

Challenges for Improvement of Quality in Construction of a Growing Economy

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Abstract

This paper highlights the results of a questionnaire survey amongst contractors and contracting consultants in a growing economy. The survey was intended to explore the problems that the employees think might affect the quality of construction works. Thirteen factors known to have some bearing on the quality of construction have been identified through literature and were used as a basis for the survey.

The findings of the survey revealed that there is a need to focus on the human factors in addressing the quality issue. The four most problematic factors indicated by the respondents are lack of information, time constraint, lack of teamwork and poor communication. The results indicated the importance of a unified force; an enhanced coordination flow and improved teamwork are required to achieve the project quality objectives. A quality system will not succeed unless both the technical and humanistic aspects are addressed. These are some of the challenges that construction-related organisations must address to continually improve their quality of products and services to be able to compete aggressively in an environment where the quality requirements are always rising.

Keywords: *quality, construction, human aspect, questionnaire*

Introduction

The organisational structure of any company is a function of the collective functions of all employees, albeit from the top management to the general workforce. Any attempt to implement a quality effort by only concentrating on formal policies and procedures is naive and can lead to a failure in its implementation. As in any attempt to improve the management system such as through changing the procedures, implementing revised policies, buying new technology and upgrading the information system, the organisation will not get the much desired outcome without the commitment of fellow employees (Burati *et al*, 1989).

The importance of human factors within an organisation has been emphasised for quality improvement. Managers and chief executive officers (CEOs) of many companies have come to realise that to make quality work, their employees and subordinates should be the forerunners who carry the quality flag with them. In the past, only the technical attributes were given emphasis in the quality improvement programmes of construction companies. Ciampa (1992) mentioned that there are two vital components of total quality; one component is technical and the other, human-related. In short, emphasising on technical aspects alone is not adequate for the improvement of quality in organisations because when

quality-related problems occur in the running of plant and equipment, it also implicates the humans that handle these items.

It appears that the more complex the organisational structure is, the more effective its quality management system becomes due to the informal multi-relationships which exist in a complex or matrix structure that allows for flexibility to adapt to change and innovation (Pheng and May, 1997). When there is a cordial relationship between the upper and lower management of a company, the company's concept of quality management system would be easily conveyed and understood. The quality concept should be constantly explained by the Quality Manager and top management until it is integrated into the employee's scope of work. When there is an increased understanding and knowledge of the quality management system by employees, quality can be improved further and significantly.

Diverse management factors such as support from senior management, appropriate leadership style, cultivating employees' enthusiasm and participation, open communication and feedback should be managed properly to achieve an effective quality management system in the construction industry. The primary goal of managers is to influence the behaviour of their subordinates in order to achieve predetermined goals. Managers should motivate their workers and, for many organisations, this is problematic. The relevant and adequate motivation factors are sometimes not as apparent as they should be. The problem is aggravated by the fact that some managers do not want to take that extra step to enquire with their subordinates as to what these factors are, and this situation is present in the construction industry.

There are numerous systems and tools of quality management that a company can adapt as its work system or process. Examples are ISO series, Malcolm Baldrige National Quality Award, European Quality Award, Quality Control Circle and Just-In-

Time. This list is by no means exhaustive. These methods (with their inherent advantages and disadvantages) can be successful in improving the quality level of a company provided the company has evaluated carefully the approach chosen. Integration between good human attributes and technical process is deemed necessary in order for construction companies to achieve total quality success.

This paper presents a study conducted via a questionnaire survey amongst construction contractors and contracting consultants. The survey intended to explore the problems that employees think might affect the quality of construction works. The emphasis of the survey was on the importance of human factors for improvement in quality.

Methodology

Research on the attitudes and understanding of human nature was accumulated through the literature review. To gather the additional data, a questionnaire survey was conducted, targeted at different groups of construction employees. The questionnaire survey had a target group of the lower to middle management level of personnel and 1,000 contractors and consultants were shortlisted. The names of companies were obtained from CIDB Directory, the internet and newspapers. A total of 489 companies agreed to participate and the necessary details were obtained. The rest of the companies had either moved, or ceased operation, or had their contact addresses changed, could not be traced or simply did not respond. The 489 survey forms were sent out and 241 responded. The target group involved site supervisors, technicians, site engineers, design engineers, project engineers, quantity surveyors, field surveyors, QA/QC supervisors and assistants, document controllers, contract personnel, site and main office administration personnel. The survey was sent out through the mail and some personally delivered to the

construction personnel. This exploratory research was done with the intention to find out the problems that employees think might affect the quality of works.

