. The overall service quality gap score indicates that the providers overestimate clients' expectations. Theoretically, this should result in a higher overall service quality. In fact, a negative service quality score is obtained. Thus, the positive gap score does not imply that the service quality meets clients' satisfaction.

From Table 6, the reliability dimension, which is most important dimension of service quality, has a negative gap score of  $-0.44$ . Tangibles dimension has a positive gap score of  $0.39$ . These scores suggest that the providers do not allocate their resources effectively to meet clients' requirements.



## CONCLUSION

Many organisations view service quality as only a support mechanism, rather than a viable competitive strategy. An alternative approach is to devise a service quality program in which process and product are differentiated to obtain a competitive advantage. This involves the consideration of marketing, as well as production, issues. Of particular importance are the perceptions of the recipients, or customers, of the service. Reichheld and Sasser (1990), for example, found that companies increased profits by almost 100 percent by retaining just 5 percent more of their customers. Providers whose clients are insufficiently satisfied, on the other hand, provide expansion opportunities for organisations that are more competent. Providers with a clear sense of clients' expectations, therefore, are in a better position to provide the service that meets those expectations which in turn results in a higher level of service quality. Consequently, the consideration of client satisfaction has been found useful in analysing weaknesses in the strategy of the firm or its competitors.

Satisfaction is widely viewed as involving both perceived quality and expectations. Perceived quality is an important antecedent of satisfaction while expectation has a very weak negative relation with satisfaction. The level of satisfaction is also positively related to the service quality and service quality gap. This approach provides a systematic benchmark for future improvement.

In applying gap analysis to a small sample of clients and providers, it was found that:

- service providers generally overestimate client expectations of the quality of service to be provided
- service performance of current providers is generally below clients' expectation
- the reliability dimension is considered by both clients and service providers to be the most important variable of service quality
- in contrast with the service providers, the clients considered tangibles less important than the other three dimensions of responsiveness, assurance and empathy.

This demonstrates the potential of the method. The overall conclusion of this analysis is that the providers have, to some extent, lost touch with clients' needs and expectations. Clearly, the providers here need to work closer with their clients to (1) better align themselves with client expectations and (2) better meet those expectations.

What the method did not reveal was the level of agreement between client-respondent pairs ie., clients and providers for each other and it would be useful to incorporate this analysis in future work. Another extension of the work would be to compare the results obtained from managers and those in the workforce as this would provide a valuable validity check as well as revealing differences in perceptions.

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<b>Dimension</b>	<b>Statements pertaining to the Dimension</b>
<i>Tangibles factor comprised three items :</i> Up-to-date equipment Physical facilities that will be visually appealing Neat in appearance	Statements 2.1-3 /4.1-3
<i>Reliability was represented by four items:</i> Will do something by a certain time as promised Show sincere interest in solving problems Provide the service at the time promised Perform the service right the first time	Statements 2.4-5, 2.8-9/4.4-5, 4.8-9
<i>Responsiveness was formed by four items:</i> Tell clients exactly when services will be performed Give prompt service to clients Respond to clients' requests Willing to help clients	Statements 2.6-7, 2.10-11/4.6-7, 4.10-11
<i>Assurance included four items:</i> Behaviour of employees instil confidence in clients Clients feel safe in their transactions Employees consistently courteous with clients Employees have knowledge to answer clients' enquiries	Statements 2.12-15/ 4.12-15
<i>Empathy comprised three items:</i> Operating hours convenient to clients Give clients individualised attention Understand specific needs of client	Statements 2.16-18 / 4.16-18

