# Correlations between sime qyality management practices and internal knowledge transfer

**UDC 005.6:005.94**

**Dragan Manasijević, Živan Živković, Ivan Mihajlović**
*University of Belgrade, Faculty of Engineering in Bor, VJ 12, 19210 Bor, Srbija*

*This paper analyzes the relationship between the degree of implementation of the different quality management (QM) practices, knowledge transfers and firm's performance. The proposed model and the hypotheses were tested on a sample of 102 managers from 34 Serbian firms. The analysis of obtained results was conducted using Structural Equation Modelling (SEM). The results confirm the importance of the teamwork and process control as QM practices on internal knowledge transfers and strong positive correlation between internal knowledge transfers and firm's performance.*

## 1. Introduction

Quality management (QM) is one of the most important research issues in the field of operational management [1] as well as in academic circles [2,3].

The relationship between QM and financial and business results has been the subject of numerous research works [4].

In this work, our aim is to explore the relationship between quality management and business operations from a different point of view. Here we analyse the implications of various areas of quality management upon the knowledge transfer within the firm. The relationship between the QM field and business is not analysed directly, but on the basis of improvements in internal processes whose importance in generating competitive advantage has already been presented.

The aim of this work is to prove the thesis that there is a relationship between the implementation of QM and organizational business operations. We follow the same research methodology used by Molina [5] and collaborators. Whatever the importance of knowledge management within the firm [6], there are only few empiric studies on its relationship with QM [5]. In the current study we analyse the impact of QM practices upon knowledge transfers, having in mind that the extent to which the firm employs knowledge transfers is taken as a key one in explaining the differences in business operations among firms.

This paper begins with a review of literature on QM and knowledge transfer. Then, on the basis of literature data, we analyse to what extent the QM and the knowledge transfer fields are interrelated and certain hypotheses are set. The fourth chapter deals with the description of the methodology, and then the results are presented. The paper closes with the discussion on the results and a conclusion.

## 2. Quality management and knowledge transfers

### 2.1 Quality management

Quality management is defined as a management approach consisting of a "set of complementary principles, in which each principle is characterised by a set of areas and techniques" [7]. In the area od business operations [8], this approach distinguished itself from other strategies by its features. In order to determine the level of QM implementation in a firm, we have to analyse the fields that are possible to observe and estimate in QM, since we deal with very general principles, whereas, on the other hand, techniques are extremely detailed [9].

Since the earliest works of Saraph and collaborators [10], many a study relied on the literature on quality management in an effort to identify different types of key areas of QM and develop measurement tools to analyse the QM implementation in the firm. The review of the studies was conducted by Haynak [4]. The studies have shown that QM includes the methods needed to improve both the firm environment and the relationship between the firm and the given environment. It also includes the areas related to the technical amd social sections of the firm.

In the field of the firm's relationship with its environment QM plays an important part in the cooperation with the suppliers and the consumers alike. When talking on the cooperation with the suppliers and the consumers, we have in mind the organizational inclination to take part in non-competitive activities with the consumers and the suppliers, as well as to cherish good rapport with them [11]. One of the basic ideas of QM is a premise that the firm functions as an integrated (unique) system [8]. This idea on the system, however, is not confined only to the relations existing within the organization. It is also valid in the relations the firm establishes with the outer world. The total value chain of the product is thus viewed as one system, and so it must be viewed, for the purpose of its optimisation; after all, such a quality of the product should be achieved that will satisfy the customer [12]. Schonberger [13] maintains that, in accordance with QM, the firm is actually a part of the supplier-customer chain.

In a strictly internal arena, QM includes the areas related exclusively to the firm's social component, the areas such as autonomy and team work, then the areas entailing technical issues, such as the process control. Team work means a tendency to solve tasks within the group, rather than individually. Autonomy refers to the groups or individuals' capabilities of being relatively independent and self-confident in accomplishing their tasks. The process control means explaining organizational tasks to people who are to accomplish them, as well as investigation into the sources of unintentional errors [14].