Problems affecting the quality of works

An effective quality management system will be extremely vital as the demand for better quality at lower costs and shorter completion time is not uncommon in construction industry today. Lim (1993) stated that higher productivity in construction is an essential ingredient of Singapore's competitive position in the work economy, and from the authors' observation, so is Malaysia. Lim (1993) mentioned that productivity gains will arise from improvement in three areas namely technology, management systems and human relations. Based on the literature review, thirteen factors that can affect the quality of work were used. An understanding on how these factors may affect the quality is important as it could help the organisation in improving the quality of production. As the human aspects contribute significantly in the quality improvement effort, the companies should find ways to understand their employees better. The survey on employees was conducted based on the thirteen selected factors as described in the following sections.

Poor leadership

McGregor (1985) suggested that generally a manager's behaviour would be driven by his or her assumptions or theories about human nature. His research led him to believe that almost all managers subscribe to one or the other of two basic theories, which he labelled as Theory X and Theory Y. Supporters of Theory X maintain that the average employee has an inherent dislike of work and will only make an effort to achieve the company's objective if threatened, punished or coerced. Theory Y on the other hand, suggests that the average employee is not averse to physical work. The failure of management to secure cooperation and

coordination adds to difficulties in implementing quality systems. Commitment and support, together with a thorough understanding of the organisation's quality management system are essential to create the culture and climate for initiation which contribute to changes, innovation and improvement. Employers must be flexible to accept contributions on changes and innovation from their subordinates. Some managers have a conservative attitude and mindset which believes that change and innovation are threats to the stability of the organisation. Employees at the lower levels are discouraged from contributing because of the belief that top management should already have known and considered all possibilities of change and innovation leading to quality improvement. Arditi and Lee (2003) anticipated that good leadership would help to establish the foundations for the quality system of a company.

Lack of Understanding of Managers

Beng *et al* (2000) cited wrong understanding and misinterpretation of the top management as reasons why quality management failed in companies and related his reasons to the following beliefs held by managers:

- a) the belief that quality means goodness or luxury;
- b) the belief that quality is intangible and therefore not measurable; and
- c) the belief that the problems of quality originated from the workers.

Unfriendly working culture

The unfriendly working culture of the company might lead to a feeling of non-belonging among the employees toward the company. If the employees are not openly asking the question of 'what's in it for me?' (Caulcutt, 1995), perhaps the managers should reflect on the reason for their silence. A company culture that does not encourage openness may suppress creativity, contribution and cooperation.

Lack of Training

A manpower survey conducted by the CIDB in Singapore in July 1995 reported that 62% of contractors viewed training as investment, while 38% still viewed it as expenditure. It is estimated that each contractor spent an average of S\$600 per professional staff and S\$500 per technical staff in 1990 for training purposes (Lim, 1993). If employers invest more in staff training and development, it would help to ensure that the employees are aware of the relevance and importance of their activities and how they can contribute to the achievement of the company's quality objectives. Training that emphasises on better communication, teamwork, or even on self improvement courses for example, should be implemented as all these aspects will directly affect the work of every employee.

Poor communication

Good communication will improve the day to day dissemination and access of information within the company because the responsibilities of people in construction are better defined (Leon, 1994). Effective communication in the construction industry is not easy since this industry involves different trades of people, skilled, semi-skilled, professional, direct labours, foreign workers and others. Improved relationship between employees and employers should be emphasised to create a better environment for the quality improvement.

Lack of recognition

Recognition is regarded as the vitally necessary component of any quality programme and it is often overlooked or conducted improperly. Done correctly, it becomes the shining star of the entire integrity system (Crosby, 1996). When one achieves a target set by the company, he should be recognised by the company as doing a job well done. This recognition is rather important to fulfil both the esteem and self-actualisation needs as in Maslow's theory (Maslow, 1970).

Lack of full authority

Empowerment means to enable, to allow or to permit, and can be conceived as self-initiated as allowed by superior(s) (Pheng and May, 1997). Empowerment is the process of enabling workers to set their own work related goals, make decisions and solve problems within their sphere of responsibility and authority. Empowerment is the authority to take control and make decisions (Hodgetts, 1993). Company's emphasis on empowered teams has helped Motorola to flatten its structure (by eliminating unnecessary hierarchical levels of management) and get things done faster and less expensively (Hodgetts, 1993). Thus, employees will be discouraged to work efficiently, if they are not being given full authority in performing their work. The lack of authority can also indirectly affect their quality of work. In this regard, Irani *et al* (2002) have identified that workers' empowerment represents a challenge for many managers.

Lack of Teamwork

'Coming together is a beginning, staying together is progress, and working together as a team is success' (Miller and Brown, 1993). Teamwork is necessary because it encourages the immediate exchange of support and information. In a construction workplace, in order to achieve completion of any work, teamwork is very important as no part of the job can be completed by a single operator. Therefore, employees must have the ability to work in teams as it can help to improve the quality of works and services provided by the company. However, it has to be appreciated that it is not easy to develop teamwork since the managers and employees vary considerably on several key individual characteristics (Patti *et al*, 2004).