*Table 1: Statements pertaining to the dimensions*

SERVQUAL score		Clients			Service Providers		
		Mean	Variance	Standard Deviation	Mean	Variance	Standard Deviation
<b>Expectations</b>	<b>Tangible</b>	5.29	0.88	0.94	5.97	0.94	0.97
	<b>Reliability</b>	6.11	1.82	1.35	6.46	0.44	0.66
	<b>Responsiveness</b>	5.79	1.54	1.24	5.85	0.96	0.98
	<b>Assurance</b>	5.81	1.66	1.29	6.02	1.16	1.08
	<b>Empathy</b>	5.86	1.54	1.24	5.72	1.35	1.16
	<b>Overall</b>	5.77	1.28	1.13	6.01	0.84	0.92
<b>Perceptions</b>	<b>Tangible</b>	4.98	0.54	0.73	5.81	0.98	0.99
	<b>Reliability</b>	5.12	1.12	1.06	5.73	0.86	0.93
	<b>Responsiveness</b>	4.94	0.71	0.84	5.52	0.70	0.84
	<b>Assurance</b>	5.18	0.71	0.84	5.75	0.89	0.94
	<b>Empathy</b>	5.41	1.21	1.10	5.94	0.87	0.93
	<b>Overall</b>	5.13	0.63	0.79	5.75	0.68	0.82

*Table 2: Comparison of Clients' Expectations and Perceptions with Service Providers' Perceptions of those Expectations and Perceptions*

<b>SERVQUAL score</b>		<b>Clients</b>	<b>Service Providers</b>
<b>Expectations</b>	<b>Tangible</b>	0.69	1.08
	<b>Reliability</b>	2.51	2.07
	<b>Responsiveness</b>	1.10	1.11
	<b>Assurance</b>	0.87	1.02
	<b>Empathy</b>	0.70	1.02
	<b>Overall</b>	5.87	6.08
<b>Perceptions</b>	<b>Tangible</b>	0.65	1.05
	<b>Reliability</b>	2.10	1.83
	<b>Responsiveness</b>	0.94	1.05
	<b>Assurance</b>	0.78	0.81
	<b>Empathy</b>	0.65	1.07
	<b>Overall</b>	5.11	5.81

*Table 3: Weighted Expectation and Perception Scores for Clients and Service Providers*

<b>Determinants of Service Quality</b>	<b>Clients</b>	<b>Providers</b>
The Appearance of the company's physical facilities, equipment and personnel	13%	18%
The company's ability to perform the promised service dependably and accurately	41%	32%
The company's willingness to help customers and provide prompt service	19%	19%
The knowledge and courtesy of the company's employees and their ability to convey trust and confidence	15%	17%
The caring, individualised attention the company provides its clients	12%	14%
	100%	100%

*Table 4: Summary of Question 3*

<b>Dimensions</b>		<b>Perception Mean</b>	<b>Expectation Mean</b>	<b>SERVQUAL</b>
<b>Unweighted</b>	<b>Tangible</b>	4.58	5.29	-0.71
	<b>Reliability</b>	5.12	6.11	-0.99
	<b>Responsiveness</b>	4.94	5.79	-0.85
	<b>Assurance</b>	5.18	5.81	-0.63
	<b>Empathy</b>	5.41	5.86	-0.45
	<b>Overall</b>	5.13	5.77	-0.64
<b>Weighted</b>	<b>Tangible</b>	0.65	0.69	-0.04
	<b>Reliability</b>	2.10	2.51	-0.41
	<b>Responsiveness</b>	0.94	1.10	-0.16
	<b>Assurance</b>	0.78	0.87	-0.09
	<b>Empathy</b>	0.65	0.70	-0.05
	<b>Overall</b>	5.12	5.87	-0.75

*Table 5: The Analysis of Service Quality*



<b>Dimensions</b>	<b>Provider Expectation Mean</b>	<b>Client Expectation Mean</b>	<b>G</b>
<b>Tangible</b>	1.08	0.69	0.39
<b>Reliability</b>	2.07	2.51	-0.44
<b>Responsiveness</b>	1.11	1.10	0.01
<b>Assurance</b>	1.02	0.87	0.15
<b>Empathy</b>	0.80	0.70	0.10
<b>Overall</b>	6.08	5.87	0.21

*Table 6: Analysis of discrepancy between clients' Expectations and Service Providers' perceptions of clients' expectations (weighted)*

<b>Correlation Coefficient</b>	<b>Expectations</b>	<b>Perceptions</b>	<b>Level of Satisfaction</b>	<b>Service Quality</b>
<b>Expectations</b>	-	-0.05	-0.19	-0.84
<b>Perceptions</b>	-	-	0.73	0.57
<b>Level of Satisfaction</b>	-	-	-	0.57