## 2.2 Knowledge transfer

According to Darr [15], knowledge transfer is defined as a learning proces in which one organizational unit learns from the experience of the others. The internal knowledge transfer points to the fact that the unit providing the knowledge is situated within the firm. This field of research has recently become very interesting and includes studies that deal with both understanding of the transfer process, and identification of the factors that may enhance or hinder the transfers [16]. The factors determining the extent to which knowledge transfers may be easy or complicated may be classed into factors related to the source units only, factors connected with the recipient, factors related to the connection between the source unit and the recipient and factors related to knowledge only.

According to Krone [17], any communication consists of the following elements: message, sender, code system, communication channel, recipient and the decoding system. Frome these elements factors are derived to explain in a simplified way both the transfer and knowledge characteristics (message) which the sender wishes to send as well as the difference between the two unit systems of coding.

## 3. Postulating hypotheses and modelproposed

### 3.1 QM team work and internal knowledge transfer

Structuring the firm into work teams is one of the basic principles of QM. Improving coordination means that people who contact most due to the tasks they are assigned cannot communicate among themselves using classic hierarchal mechanisms. Instead, they have to use some other ways of communication that mean a greater extent of adapting mutually [6]. Dean and Evans [12] maintain that the QM team effectiveness "consists of achieving the goals in quality area timely and of strengthening the relations within the team itself as well as within the organization as a whole". In order to achieve these goals, it is very important that the problem selection process and information search be improved. Improving the knowledge transfer is a necessary precondition for the team work within the firm to be successful. In addition to this, the field of human resources is closely related to knowledge transfers. Sparkes and Miyake [18] even stress that, once a valid communication among people has been established, knowledge transfer is taken for granted and happens indirectly. Team implementation is considered a fundamental element. Hedlund [19] states that organizations wishing to improve their knowledge managementshould consist of temporary constellations of workers, in which the lateral communication is dominant. When talking about temporary constellations, Hedlund has in mind the idea of the flexibility of human resource mobilization after the system of temporary work teams. Dougherty [20] maintains that implementing the team in the work enhances the creation of the image of belonging together, which actually helps knowledge transfers in the organization. Similarly, Crossan et al. [21] state that "action creates an opportunity to share common experience, which will lead to the development

of one way of understanding common reality".

Brown and Duguid [22] use the term *practical communities* to denote work groups created among the workers doing the same job. These communities should not be limitted to only one firm; on the contrary, they should consist of the members of different firms. Brown and Duguid think that "these groups of interdependent participants create a working context in which the members not only build their mutual identities, but also create a social context in which these identities are mutually shared and known, and the organization itself becomes something more than just a practical community". In such a way, by defining a shared (common) knowledge, work teams contribute to forming a common basis to which knowledge is transferred.

In a similar way Orlikowski [23] explains the way people acquire knowledge through practice, so that the practice of transferring knowledge within the group in order that a task be accomplished actually leads to acquiring that knowledge required for the transfer to be effected, both within one group and with other groups. In other words, the need to transfer knowledge in order that work be coordinated, in fact, creates knowledge necessary for the transfer.

Hansen [16] finds that the fewer the mediators in the relationship between two individuals that are not directly connected, the better the knowledge transfer. Here, structuring the firm into work groups shortens the communication chains, since it is no longer necessary that we stick to hierarchy in order to discover the possibilities other groups have already used.

Grant [24] finds that today's great interest in the team based structures is a result of the need to improve integration and knowledge transfer within organizations. According to Grant, QM is in fact a "technique based on team work that does not recognize hierarchy and that allows for the organization to approach the source of knowledge and use the individual's knowledge located in lower levels of the organization".

Having in mind all these we postulated the following hypothesis:

> **H1. The level of team work implementation within QM shows a positive correlation with the internal knowledge transfer**.