Language barriers

This factor was added as the second author had observed that it has resulted in communication problems that can affect

the quality of work. Since Malaysia is a multi-racial country with many foreign labourers, the employees might face language problems in communication. This is especially true for site employees, as they are usually from a lower education background. In fact, some of the site employees have not been through formal education. Ahmad and Schroeder (2002) suggested that the managerial level 'should pay close attention to prospective employees' behavioural traits and their fit with the TQM philosophy', and 'should not limit their attention to potential employees' technical skills'.

Other factors

Every human being makes errors in their life everyday and there will be no way of making completely sure that this error does not occur. Wantanakorn (1999), among other things, has identified time shortage, information overload and information quality as the main causes of human errors in construction industry. *Time shortage, or time constraint*, is almost unavoidable in the construction industry. For instance, it is the contractor's obligation to complete the works on or before the contractual date for completion so as to avoid the liquidated damages. As a result of rushing to complete the work, human errors may occur because there is not enough time available for detecting and correcting errors. *Information overload* is said to be happening when simultaneous and continuous submission of information goes beyond the employee's capacity to take, receive and process it. Information overload will make the employees overworked and overstressed. *Poor information quality or lack of information* will also cause human errors in the construction industry. The employees must also be informed of the company's quality objectives in order to enable them to provide their full commitment to the goals of the organisation. According to Jackson (2004), the 'commitment of employees to the goals of the organisation is a critical component of any total quality programme'. It is also

directly related to *ineffectiveness of the company's quality system* regarding the procedures of transmitting instructions from one person to another. An effective quality management system is one which adopts customer-oriented strategies and has an organisational form which can respond efficiently to customer preference (Pheng and Omar, 1997). Therefore, causes such as time constraint, overwork and overstress, lack of information and an ineffective company's quality system must be avoided as they could directly affect the quality of work.

The Survey

The respondents were required to rate on a scale of 1 to 10 whether the items listed in the questionnaire have occurred and affected the quality of their work, with a score of 1 denoting the lowest and 10 denoting the highest level on problem magnitude. Generally, all items were rated with average importance of 5 to 6. The responses indicated that all the items identified for the survey and listed in the questionnaire are problems experienced as having affected the quality of the respondents' work. The method of analysis for this questionnaire uses the average problem index and highest ranked index.

The average problem index is calculated for each item using the formula:

$$\text{Average problem index} = \frac{\sum x}{n}$$

where x = the value rated by the respondent, from a minimum of 1 to a maximum of 10, and
 n = total number of respondents

The highest ranked index is defined as the total number of respondents who have rated one factor at the highest scale as compared with other factors. In other words, highest ranked index is the sum of all respondents who have ranked that particular factor highest as compared to other items. Therefore the highest ranked index can only be tabulated where there is one item from

the comparison items being rated highest. For example, if one respondent gave a rating of 5 for all the 13 factors, the highest ranked index will not take this data for calculation; whereas if one respondent gave a rating of 8 on the item of poor leadership and a rating of below 8 for all the balance of 12 factors, then poor leadership is the highest ranked item for that particular respondent.

The general view of the respondents pertaining to the problems is graphically shown in Table 1 and Table 2. Data on the average problem index and the classification of different jobs of the personnel are presented in Figure 1 to Figure 5. Problems that have been identified and have affected the quality of the works by the employees in the construction industry as rated by the respondents are presented and discussed. The most problematic issues are presented based on the most serious followed by the less serious as rated by the respondents.

Survey Results and Discussion of Findings

Lack of information

Lack of information has been rated as the most problematic factor among the respondents. Having an average problem index as 5.82, this factor also has the top score for the highest ranked index with a value of 78. This means that almost one third of all the employees revealed that this is the most problematic factor. Most personnel in the construction industry, regardless of their job, strongly agree that lack of information is the most serious problem. Lack of information can lead to serious problems in the construction work. For on-site construction work errors can occur if the most up-to-date information is not received. It is typical that a design changes several times during the duration of a construction project. There are many cases where the latest information is not obtained by the supervisor in charge and later resulted in wrongly constructed work. There are also cases where important

information was not given to the respective involved parties. For example, information given from the designer to the main contractors, but was not transmitted to the subcontractors. All these problems have resulted in many obstacles in construction sites such as delays and poor workmanship.

Time Constraint

As most of the construction projects are bounded with limited time of construction, many managers would tend to stress on their workers to perform their job as quickly as possible, and usually with the sacrifice of quality. All contractors are subjected to LAD (Liquidated and Ascertained Damages) in their contracts, a penalty equivalent to the number of days delayed that shall be imposed on the contractor in the event that the works are not completed on time. With the imposed penalty, all contractors will try their best to complete all their contractual works on time and as soon as possible. And since many managers still believe that quality work carries a price tag with it, they will usually stress their workers to do only the necessary work; the quality of the work does not have to be so good, as long as it is acceptable. Time is of essence to many construction projects. Regarded as the second most problematic factor, this item scores an average problem index of 5.62 and the highest ranked index equal to 78. Employees claimed that work has to be completed very fast and therefore there is no time for quality.

