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Simultaneous consideration of contingency factors and quality management: An empirical study of Serbian companies

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The aim of the present paper is to answer whether the QM concept is universal or context-dependent, organic or mechanistic, and theoretical or practical in its essence. The study examines the impact of contingency factors on quality management in Serbian companies in order to find out the possible causes of failure, that is inadequate results of QM application and to recommend the companies how to harmonize their context with TQM principles. The starting point is that QM concept is not universally applicable, but context-dependent, so this is the reason why a model is assumed for relation between organizational contingency factors – environment, demographic variables, strategy, management style, organizational structure, technology applied, and employees' behavior, and QM critical factors. The model was tested by the structural equation modeling method using the sample of 111 Serbian industrial companies. Context-dependent nature of QM concept has been proved by confirming basic research hypotheses, through direct impact of organizational structure and employees' behavior, and by confirming accessory hypotheses for indirect impact of other contingency factors, such as environment, strategy, technology, and management style in the model. Quality management is directly dependant of mechanistic organizational structure (relation strength 0.657) and organic employees' behavior (relation strength 0.520). The other contingency factors exert their influence indirectly through mediation (the largest influence has strategy 0.500, followed by demographic variables and management style 0.380, then technology 0.240, and finally environmental factors -0.280 on lower level of significance). The results indicate that large companies achieve solid results relatively easily in QM area, while small- and medium-sized companies cannot achieve solid QM practice through the pathway of demographic variables and organizational structure. Therefore, it is recommendable for SMEs to take the "alternative road" through clearly defined strategy without risk elements, which further impacts technology (so it can alleviate unfavorable environment impact) and furthermore management style and employees' behavior. Also, it is noticeable that in more favorable environment the small-sized companies will additionally strengthen technology impact and thus achieve better QM practice. The present work also indicates that it is needed to combine mechanistic and organic principles, because high organizational structure with high formalization and specialization is a feature of mechanistic approach, while proactive behavior of employees with a strong spirit of collectivism is a typical feature of organic type.

Key words: Contingency factors, quality management factors, structural equations modeling.

INTRODUCTION

In a large number of companies the QM programs and standardization in the field of quality have not led to a

higher organizational efficiency, effectiveness and higher performances indicators. Results reported in Nakayo, Hikida and Sanada (1996), Hutchens (1996) and Sila (2007) indicate that QM program failure rate is higher than 30%. Over the past years, some researchers (Germain and Spears, 1999; Hair, Anderson, Tatham, and

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Black, 1998; Prajogo and Sohal, 2006; Saad and Siha, 2000; Sousa and Voss, 2001; Vickery, Drogba and Germain, 1999) have associated frequent QM program failures with contingency factors, denying the assumption on the concept universality. However, works available have comprised only a smaller number of contingency factors proving most often their connection with quality, but rarely employing mediation among the factors. Consequently, the goal of this study is to set up a comprehensive model of all contingency factors' impact on QM and to prove the existence of the given connections, thereby opening up the possibility of more successful QM application. Basically, it is set out from the fact that QM successfulness is conditioned by harmonized impact of contextual factors, including their mutual mediation, which will be proved using the experience of Serbian firms. Contingency approach to organization theory and practice was developed in the 1960s, and its testing and empirical promotion reached its peak in the 1980s. Today, works in the respective field are getting rare, while those in QM area have achieved their maximum in the numbers lately. The potential correlation between the two mentioned trends – contingency theory and QM – have been seldom considered, even though both concepts were developed with the same aim – to increase the firm's efficiency.

The common denominator of works in the contingency theory and QM fields is "a theoretical jungle". Just as Koontz, in one of his articles (1961) concerning organization theory, a flood of theories on scientific organization of work metaphorically calls "a theoretical jungle", referring to multitude of authors and various theoretical approaches in that field (Holt, 1999), so do Watson and Korukonda (1995) writing a work related to the QM area about theoretical jungle, and asking the questions whether the QM concept is organic or mechanistic, universal or context-dependent, and theoretical or practical in its essence. A definite answer to the questions posed by them and closely interrelated, has not been given to the present day. Therefore the aim of the present paper is to answer the following research questions:

Question 1: Is the QM concept universal or context-dependent?