### 3.2 QM autonomy and internal knowledge transfers

The importance of decision making among workers is in the fact that, according to the QM doctrine, the sites where the best information are stored are the very ones where the decisions are made, which may very often mean that the necessary knowledge (information) is actually stored in workers themselves. Grant [24] maintains that the more implicit knowledge is, the less efficient hierarchy is, since no manager is capable of integrating the knowledge of his subordinates. Grant also suggests that "decisions demanding idiosyncratic implicit knowledge that is not easily transferred, should be made at the sites where the knowledge is stored".

QM requires that people make real changes in their way of work. Dean and Evans [12] comment that it is only the

employees who are included into the processes that possess the necessary understanding, which is an important reason for which such a large number of managers think that inclusion and autonomy of the employees are a very important part of quality marketing. Moreover, decision making normally requires integration of a large quantity of knowledge that is scattered all over the firm. This means that decision makers must serach for necessary knowledge within the organization, and then transfer that knowledge to work groups, where it is needed in a given moment.

Where decisions are made in the head office, information must be steadily and equally transferred throughout the organization. If, however, a large quantity of information apperas, workers' knowledge must be coded, summarised and shaped, so that the management can make decisions. Therefore, if workers do not enjoy a sufficient level of autonomy, there is a serious possibility that a powerful vertical transfer of coded knowledge or information appears, which may result in an extremely inefficient decision making process. Similarly, Teece [25] mentions that an efficient knowledge management requires not a bureaucratic, but a decentralised company structure.

However, when the employees enjoy an increased level of autonomy, the implicit knowledge transfers among various work units and groups must be at a high level, since the decisions must be made and implemented by the workers themselves. O'Dell and Grayson [26] maintain that it is necessary that the employees should be responsible for their own work in order that internal transfers should come to being.

Therefore, we propose the following hypothesis:

**H2. The autonomy level within QM correlates positively with internal knowledge transfers.**

### 3.3 QM processes and internal knowledge transfer control

Processes control within QM requires that people understand the organizational processes they conduct [10], and also makes involuntary errors identification possible [14]. In order to achieve these, QM implements a set of basic tools that include statistic control techniques (SCT). These tools supply the organization with important information as regards the key aspects of the processes carried on within the organization.

An important standpoint in the relationship between the QM processes control and internal knowledge transfers refers to the fact that a systematic implementation of the control process in the organization clearly affects the search for information, as well as the very knowledge transfer these processes are applied to. This is the first step to take towards knowledge transfer. Secondly, this helps identify the source of necessary information. Information as to the various processes carried out in the organization and the possibility of comparing and assessing this information facilitates work to a large extent and can serve as a signal system [26]. For this reason O'Dell and Grayson [27] maintain that "estimation of business activities may help when identifying some advanced area,

otherwise it may not be enough by itself". The importance of QM in the continual improvement of processes is great and those firms that implement QM will search for knowledge and use the knowledge they need [7].

Similarly, a systemic implementation of the same tools (instruments) in the firm will ensure that the language become common. One of the basic problems in the knowledge transfer is the need that the sender and the recipient both communicate using the same code system, the one they both understand. Therefore, when the knowledge transfer refers to goals, requirements or the flow of processes implemented among various groups, it is important that a language be used that is understood throughout the organization since this will enhance the transfer among the groups. Hence, when the costs and benefits of each transfer are viewed, we can say that the control process, especially the one including SCT, can help reduce the costs of transfer.

Another important viewpoint is the reduced risk for those who have to learn and, as the case may be, have to implement the acquired knowledge. This risk can be reduced when the recipient is certain (knows, sure) about the data accumulated, since in this case, and this is statistically proven, the transfer of implemented knowledge is highly efficient. Whether the words of the sender are believed to is not important; important is the quality of the data gathered. A lack of confidence in the real effectiveness of knowledge on the part of the recipient is a key problem of a satisfactory transfer of internal knowledge. Finally, the process control implementing SCT includes an attempt to decode part of implicit knowledge implemented in the processes. Knowledge that failed to be decoded when it should have been is a lost chance. The transfer is halted, although the decoding of knowledge would help improve the operations throughout the organization, as well as allow for the transfer and implementation of knowledge in other units within the firm.