Lack of teamwork

The success of a project is determined by the collaboration of its workers. As it is heavily emphasised in many companies, safety is everyone's responsibility, so is quality. Teamwork generated by the employees will therefore play an important role in the whole process of the construction project. No one can be self-centered in performing a job as any work, especially in large construction projects, involves too many activities and everyone has to depend on others to fully complete a job. Teamwork

has been heavily rated by the respondents, providing an average problem index of 5.56. Obtaining a ranking as the third most problematic, almost a quarter of the respondents selected this factor as their most problematic factor in their work.

Poor communication

All information has to be communicated to the respective parties before the job can start. If there is any breakdown in the communication passage, problems will definitely arise. Poor communication was rated an average problem index of 5.30, obtaining a ranking as the fourth most problematic problem. It seems that in most construction companies, it is inevitable that communication problems will occur, either between the staff in the same department or inter-departmentally. Some of these communication problems are due to poor mode of communication. For example, the process of information updating is slow and not through any formal process, and is also due to the personnel characteristics of the employees. Communication barrier does exist among many of the employees. If all employees are willing to communicate effectively among each other, not only can they share and discuss problems but also they will tend to understand each other better and later form a closer relationship.

Problem of Overwork and Overstress

In the construction industry especially the construction site, people are normally working under extreme conditions, unfriendly working environment and unpleasant site conditions. Competition among companies, locally and globally exists and, therefore, employees are usually used up to their fullest for the benefit of their company. Therefore, it is not surprising that the local construction employees ranked 'being overworked and overstressed', a relatively high position of fifth as their most problematic factor. This problem scores an average problem index of 5.21

Poor leadership

Improvement and changes can come about when there is commitment and support from top management. Employer's attitude and leadership qualities are essential to create the culture and climate for initiation which contribute to changes, innovation and improvement. The factor 'poor leadership' has an average problem index of 5.16 with 52 out of 241 respondents ranking this as their highest ranked index. The respondents viewed that poor leadership qualities and lack of management skills had created a boundary for them to perform better quality work.

Lack of recognition

Quite a high number of respondents claimed that they are not being appreciated by their employers and their hard work and extra effort being put into their job are not recognised. They usually viewed that appreciation and recognition should be in terms of salary/incentive increments, job progression or even a mere word of appreciation and thanks from their managers. This factor is viewed as the seventh most problematic issue and has an average problem index of 5.10. The first author's experience showed that when the employees felt that they are underappreciated and the company does not seem to care about them, or when their needs are unfulfilled and they have a feeling of dissatisfaction, they will just work at a stagnant pace and would not put out extra effort for the company.

Managers not understanding

The characteristic of the direct superior or managers of the employees will play an important role in affecting the work performed by the employees. They would also appreciate if their managers are more understanding towards their feelings and their problems. Some managers are not understanding and are unwilling to listen and the welfare of the employees is not well taken care of. With an average importance

index of 5.04, the respondents rated this as their eighth most problematic issue.

Not given full authority

Employees who are not given full authority in their work will be impeded in performing their job better. Authority will make them feel more responsible and in command of their work. They would feel that it is their duty to perform their job well as the company has placed all trust in them. This factor of authority obtained a ranking of ninth and had an average problem index of 5.02. The site/office personnel rated highly on this factor, where this factor appeared to be their fifth most problematic aspect.

Lack of training

With the average problem index showing a value of 4.96, lack of training only ranks a mere tenth on the list. This proves that adequate training has been conducted in many of the construction companies that responded and the employees believed that they were capable of doing their current work. However, although this factor was not considered as a very major problem, an average importance index indicating a value near to 5 is still classified under the region of 'problem' by the respondents.

Ineffective quality system

The quality system of the company will outline and determine the overall success of the quality implementation of the company. If the quality system is ineffective and regarded as not feasible, the quality effort will eventually fail because many non-conformances may arise leading to certification problem. Ineffective quality system was rated as the eleventh most problematic factor showing an average problem index of 4.94. The office based job category rated highly for this factor, indicating this factor as their fifth most problematic aspect. This result proves that many of the office construction employees felt that the quality system being implemented in the company was ineffective.

Unfriendly working culture

A pleasant and comfortable working culture, where employer-employee relationship is not sour and the work environment is well-maintained, plays an important role in creating a workplace where the employees felt safe, relaxed, comfortable and easy going. The working culture in a company is generally a cumulative sum of many factors, from all the systems in the company, the organisational structure, the leaders, the people, the job, etc. A friendlier working culture will eventually give a feeling of belonging of the employees towards the company. Having a ranking of twelfth and an average problem index of 4.93, unfriendly working culture was rated as not too important as compared to other factors. Generally, the working culture in the construction companies seems to be good or in a tolerant condition and has not reached a level where it is affecting the quality work of the employees.