Question 2: Is the QM concept organic or mechanistic?

Question 3: Is the QM concept theoretical or practical in its essence?

It is expected that responses to above questions, the goal of the study, will provide guidelines for QM application, context-dependent this time, which will raise the success rate of QM programs introduced.

LITERATURE REVIEW

In our opinion, Khandwalla (1977), although many years ago, has gone very far in his research proposing model of

organizational functioning. The model comprises all groups of contingency factors and is based on correlation analysis of factors proposed within the model. Within the framework of contingency theory, the correlations actually are confirmed by a volume of researches. The most prominent are Burton and Obel (1996); Child and Mainsfield (1972); Donaldson (2001); Germain and Spears (1999); Khandwalla (1977); Mintzberg (1979); Vickery et al (1999) and Woodward (1958), with the following conclusions about influence of company size:

- i. Impact of company size on the organizational structure is proved and described by correlation or path coefficient 0.50-0.70,
- ii. Impact of company size on specialization is described by correlation or path coefficient of approx. 0.60, and
- iii. Impact of company size on formalization is described by correlation or path coefficient of approx. 0.60.

Burton and Obel (1996) and Miller (1996) encompass the impact of technology on the company organizational structure. The correlation can be represented by linear dependency and quantified by correlation coefficient of approx. 0.30, which means that technology correlation with company organizational structure is much lower than company size correlation. The development of QM theory and practice proceeded as follows. Works of experimental character in QM field emerged in the late 1980s and early 1990s, so the first empirical study was by Benson, Saraph and Schroeder (1996). From 1989 to 2000, in English-speaking countries, 347 works dealing with TQM were published (Sila and Ebrahimpour, 2002).

The QM concept critical factors are also the subject of researches of scientific public. In their writings published from 1989 to 2000 Sila and Ebrahimpour (2002) conclude that 25 TQM factors can be recognized. A majority of studies, according to Sila and Ebrahimpour (2002), consider QM factors within one country, most often North America. A year later, the mentioned authors in their work in (2003) determine 18 TQM critical factors, based on search for key words and frequency of their use in 76 relevant works from 23 countries. In their work Karrupussami and Gandhinathan (2006) using Pareto analysis categorize TQM critical factors from literature available in the period 1989 to 2003. On the basis of 37 works, they identify 56 factors, of which a significant minority is constituted of 12 factors. Tsu-Ming Yeh et al. (2010) design a model, to help companies to diagnose the effectiveness and efficiency of TQM practices by considering the level of importance, the level of easiness to implement and the level of accomplishment of each TQM practice.

In the works Ahire et al. (2000), Esenciano et al. (2002), Germain et al. (1999), Kuei et al. (1997), Moreno Luzon et al. (1998), Quazi et al. (1997), Prajogo et al. (2001,2006), Saad and Siha (2000) and Sousa and Voss (2001,2002) it is pointed to the possibility of QM contingency-dependence. Studies were most commonly conducted on impact of one or two factors from a single

group of contingency factors, less commonly from the whole group, and weaker or stronger dependence was obtained. To that end, hypotheses testing, variance and covariance analysis, regression analysis, and post 2004, more often, structural equation modeling, were used, which enables positing the multiple relations of dependent and independent variables. The most commonly studied impacts are:

- i. Impact of company size on QM,
- ii. Impact of organizational structure on QM,
- iii. Impact of environment on QM, and
- iv. Impact of technology on QM.

However, they were studied, for the most part, in isolation without any mediation. To put it more precisely, impact of company size must be also transferred to QM via all factors affected by the size. In this regard, emphasis should be placed on the work by Germain and Spears (1999) who showed that company size and technology exercise positive and indirect impact on QM through organizational structure. In other available works the impact of size, technology, environment and organizational structure on QM has been proved, however, it is still unclear whether it is direct, indirect or covers up the impact of some other uninvestigated factor. Thus, a relation between company organizational structure and QM is described by various authors as follows:

- i. According to Madu (1998), the flatter the organizational structure (reduced hierarchy levels, but increased management range), the better QM indicators,
- ii. According to Germain and Spears (1999), with increased formalization, specialization and decentralization levels, QM practice is better,
- iii. According to Beyer et al. (1997), in initial stages of applying QM, mechanistic organizational structure should be put into use and later on elements of organic structural organization should be introduced, so as to radically change employees behavior, and
- iv. According to Lagrosen and Lagrosen (2003) in a simple organizational structure and adhocracy (small-sized companies), QM practice is poor, therefore machine or professional bureaucracy, or divisional forms should be exercised.