*Table 7: Pearson Correlation Matrix between Expectations, Perceptions, Level of Satisfaction and Service Quality*

*Fig 1: Level of Satisfaction of overall service quality*

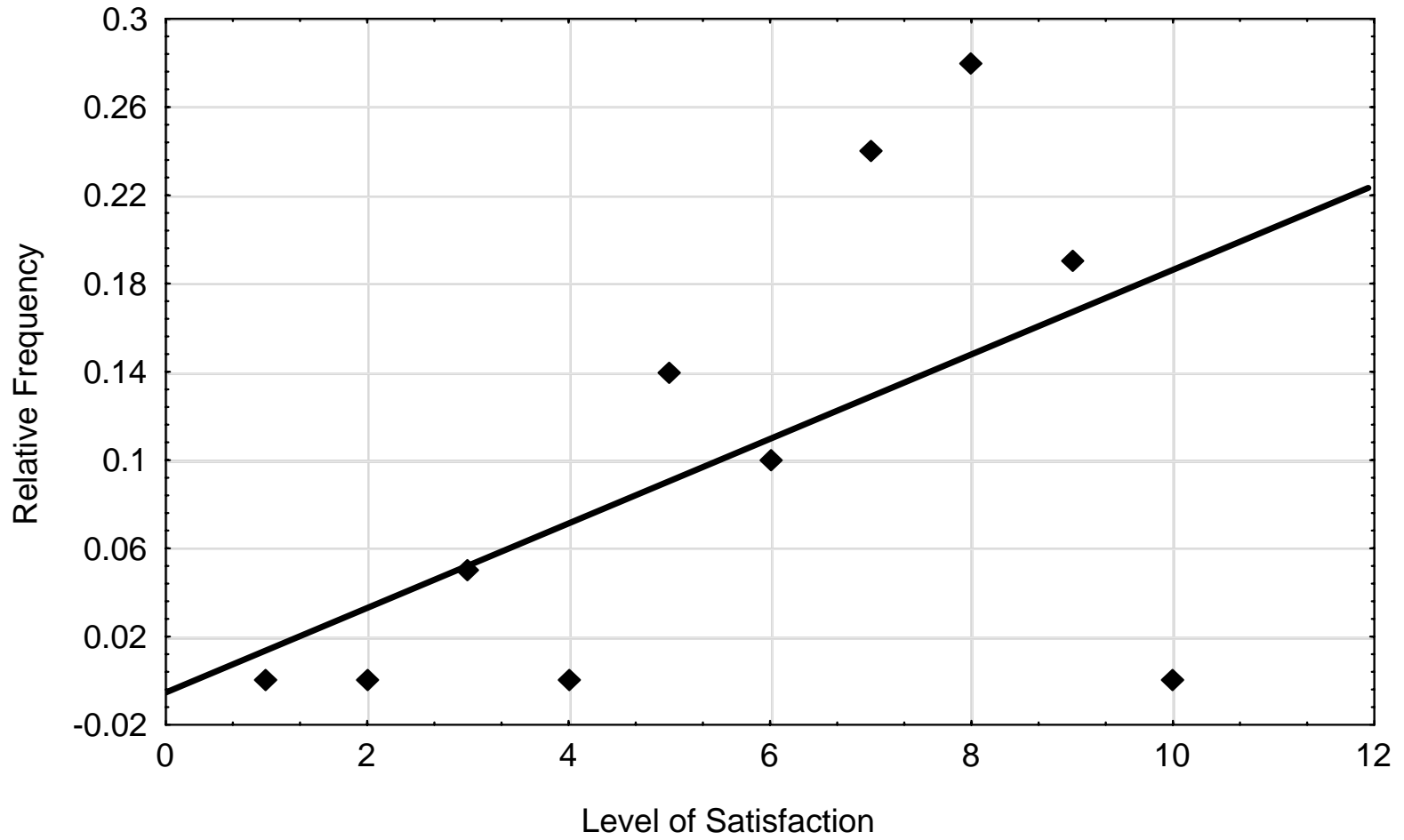


Fig 2: Correlations between G and SQ