Language barriers

Since Malaysia is a multi-racial country, the employees might face language problems in communication. This is especially true for site employees, as they are usually from a lower education background. In fact, some of the site employees have not been through proper formal education. Language barriers might result in communication problems and this can cause errors in construction. This factor was ranked as the least problematic factor by the respondents, showing an average problem index as 3.80, a figure far lower than the rest of the factors.

Conclusions

The improvement of quality in construction has to do not only with the development procedures, techniques, concepts or standards, but also with the influence of the attitudes, the mentality and the understanding of human behaviour. To improve the quality of the services in construction, it is necessary to adopt an integrative approach in looking into the

social or human aspects of improvement in quality. Total and full commitment is necessary from all parties in the construction team, regardless of their hierarchical status, towards the quality improvement. Every construction team member has to be aware of the quality effort being put in by the company. The purpose is to recognise the importance of a unified force, enhance the coordination flow and satisfy teamwork in achieving the whole quality objectives.

As technology advances, construction has become more complex and technical. The relationship and contractual groupings of those involved are complex and contractually varied. The findings of the research perceived that one of the construction company strategies is to align the internal operation of the organisation, including the allocation of human, physical and financial resources, to achieve the total quality culture. An effective construction quality management system today must combine technical improvements with the human sciences of people and their relationships. A quality system will not succeed in full unless both the technical and humanistic aspects are addressed.

An in-depth study as to what cultural factors can positively and negatively affect the quality management implementation, ways to encourage a project-wide quality management, and the cost of failure to implement an acceptable level of quality to the construction industry and the society are suggested for future studies.

To achieve continuous improvement may be difficult for some construction companies, but this discomfort should be tempered by the thought that the organisation is setting this formality in place for the future, as quality improvements are critical to any construction company's future competitiveness.

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Type of responses	Number of responses	Percentage (%)
Site-based work	44	18.3
Office-based work	104	43.1
Site and office-based work	86	35.7
Others	7	2.9
Total	241	100.0

Table 1 : Profile of Respondents

Challenges for Improvement of Quality in Construction of a Growing Economy

Problems	Total no of responses										Total	Average problem index	Highest ranked
	Not a problem					Very problematic							
	1	2	3	4	5	6	7	8	9	10			
Lack of information	11	26	23	21	31	21	34	18	23	30	238	5.82	78
Time constraint	11	22	24	31	29	30	24	24	15	26	236	5.62	78
Lack of teamwork	16	21	29	27	35	22	22	24	16	29	241	5.56	60
Poor communication	25	24	32	21	31	19	20	28	9	30	239	5.30	62
Overworked and overstressed	20	15	37	31	36	22	23	25	12	18	239	5.21	48
Poor leadership	22	35	34	17	26	19	24	18	15	27	237	5.16	52
No recognition	24	27	32	25	37	17	20	18	17	22	239	5.10	43
Managers not understanding	21	33	35	20	31	19	24	24	12	19	238	5.04	43
Not given full authority	18	32	33	24	30	29	25	22	13	13	239	5.02	46
Lack of training	19	33	29	22	34	32	20	17	13	14	233	4.96	40
Quality system ineffective	19	32	36	23	39	16	26	22	11	15	239	4.94	32
Unfriendly working culture	22	41	33	18	29	24	18	23	11	21	240	4.93	42
Language barriers	55	46	33	14	25	21	14	10	9	8	235	3.80	25