Impact of other contingency factors on QM has not been sufficiently studied in available literature.

THEORETICAL BACKGROUND AND RESEARCH FRAMEWORK

Research framework encompasses positing a model of contingency factors exercising the impact on QM that will indicate the context-dependent nature of the concept and

in that way show how QM works well. So, it is expected to obtain the answer to the question of organic and mechanistic nature of the concept.

Accordingly, the research goal is to set up a theoretical framework for interdependence of organizational contingency factors and QM critical factors on the basis of experimental research of contingency factors and management practice in Serbian industrial companies. The novel framework will enable to establish recommendations for QM management, this time context-dependent, that is the situation specific for each company. The research goal implies the achievement of a number of low-level goals, such as:

1. Definition of constructs and dimensions describing contingency factors and QM.
2. Setting up the submodels of contingency factors and submodels of factors describing QM practice by research hypotheses formulation.
3. Establishment of mutual impact regularity among contingency factors and QM factors using the sample of Serbian industrial companies.
4. Validity testing and control of established regularities in mutual impacts among the given groups of factors.
5. Model of regularity in contingency factors' impact on QM is a proposal for the novel improved model of QM system implementation methodology, depending on contingency factors' characteristics.

Contingency factors and QM constructs and indicators

The model set up where contingency factors and QM will be considered simultaneously demands first the definition of constructs and their indicators in the model, to be tested by statistical models afterwards. According to recommendations by Martinez-Costa (2008), we relied upon previous researches reported in literature. Contingency factors constructs and dimensions are defined according to Burton, Obel (1996,2000), Child et al. (1972), Donaldson (2001), Fuentes et al. (2004), Klarin et al. (2000), Lagrosen et al. (2003), Mintzberg (1983), Vickery et al. (1999), Woodward (1958), Wu et al. (2007) and Miller (1986,1996) and shown in Table 1.

Demographic variables are used to describe company size, age, ownership structure and type of activity. Company size, according to the serbian national law of companies is determined by number of employees, total revenue and asset value. In a volume of works, such as Burton et al. (1996,2000), Donaldson (2001), Germain et al. (1999), Khandwalla (1977), Mureno Lluzon et al. (1998), Sousa et al. (2001), number of employees is considered as the most prominent factor to describe company size. An additional, most commonly used criterion according to Mureno Lluzon et al. (1998) is total revenue or less commonly sales revenue. The age of a company

Table 1. Contingency factors' constructs and indicators.

Contingency factors constructs	Contingency factors dimensions
Demographic variables	Company size, age, ownership structure
Environment	Heterogeneity (different markets and types of consumers), dynamism (frequent changes in the environment), insecurity (grave threats for company survival), uncertainty (it is difficult to forecast trends of changes in the environment), technical complexity (frequent technological changes of complex environment are demanding product and process innovations), unfriendliness (strong competition), and restrictiveness (many limitations).
Strategy variables	Strategy elements: differentiation and product innovation, cost minimization, analysis of products, markets and consumers, and risking as a strategy dimension
Technology variables	Production massiveness level, operations automation level, IT application level, production program diversification, product complexity and technological level of technology applied against competitors.
Organizational structure variables	Number of hierarchy levels (number of layers), management range (span of control), technocratic specialization (because industrial companies are considered), spatial differentiation formalization, and decentralization.
Management style variables	Manager likes to delegate, gives general instructions for decision-making, is pro-active, focuses on long-term planning, risks if necessary, and more often motivates than controls employees.
Employees behavior variables	Pro-active/reactive culture (orientation to quality, innovation, pro-active thinking), soft/hard culture (describes employees interpersonal relations: good, informal, fellowship atmosphere), collectivism/individualism (collective spirit and good cooperation), and power decentralization/centralization (power participation and decentralization).

is a time period from the establishment of company to the initiation of research. Type of ownership designates social, state or private ownership of the company.