Having this in mind, we formulated the following hypothesis:

**H3. The level (extent) of processes control implementation within QM has a positive impact upon internal knowledge transfers.**

### 3.4 Knowledge transfer and profitability ratio

A positive ratio between a better internal knowledge transfer and the firm's profitability is an amply studied theoretical issue, however, it is hardly mentioned in empirical studies. This ratio is supported by the fact that the transfer of best techniques and procedures improves the average operations of the firm [28]. Therefore, if the inefficient actions and procedures are substituted by the more efficient ones, the general performance of the organization will be improved, especially if we take into account that the differences in the firm's performance may be big even in case of one and the same process [28].

On the other hand, knowledge transfer from different members enhances integration and correlation among different workers. Thus, internal knowledge transfers help create a larger extent of familiar (mutual) terms and meanings understood by all the memebers of the firm,

creativity and transmission are increased and, finally, conditions are formed that workers collaborate well with less effort [6].

On the basis of the abovestated, we formulate the following hypothesis:

**H4. Internal knowledge transfers show a positive correlation with the firm's performance.**

## 4. Research methodology

### 4.1 Sample and data gathering

In order to test the hypotheses proposed, we conducted an empirical research in thirty-four firms in Serbia that introduced a quality system. The questionnaire was specially designed to test the relationship between the quality management and the internal knowledge transfer. 102 valid answers were collected. The answers were collected by means of personal interview, from May till July 2007. In all the cases that are taken as valid the respondents were quality managers or other very top managers in the firm. The managers were chosen to be respondents since they receive information from different departments, therefore they are a very important source of estimate of various variables in the organization. They also have the main role in forming and shaping these relations in that they define the type of behaviour that is expected and encouraged.

### 4.2 Questionnaire design

The questionnaire design was similar to one used by Molina and collaborators [5] in their research, and was composed on the basis of already published works [11]. It had 5 groups of questions related to team work, autonomy, process control, internal knowledge transfers and business operations. The total number of questions was 22 (see Appendix A).

#### 4.2.1 Team work

Three indicators were used to determine the extent of team work in the firm: a) to what extent team work is enforced by management; b) how often the firm implements team work in solving prblems; and c) in which way the firm uses interfunctional teams. Likert scale was used (1="never", 7="to a great extent").

#### 4.2.2 Autonomy

Four indicators were used to determine the extent of autonomy within the firm. The task was to find out: a) the extent of control over workers and the extent to which they themselves bear responsibility for their work; the extent to which the workers are encouraged to identify and solve problems related to work process; c) if the extent of autonomy in decision making is increased. Likert scale of seven figures was used to measure this group of answers.

#### 4.2.3 Process control

Four indicators wre used to determine the extent of process control present in the firm that is part of QM.

Likert scale was used again (1="never", 7="to a great extent") to find out to which extent: a) statistical methods are applied in quality control; b) whether the processes are performed in accord with the adopted attitudes and views on quality; c) whether the design of product/service and final quality are guaranteed; d) whether the employees are familiar with the statistic control techniques used in the process control.

#### 4.2.4 Internal knowledge transfer

The respondents were requested to mark the extent of transfer in different units of the firm, on a Likert scale (from 1="never" to 7="to a great extent"): a) goals and responsibilities; b) specific tasks/requirements; c) procedures presented in writing and practical guidelines on how to approach these procedures; d) practical implementation that was proven most efficient in accomplishing tasks; and e) clear recommendations and advice as to how to improve accomplishing the tasks.