Table 2 : Ranking of responses

Figure 1 - Comparison of overall average problem index

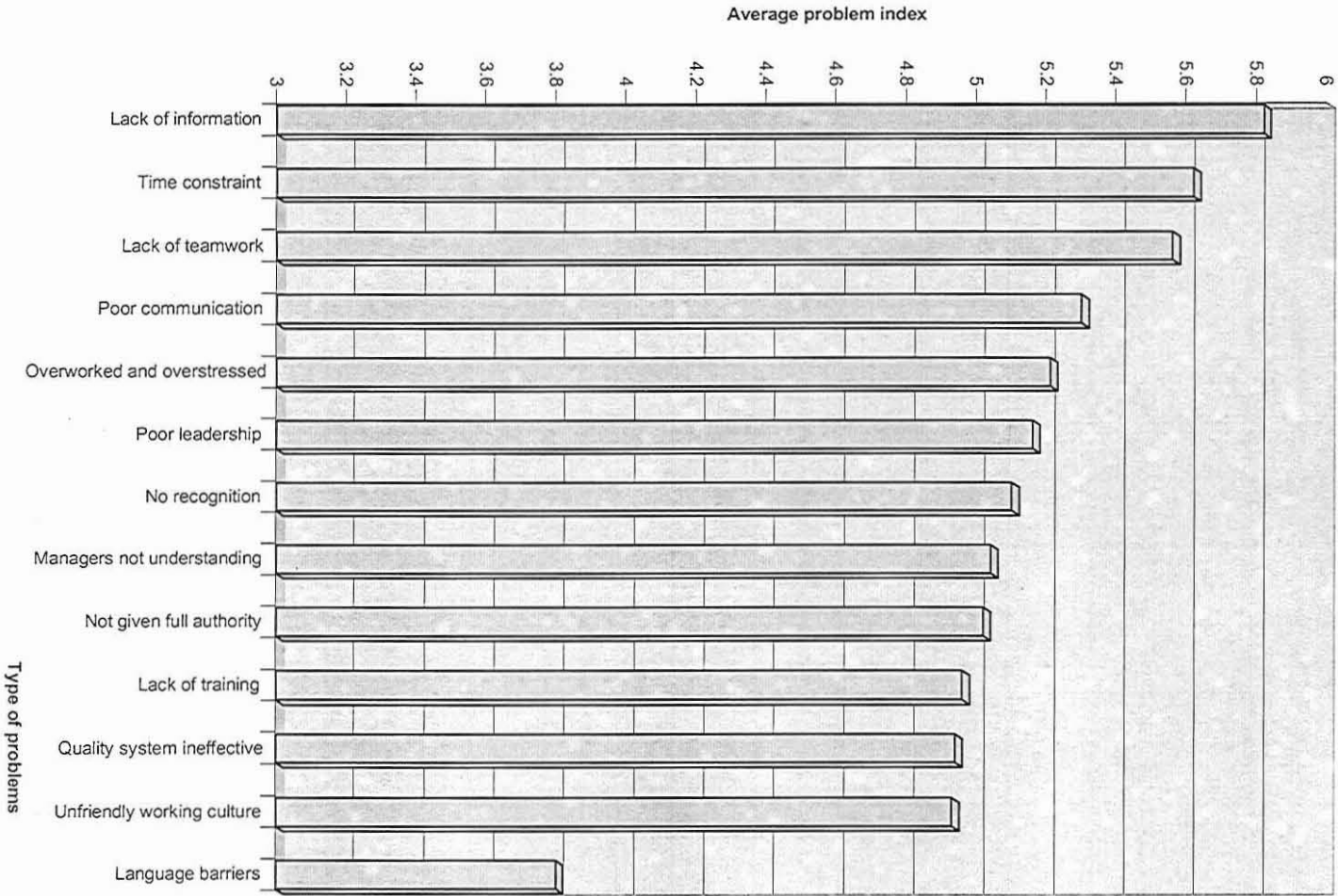


Figure 2 - Comparison by job