Environment is most often a source of diverse types of pressures on the company, so that it must adapt to assumed environmental factors. Environmental dimensions encountered in literature Burton et al. (1996, 2000), Cvijanovic (2004), Fuentes Fuentes et al. (2004), Khandwalla (1977), and Mintzberg (1979) are as follows: complexity, dynamism, opportunism, restrictiveness, turbulence, hostility, diversification, equivocalness, technical complexity, uncertainty, insecurity, un-friendliness, heterogeneity etc. Overlapping of some dimensions and describing the same phenomenon by its own antipode is noticeable, therefore it is possible to define the dimensions as follows:

1. Heterogeneity (different markets and types of consumers).
2. Dynamism (frequent changes in the environment).
3. Insecurity (grave threats for company survival).
4. Uncertainty (it is difficult to forecast trends of changes

in the environment).

5. Technical complexity (frequent technological changes of complex environment are demanding product and process innovations).

6. Unfriendliness (strong competition), and

7. Restrictiveness (many limitations).

Most studies consider the subject of adequate strategy selection through notorious strategy typologies. Miles and Snow propose categorization into defensive, prospective, analysis and reactive strategy (Ahire, Dreyfuss, 2000). Nicholson et al. in Burton and Obel (2000) add the type of hybrid typology that implies combination of defensive and prospective strategies. Burton and Obel (1996) divide the analysis strategy into two types: analyzer, with or without innovations. Lucas, Tan and Holt (2001) define the following strategy types: 1. risk strategy, 2. proactive strategy, 3. analysis strategy, and 4. defensive strategy. Porter defines typology that comprises differentiation strategy, cost-based leadership strategy, and strategy of focusing (Miller et al., 1986). In 1986, Miller et al. checked Porter's categorization using a large-scale sample

of 102 USA companies and obtains the results indicating that typological divisions are not that useful, for a number of strategy types are encountered more or less in a single company, although one being most often dominant. He also defines the following strategy dimensions: innovativeness, market differentiation, cost management and product, market and consumer analysis. Wu and Chen in their study in 2007 as well as Dess et al in (1997) conclude that strategy types must be combined to achieve optimal results. Segars et al. (1994) ascertain that IT users are not concentrated in a certain strategy type, but are found in all strategy types, except in the reactive one according to Miles and Snow. Fundamentally, all companies respond to uncertainty, dynamism and heterogeneity in the environment by some pro-activity together with product innovation and risks, certainly tending to reduce their costs, consequently it is inevitable to combine strategy types. Innovativeness and market differentiation contain very many coinciding elements, so they can be integrated, while risk strategy is not included in Miller's dimensions. Hence, the present work will consider the following strategy elements: differentiation and product innovation, cost minimization, analysis of products, markets and consumers, and risking as a strategy dimension.

Technology is basically divided into four dimensions as follows (Burton and Obel, 1996):

1. Manufacturing or service,
2. Custom technology, batch technology, mass production or continuous process technology (massiveness level/ production type),
3. Routine (simple problems with few exceptions) or non-routine (complex problems with very many exceptions), and
4. Divisible or non-divisible (divisible into independent/dependent tasks).

Some aspects of capacities levels in batch technology are analyzed by Klarin et al. (2000). Khandwalla (1997) adds that technology is also determined by operations automation level, IT application level, production program diversification, and product complexity. Escanciano et al. (2002) point out that it is useful to take into account the technological level against competitors within a branch of industry, and thus separate capital-dependent from non-dependent branches. The present work considers industrial companies, so basic technology dimensions to be analyzed are as follows:

1. Production massiveness level
2. Operations automation level
3. IT application level
4. Production program diversification
5. Product complexity, and
6. Technological level of technology applied against competitors.