#### 4.2.5 Business operations

We adopted the business operations measuring scale proposed by Murray and Kotabe [29]. The managers in the firms were asked about what they appreciate, again according to the Likert scale (1="much worse compared to competition", to 7="much better compared to competition").

## 5. Results

The data analysis was conducted using SE modeling (SEM-Structural Equation Modeling). To calculate and analyse data the LISREL880 (LISREL-Linera Structural Relationship) program was applied [30].

The assumed hypothetical model of positive impact of certain quality management components: team work (T), autonomy (A), and process control (PC) upon the internal knowledge exchange (transfer) (IKT) as well as a beneficial impact of IKT upon the firm's business operations (BO) is presented in Figure 1.
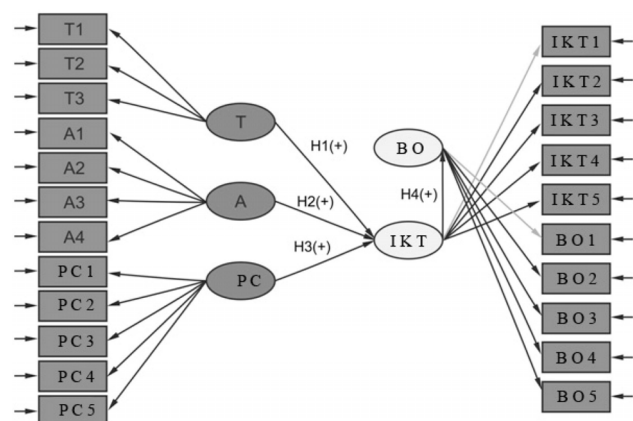


***Figure 1.*** *Hypothetical model of certain areas of quality management impact upon the internal knowledge transfer and the firm's business operations*

The values presented in Figure 1 mean the following:

T1, T2, T3 – variables from the questionnaire – team work indicators (T).

A1, A2, A3, A4 – variables from the questionnaire – autonomy indicators (a)

PC1, PC2, PC3, PC4, Pc5– indicators from the questionnaire – process control indicators (PC)

IKT1, IKT2, IKT3, IKT4, IKT5 – variables from the questionnaire – indicators of internal knowledge sharing (transfer) (IKT)

B1, B2, B3, B4, B5 – variables from the questionnaire – business operations indicators (BO)

T, A, PC, IKT, and B – latent variables of team work, autonomy, process control, internal knowledge transfer and business operations, whose cause-effect relationaships are subject of our research.

The structural analysis results are presented in Figure 2.

At the beginnning of the result analysis we analysed the values of the indicators obtained denoting whether the proposed model fits the starting data in a satisfactory way. The following indicators were analysed: Root Mean Square Error of Approximation (RMSEA) and Goodness of Fit Index (GFI).

The RMSEA indicator shows the approximation error and the lower its value is, the better the model fits the starting data. The acceptable model is characterised by the values of this indicator lower than 0.1. In our model, the RMSEA value amounts to 0.097 which is an acceptable value.

The GFI lies within the values 0 to 1. The higher the value of this indicator, the better the model fits the starting empirical data. The acceptable values amount to over 0.9. Therefore this indicator is acceptable for our model (GFI = 0.93).

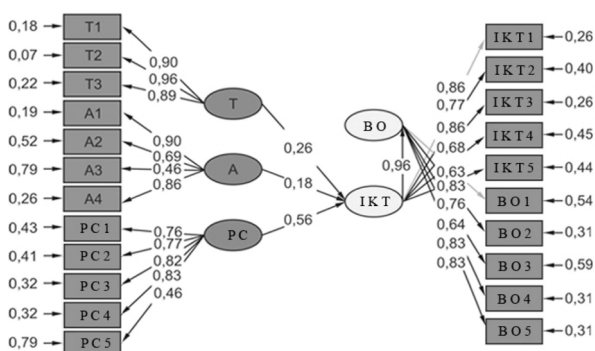Figure 2 shows the calculated path coefficients (correlation) between the variables observed.