using highest ranked index

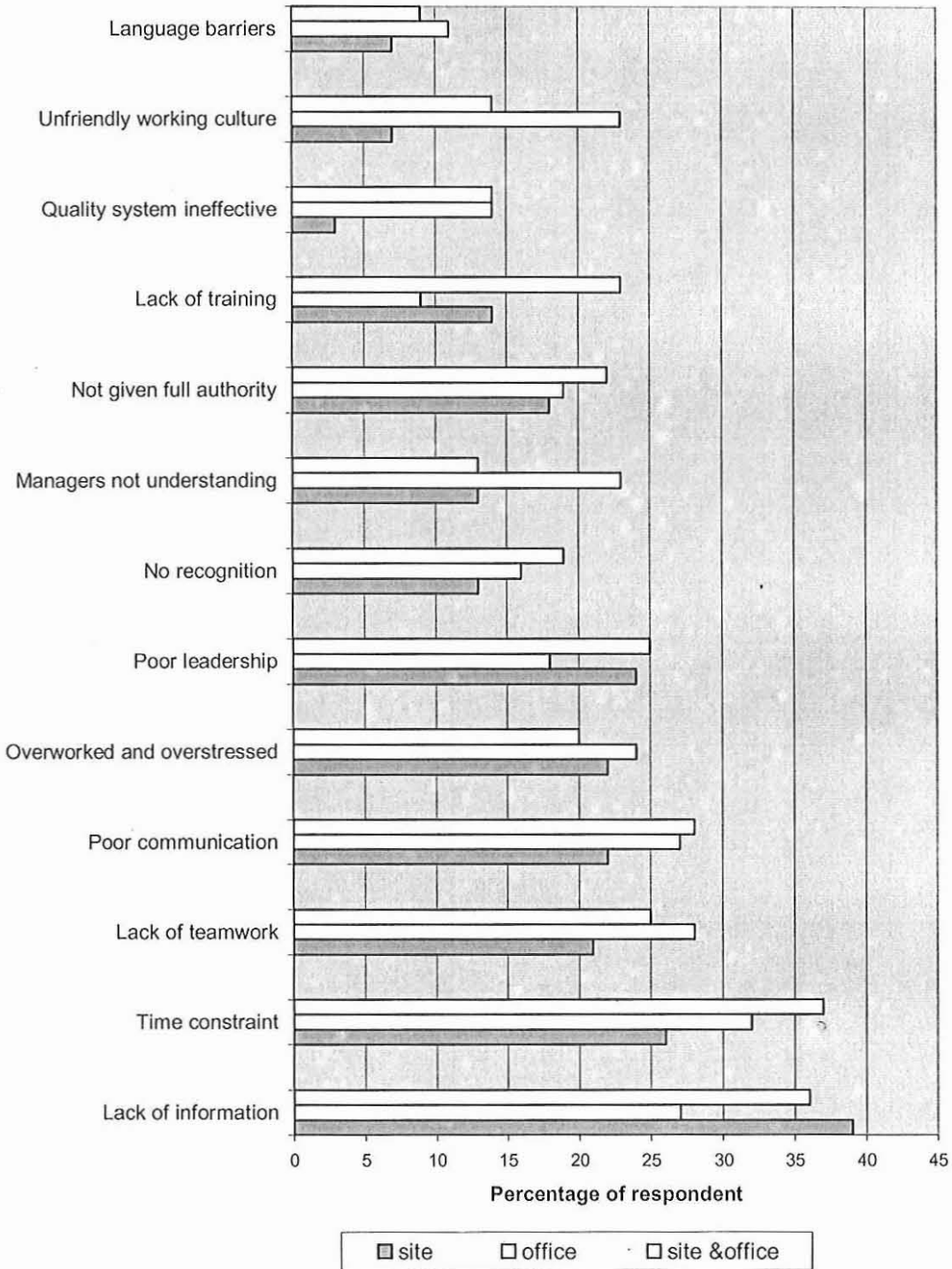


Figure 3 - Problems affecting the quality of work - job classification (site/office)