Burton and Obel (1996) place emphasis on organizational complexity (horizontal, vertical and spatial differentiation), formalization, centralization and coordination and control as basic organizational structure dimensions. Germain and Spears (1999) consider formalization, technocratic specialization and decentralization. Vickery (1999) perceives number of hierarchy levels, management range and decentralization as basic organizational structure design parameters. Robinson enlists 13 most commonly mentioned and explained organizational structure dimensions (Cvijanović, 2004). Robinsons' 13 dimensions can be reduced to 3 basic ones: complexity, formalization and centralization. Organizational structure complexity involves horizontal, vertical and spatial differentiation. Basic organizational structures that will be discussed herein are parameters common to the studies of Burton and Obel (1996, 2000), Germain et al. (1999), and Vickery (1999), such as:

1. Number of hierarchy levels (number of layers)
2. Management range (span of control)
3. Technocratic specialization (because industrial companies are considered)
4. Spatial differentiation
5. Formalization, and
6. Decentralization.

Management style dimensions depict tendency of management to micro-involvement, so that manager with a low-level tendency to micro-involvement possesses the following characteristics (Burton and Obel, 1996):

- i. likes to delegate
- ii. Gives general instructions for decision-making
- iii. is pro-active
- iv. Focuses on long-term planning
- v. risks if necessary, and
- vi. More often motivates than controls employees.

The essential aim of management is to make employees, in its distinctive style, behave in a way management thinks they should, which means that desirable behavior of employees should derive from this. However, most often this is not the case, so it is needed to determine the dimensions of employees' behavior and study the correlation between management style and employees behavior. Fok et al. (2001) arrange employees behavior parameters into the following groups: a) pro-active/reactive culture (orientation to quality, innovation, pro-active thinking), b) soft/hard culture (describes employees interpersonal relations: good, informal, fellowship atmosphere), c) collectivism/individualism (collective spirit and good cooperation), and d) power decentralization/centralization (power participation and decentralization). We are inclined most to accept employees behavior dimensions as proposed by Fok et al. (2001), where they are grouped by means of factor analysis, so the present work will consider the following

Table 2. QM dimensions.

QM critical factors	Dimensions of QM critical factors
L: Leadership and management support for quality program	L1: Management assumes responsibility for quality L2: Care of Department manager for quality L3: Efforts of company management to improve quality L4: Goal setting and quality policy L5: Establishing regulation for quality L6: Management encourages employees to independently make decisions and introduce innovations L7: Motivating the employees and rewarding them for high-level of job done
OB: Training and involvement of employees	OB1: Responsibility of employees for quality OB2: Employees training as priority of the company OB3: Existence of financial resources for employees training OB4: Employees training to apply quality tools
SIST: Systemic approach and documentary evidence for quality system	SIST1: Availability of data on quality to each employee SIST2: Analysis of collected data on quality in order to improve it SIST3: Existence of Department of quality SIST4: Possession of documents for quality system
PROC: Process management	PROC1: Differentiation and description of each process in the company PROC2: Continuous monitoring of key processes in the company and their improvement PROC3: Determination of quality measure for each process in the company PROC4: Participation of machine operator in maintenance
ISP: Supplier quality management	ISP1: Relying upon a small number of reliable suppliers ISP2: Selection of certified suppliers ISP3: Participation of supplier in product development ISP4: Participation in employees training in quality field at supplier's firm
PK: Continuous quality improvement	PK1: Permanent tendency to eliminate internal process leading to waste of time or money PK2: Innovating production program PK3: Application of advanced IT to better analyze data and determining priorities to improve quality PK4: Revision of documents for quality system when necessary PK5: Application of quality tools
PP: Product design according to user demands	PP1: Coordination of employees from different organizational units in product development process PP2: New product quality as priority in its design and manufacture PP3: Analysis of possibility for manufacture and cooperation in product development

dimensions:

1. Employees pro-activity and reactivity respectively
2. Employees interpersonal relations
3. Employees collectivism versus individualism
4. Power participation and decentralization versus performing tasks by orders and centralized power.