*Figure 2. Calculated path coefficients for the model observed*

It is evident that in case of all the proposed hypotheses the respective calculated values of the coefficient paths are positive. Prior to concluding upon the acceptability of the hypotheses, the respective T-values had to be defined in order to test the statistical significance of the results obtained. In order to test the statistical significance

of the correlations obtained, T-values were calcualted for each path coefficient. For the T-value above 2, the calculated path coefficient is significant and in this way the assumed a positive correlation between the variables observed is proven. Figure 3 shows the calculated T-coefficient values:
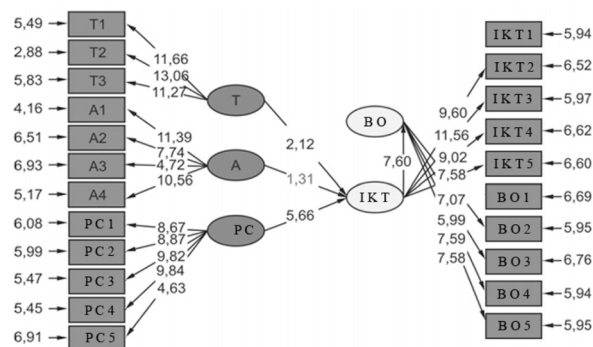


*Figure 3. t-values in the model observed*

The calculated t-values prove the hypotheses H1, H3, and H4. It is only a certain correlation in the case of ther H2 hypothesis (the autonomy level correlates positively with internal knowledge transfers) that is not statistically significant. Other relations proved to be significant to a large extent ($p<0.05$). The results prove the general hypotheses of the study; namely, the QM implementation in the firm has positive implications upon knowledge transfers. Similarly, a beneficial impact of internal knowledge transfers upon the firm's business results was proved.

## 6. Discussion

The first conclusion that can be drawn from this study is that the results prove a positive relationship between the team work within QM and knowledge transfer. This result can be linked with a need to form strong connections among the members of one team as well as among various teams. Thus the knowledge transfer is increased within the group, but also among the various organizational units.

In hypothesis 2 we assumed that the workers' autonomy is in positive correlation with internal knowledge transfer. Autonomy entitles individuals or groups to choose those procedures that suit their tasks best. In most cases the workers have the best knowledge of their work, as well as the best information on the validity of some areas and their implementation. Although a positive correlation between autonomy and internal knowledge transfer was proven, the significance of this result is insufficient to prove the hypothesis.

Furthermore, the study supports the hypothesis that the process control within QM aids knowledge transfers, making the firm's problems clearly visible and stressing the differences in efficiency among the various processes which are underway in the firm, and which are based on facts rather than on intuition. Similarly, the process control contributes to the search for more efficient processes and improves the level of knowledge coding in the firm. The relationship between the process control and internal transfers is verified, especially in case of the processes that are described.

The results presented in this report partly coincide with those of Molina and collaborators [5] who also identified an express positive correlation between the process control and knowledge transfer as well as between the knowledge transfer and the firm's business operations. The essential difference is that the positive correlation between team work and knowledge transfer, verified in this work is not equally verified in theirs, whereas in their work a positive impact of autonomy upon knowledge transfers was verified.

Results also show that the internal knowledge transfers are crucially important for the firm's business operations. QM increases the firm's capability of transferring knowledge. This capability means meeting the requirement for creating competitive advantages and it can be used to explain a powerful impact of QM upon business operations.

## 7. Conclusion

Our subject in this paper was to analyse the relationship among certain areas of QM, internal knowledge transfers and business operations. We started by listing the results achieved so far in the fields of quality management and knowledge transfers. On the bases of literature data four hypotheses were postulated, related to the SE modelling technique. The results obtained have shown that the mutual (joint) implementation of social and technical aspects of QM, such as team work, autonomy and process control has a paramount impact on knowledge management, especially on knowledge transfers. Applying the SE modelling helped prove the hypotheses on the positive impact of the QM elements, such as team work and process control towards an intensification of knowledge transfers within the firm.