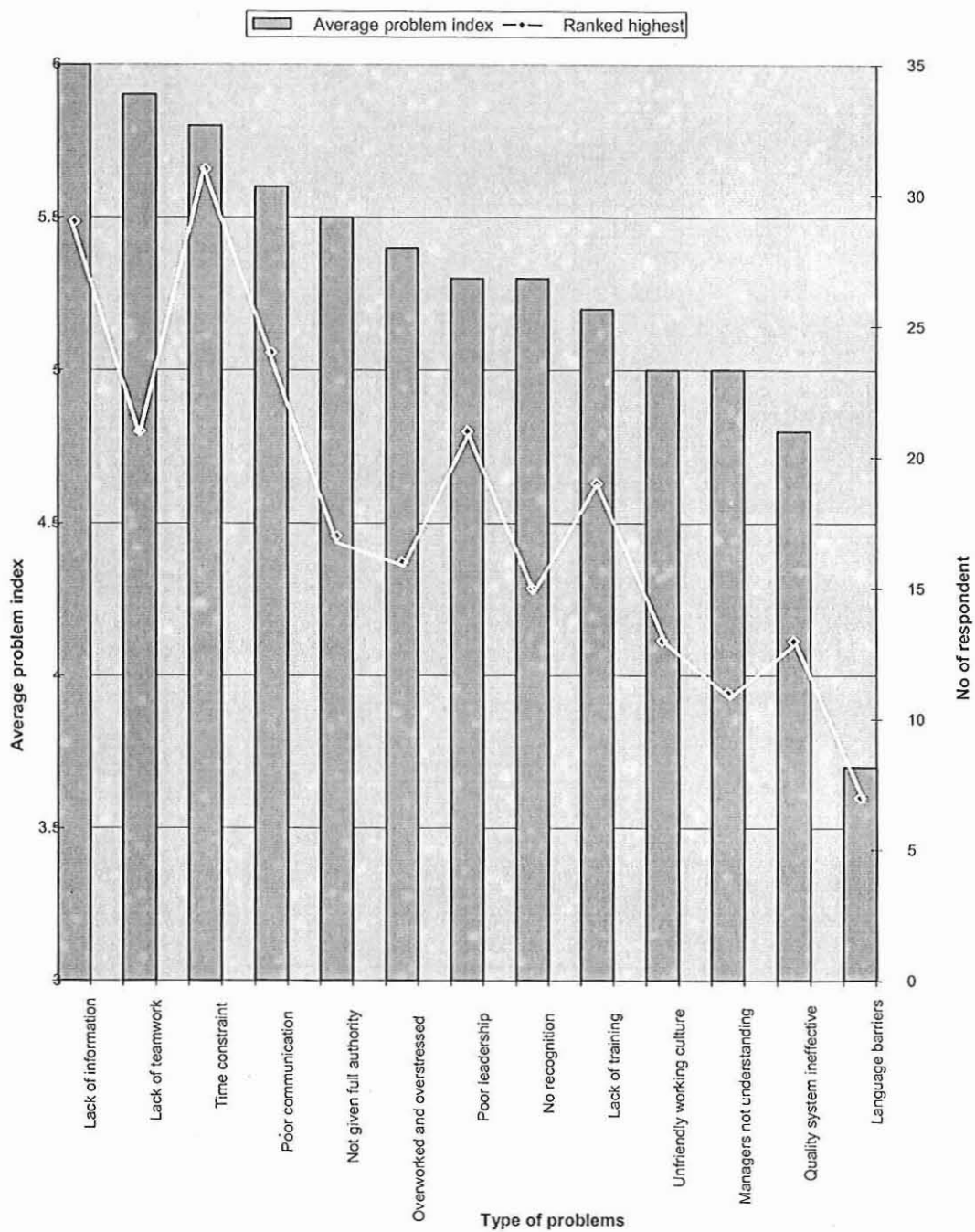


Figure 4 - Problems affecting quality of work - job classification (office)

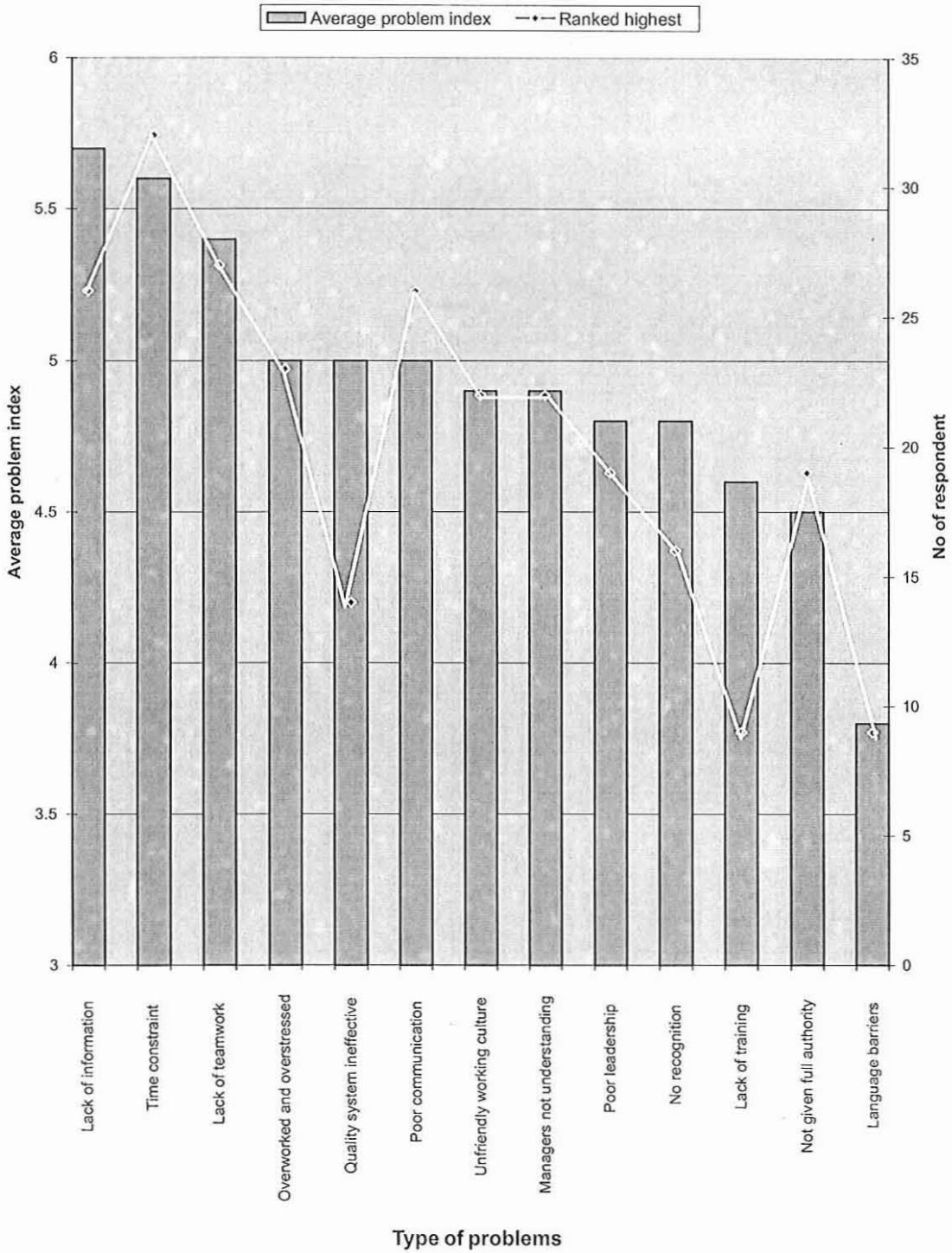


Figure 5 - Problems affecting quality of work - job classification (site)