A volume of works dealing with identification of QM critical factors is available. The initial phase of Saraph et al.'s (in Karuppussami et al., 2006) experiment contained 78 dimensions, but after a detailed analysis the number was reduced to 66 for 8 proposed QM factors. Works by Badri et al. and Tamimi (1998) are completely based on

Saraph's questionnaire. Anderson et al. propose an instrument for seven QM factors that initially involved 43 dimensions to remain 39 after statistical analysis. Grandzol et al. (1998) rely fully on Anderson's questionnaire. Motwani (2001) points out to the study by Powell who determines a 12-factor instrument with 47 QM dimensions, however, proposes a 7-critical factor instrument on the basis of works by Saraph et al., Anderson et al. and Powell. The present work, by investigating frequency incidence in Badri et al. (1998), Benson et al. (1991), Fok et al. (2001), Grandzol et al. (1998), Karappussami et al. (2006), Motwani (2001), Ooi (2009) and Sila et al. (2003), can offer an instrument with considerably lower number of dimensions for QM (Table 2). Frequency of appearance in available literature is the following:

1. Leadership and management support for quality program (17)
2. Training and involvement of employees (17)
3. Process approach (14)
4. Systemic approach and documentary evidence for quality system (13)
5. Beneficial interactions with suppliers (11)
6. Permanent quality improvement (9), and
7. Product design according to user demands (7).

RESEARCH HYPOTHESES

After the constructs and dimensions are defined, the research framework requires the set up of contingency and QM factors submodels. The correlation between QM and contingency factors submodels implies direct and indirect impacts of some groups of contingency factors on QM. The impacts presented will be described by means of hypotheses.

Using the sample of 183 companies Vickery et al. (1999) showed that uncertainty of the environment impacts the company's size and the given correlation is confirmed by applying the SEM. The authors Dansky and Brannon (1996), Khandwalla (1977) and Wu and Chen (2007) pointed to even broader correlation, where the environment impacts the company's size, organizational structure and technology. Heterogeneity and uncertainty are stressed as the strongest factors. Based on mentioned researches, the first research hypothesis can be formulated and it is that:

H₁: Environmental factors affect directly and negatively demographic variables and technology.

The impact of strategy on technology was considered by Allred i Swan (2004), while Khandwalla (1977) using the sample of 103 Canadian companies proved the connection of strategy with technology and management style by applying the correlation analysis. Burton and Obel (1996) discussed the correlation between the company's strategy

and technology and management style, making the original expert system. Consequently, the next hypothesis reads that:

H₂: Strategy affects directly and positively technology and management style.

Correlation between demographic factors and organizational structure has been often considered and confirmed in literature, and its further confirmation is expected in this work. Long ago, in 1970, the Aston Group analyzed 52 companies and concluded that the increase in the number of employees leads to the increase in the number of hierarchical levels, broader specialization, formalization and decentralization (Donaldson, 2001). One year later, Blau, Schoenherr considered 50 companies and concluded that the larger company's size implies larger structural differentiation and role specialization (Donaldson, 2001). Child, Mansfield (1972) proved that size has a stronger correlation with organizational structure than with technology, while Mayer (Donaldson, 2001) added that company's age together with its size impacts organizational structure. The Khandwalla model, (Khandwalla, 1977), should be pointed out as one of the extensive researches. A few decades later, there appeared Vickery et al. (1999) who studied the sample of 183 companies, using the advanced statistical technique (SEM) for the first time, and showed that the company's size has positive impact on the number of hierarchical levels, management span and decentralization.

Applying the same method, German, Spears (1999) inferred similar conclusions demonstrating that company's size impacts positively formalization, technocratic specialization and strategic decentralization. Moore and Brown (2006) added that increase in the company's size indicates higher presence of mechanistic components. Based on presented researches, the confirmation of the next hypothesis is expected:

H₃: Demographic variables affect directly and positively variables used to describe company organizational structure.

Correlation between technology and organizational structure has been also proved several times in literature, and it is of significance herein as a subsequent indirect connection with QM. As early as half a century ago Woodward (1958) provided mathematically proved impact of technology on company's organizational structure (correlation is not linear according to the types of production) using the sample of 100 companies, which was also confirmed by Thompson (Khandwalla (1977)). Perrow demonstrated that Routine technology correlates with mechanistic organizational structure, whereas Non routine technology demands organic organizational structure (Khandwalla (1977)). In 1989 Gerwin showed that larger-scale automation causes larger-scale formalization

(Ridderstrale, Engstrom, 2000), while proofs by SEM method can be found in Germain, Spears (1999), on the sample of 200 companies and in the fact that technology impacts positively technocratic specialization. Accordingly:

H₄: Technology affects directly and positively variables used to describe company organizational structure.