The results of this work also support the thesis on a positive relationship between QM and business operations in a theoretical sense. We can conclude that, since QM has a positive impact upon knowledge transfers, its influence upon the firm's resources and capacities, as well as its competitive advantages is also positive.

# REFERENCE

[1] Filippini, R, Operations management research: some reflections on evolution, models and empirical studies in OM International Journal of Operations and Production Management, Vol. 17, No. 7, pp. 655-670 1997

[2] Chen, W. H., The human side of total quality management in Taiwan: leadership and human resource management, International Journal of Quality and Reliability Management, Vol. 14, No. 1, pp. 24–45, 1997

[3] Corbett, L. M., Rastrick, K. N., Quality performance and organizational culture: A New Zealand study, International Journal of Quality and Reliability Management, Vol. 17, No.1, pp. 14–26, 2000

[4] Haynak, H., The relationship between total quality management practices and their effects on firm performance, Journal of Operations Management, Vol. 21, pp. 405–435, 2003

[5] Molina, L. M., Llorens-Montes, J. Ruiz-Moreno, J. A., Relationship between quality management practices and knowledge transfer, Journal of Operations Management, Vol. 25, pp. 682–701, 2007

[6] Grant, R. M., Organization Science, Vol. 7, No. 4, pp.375–387, 1996

[7] Dean, J. W., Bowen, D.E., Management theory and total quality: Improving research and practice through theory development, Academy of Management Review, Vol. 19 No. 3, pp. 392–418, 1994

[8] Hackman, J. R., Wageman, R., Total Quality Management: Empirical, conceptual and practical issues, Administrative Science Quarterly, Vol. 40, pp. 309–342, 1995

[9] Sousa, R., Voss, C. A., Quality management re-visited: a reflective review and agenda for future research, Journal of Operations Management, Vol. 20, pp. 91–109, 2002

[10] Saraph, J. V., Benson, G., Schroeder, R.G., An instrument for measuring the critical factors of quality management, Decision Science, Vol. 20 pp. 810–829, 1989

[11] Flynn, B. B., Schroeder, R. G., Sakakibara, S., A framework for quality management research and an associated measurement instrument, Journal of Operations Management, Vol. 11, pp. 339–366, 1994

[12] Dean, J. W., Evans, J. R., Total Quality Management, Organization and Strategy. Wet Publishing Co., St. Paul. 1994.

[13] Schonberger, R. J., Building a Chain of Customers., Free Press, New York 1990.

[14] Ahire, S. L., Dreyfus, P., The impact of design management and process management on quality: an empirical investigation, Journal of Operation Management, Vol. 18, pp. 549–575, 2000

[15] Darr, E. D., Argote, L., Epple, D., Management Science, Vol. 41 No. 11 pp. 1750–1762, 1995.

[16] Hansen, M. T., Knowledge Networks: Explaining Effective Knowledge Sharing in Multiunit Companies, Organization Science, Vol. 13 No. 3 pp. 232–248, 2002.

[17] Krone, K. J., Jablin, F. M., Putman, L. L., Communication theory and organizational communication. In: Krone, K. J., Putman, L.L., Roberts, K. H., Porter, L. M. (Eds.), Handbook of organizational communication: an interdisciplinary perspective. Sage, Newbury Park, CA. 1987.

[18] Sparkes, J. R., Miyake, M., Knowledge transfer and human resource development practices: Japanese firms in Brazil and Mexico, International Business Review, Vol. 9 pp. 599–612, 2000

[19] Hedlund, G., A model of knowledge management and the n-form corporation Strategic Management Journal, Vol. 15 pp. 73–90, 1994

[20] Dougherty, D., Organizing practice-based knowledge in service organizations. Academy of Management Proceedings, paper TIM: C1. 2001.