Direct impact of management style on employees' behavior is also expected as reported by Pavlovic (2005) and Mintzberg (1983), so the next hypothesis reads:

H₅: Management style affects directly and positively employees' behavior.

The fact that organizational structure is a factor of impact on QM is also undeniable, however this correlation demands further investigations because the available works arrive at various conclusions. Madu et al. (1998) using canonical discriminant analysis showed on the sample of 86 companies that organizational structure and employees' behavior are of critical importance for QM, in such a way that larger flatness (lower number of levels with larger management span) of organizational structure yields better QM practice. Germain, Spears (1999) using the sample of 200 companies and applying structural equation modeling proved that size, technology and environment dynamism impact QM positively and indirectly via organizational structure. Lagrosen and Lagrosen (2003) applying ANOVA method on the sample of 266 companies found poor QM in adhocracy compared to other types of organizational structure, as reported by Mincberg, excellent quality system in mechanical engineering and professional bureaucracy as well as division forms, while in simple structure they recognized very poor quality results. Jabnoun (2005) applied the same method to prove that QM is better in the cases of organic and process organizational structure than in mechanistic and organic structure. Mentioned statements will be tested by the hypothesis:

H₆: Organizational structure variables affect directly and positively TQM critical factors in the company.

The impact of employees' behavior on TQM is the subject of a large number of works. Using the sample of 194 companies and applying structural equation modeling Prajogo and Sohal (2001) demonstrated that group culture, characterized by team work, employees' participation, proactivity, and assuming of responsibility, produce the strongest impact on QM practice. Afterwards, mentioned authors using the same method proved that group culture has the strongest impact, however QM is also affected by hierarchical, developmental and national culture (Prajogo, Sohal, 2006). Madu (1998) applying canonical discriminant analysis proved that good relationships among employees, relaxing work atmosphere and the spirit of collectivism are all components of

organizational climate discriminating, among other things, companies with poor and good QM practice. This author also anticipated that organizational structure and employees' behavior produce the strongest impact on QM, therefore it can be inferred that impact of employees' behavior on QM is most likely direct. Mosadegh and Rad (2006) applying multiple regression analysis on the sample of 667 companies proved that impact of organizational culture on QM amounts to 50.7%. Consequently, the hypothesis is formulated:

H₇: Employees behavior variables affect directly and positively TQM critical factors in the company.

The seven hypotheses mentioned form a model of contingency factors' impact on QM and point to indirect effects making up the next five hypotheses. Indirect impact of company's size, as a demographic factor, on QM was considered by Germain, Spears (1999) who showed that size, technology and environment dynamism affect QM positively and indirectly through organizational structure. Moreno Luzon, Peris (1998) indicated that company's size, technical system and environment impact QM in such a way that larger size means better quality program. Ahire, Dreyfuss (2000) also pointed out that company's size impacts exterior quality. Zhao et al. (2004) also reached similar conclusions, which indicates that the next hypothesis is justifiable.

H₈: Demographic variables indirectly (through organizational structure) and positively affect TQM critical factors in the company.

Indirect impact of technology can be also expected because Sousa, Voss (2001) inferred that customization level (type of production), product innovation degree and standard parts share impact QM. Escanciano et al. (2002) demonstrated that higher technological level compared to competitive companies means more advanced QM level. Germain, Spears (1999) proved that impact was accomplished indirectly, via organizational structure.

H₉: Technology affects indirectly (through organizational structure) and positively TQM critical factors in the company.

Pavlović (2005) reported that proactive management style and employees' behavior should characterize organizational behavior in the companies with QM system introduced, however he did not support his finding by empirical research. Direct impact of management style on employees' behavior is expected, as also reported by Khandwalla (1977), hence it can be hypothesized that:

H₁₀: Management style affects indirectly (through employees' behavior) and positively TQM critical factors in the company.