[21] Crossan, M. M., Lane, H. W., White, R. E., An organizational learning framework: from intuition to institution, Academy of Management Review, Vol. 24 No. 3, pp. 522–537, 1999

[22] Brown, J. S., Duguid, P., Knowledge and Organization: A Social-Practice Perspective, Organization Science, Vol. 12, No.2, pp. 195–213, 2001

[23] Orlikowski, W. J., Knowing in Practice: Enacting a Collective Capability in Distributed Organizing, Organization Science, Vol. 13, pp. 249–273, 2002

[24] Grant, R. M., The knowledge-based view of the firm: Implications for management practice, Long Range Planning, Vol. 30, No.3, pp. 450–454, 1997

[25] Teece, D. J., Strategies for Managing Knowledge Assets: the Role of Firm Structure and Industrial Context, Long Range Planning, Vol. 33, pp. 35–54, 2000

[26] Morris, T., Asserting property rights: Knowledge codification in the professional service firm, Human Relations, Vol. 54, No. 7, pp. 819–838, 2001

[27] O'Dell, C., Grayson, C. J., If Only We Knew What We Know: Identification and Transfer of Internal Best Practices, California Management Review, Vol. 40, No. 3, pp. 154–174, 1998.

[28] G. Szulanski, G., Exploring internal stickiness: impediments to the transfer of best practice within the firm, Strategic Management Journal, Vol.17, pp. 27–43, 1996

[29] Murray, J.Y., Kotabe, M., Sourcing strategies of U.S. service companies: a modified transaction-cost analysis, Strategic Management Journal Vol. 20, pp.791–809, 1999.

[30] http://www.ssicentral.com/lisrel/index.html

## Appendix A: Questionnaire

Please mark (according to you) the extent to which you agree/disagree with the statements presented in the table and referring to the level of implementation of certain quality management areas in your firm.

### *Team work*

| 1 = "strongly disagree", 7 = "strongly agree" | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.Management encourages team work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Our firm uses team work to solve problems | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. Interfunctional team and group work are implemented in our firm | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

### *Autonomy*

| 1 = " strongly disagree ", 7 = " strongly agree " | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.Workers have control and responsibility for their work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Workers are motivated to seek solutions to problems they encounter in their work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. Workers' autonomy in decision making increases | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Workers have control and responsibility for their work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

### *Process control*

| 1 = " strongly disagree ", 7 = " strongly agree " | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.We implement statistical methods to estimate and control quality | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Organizational processes include mechanisms to ensure quality | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. New products/services design processes guarantee their final quality | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. employees responsible for conducting different processes in the firm are acquainted and skilled in using the process control techniques | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Variations in accomplishing tasks and processes within the firm are viewed as a way of business improvement | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

### *Internal transfer of knowledge*

Mark how often different kinds of knowledge, skills, techniques, information, etc. Are transferred or shared among work groups.

| 1 = "never", 7 = "to a large extent" | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Current goals, responsibilities or activities of the group | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Specific requirements of the project such as predicting sales, market studies and customer needs analysis | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. Procedures presented in writing and practical knowledge necessary to start these procedures (interpretation, term explaining, adapting to situation...) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Areas that proved most successful in their application | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Clear recommendations and *tricks* in improving operations | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

### *Business operations*

Answer the following questions, having in mind the situation in your firm in the past three years. Compared with the competition, how would you estimate the performance of your firm in terms of the following aspects?

| 1 = "much worse than competition", 7 = "much better than competition" | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.Profitability of the firm measured by the profits of acquiring assets | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Profitability of the firm measured by the profits obtained through own resources | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. Profitability of the firm measured by profits obtained from sales | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Placement of main products at the market | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Increase in sales of main products | 1 | 2 | 3 | 4 | 5 | 6 | 7 |