The importance of strategy for QM is dealt with in a number of works. Strategy affects indirectly (through organizational structure and employees' behavior) and positively TQM critical factors in the company. Dansky, Brannon (1996) analyzed 361 health institutions by applying regression analysis and concluded that analyzers and then prospectors attribute the greatest importance to quality, while defenders do not. Obert, Spencer (1996), also reported that analyzers are characterized by the best QM, reactors by the worst, while prospectors and defenders are in between the two. Projogo, Sohal (2006) deduced that QM is better when the strategy of costs is stronger. Sousa, Voss (2001,2002) found that the type of production strategy impacts QM, therefore it is assumed, having in mind the above hypotheses, that:

H₁₁: Strategy affects indirectly (through organizational structure and employees' behavior) and positively TQM critical factors in the company.

Lastly, Fuentes Fuentes et al. (2004), who used the sample of 273 companies and applied structural equation modeling, found that dynamism, opportunism and environment complexity impact QM positively, so it is assumed that:

H₁₂: Environmental factors affect indirectly (through demographic and technology variables) organizational structure and negatively TQM critical factors in the company.

It can be inferred that the Main hypotheses of this research involve direct impacts of the first seven major hypotheses and impacts transferred to QM by mediation in other accessory hypotheses.

MATERIALS AND METHODS

Research instrument

A majority of questions in the research instrument was taken over or designed using previous researches (which is of critical importance in researches of this kind as stated by Madu, 1998), and considered in detail in the above sections. The instrument consists of 62 questions related to contingency factors and 31 questions related to TQM, 93 questions in total. The instrument was developed based on recommendations by Courage and Baxter (2005). Questions with a five-level Likert scale were mostly administered in questionnaire. Multiple responses were offered only for formalization and specialization, as organizational structure dimensions, in the sense of some documents and tasks distribution in the company. Using recommendations by Grandzol and Gershon (1998) and Janicijevic (1999) to recode 25 – 50% of questions (posed in reverse direction relative to other questions), 45.88% of questions were recoded. Additionally, to make a check one control question was posed. Questionnaires with no coincidence in control question were later rejected.

Source of empirical data

Serbian context

A large portion of the world economy, involving the countries of the former USSR, Bulgaria, Romania, Hungary, countries developed after dismemberment of former Yugoslavia, and Serbia as well are in the transition processes – transformation of social into private ownership, introduction of new trade procedures and foreign investments in domestic companies, all demanding radical organizational changes conditioned by contextual ones in a new business ambient (Zivkovic). According to the number of QMS certificates, Serbia, with 1987 certificates, takes the 54th position in the world per 8 million inhabitants, while Croatia, Bosnia and Herzegovina and Macedonia have lesser number of certificates in proportion to the population number (ivanovic, Majstorovic, 2006). Countries in transition, Serbia being one of them, have a high rate of certificate increase, although the number is far from the desirable 2.5 certificates per 1000 inhabitants (Majstorovic, 2006). Viewed on average, Serbian companies are in transitional stage between the stages of quality assurance and TQM. According to the EQA model, the result obtained was 556.16 of the maximum of 1000 points (Majstorovic1). Domestic, Serbian companies having, on average, a very low-level technology are nowadays under strong pressure of foreign competitive companies, which increasingly imposes the necessity of changes in to date methods of business operations. Introduction of a series of ISO 9000 standards, global and regional integration of companies, application of novel technologies, permanent innovations are all only a portion of changes that companies are undertaking to survive and develop. Works on QM in less developed countries are infrequent and they commonly point to the problems of resources insufficiency, low-level staff training, management non-flexibility and rigidity and the like (Temtime, 2002). All above mentioned indicate that Serbian context is of particular interest for SIMULTANEOUS CONSIDERATION OF CONTINGENCY FACTORS AND QUALITY MANAGEMENT, because it is possible to disclose all impacts that may have remained unrevealed in researches carried out in developed countries. On the other hand, this research has been conducted at the right time because it may be of help in a more rapid transition of Serbian companies from the stage of quality assurance to the TQM stage. In this way it will be possible to find out which combinations of contingency factors impede TQM application. The finding will be certainly useful for other developing countries.

Sample size and characteristics

In this paper industrial companies were subjected to observation because they are the mainstay of any economy. Another reason for choosing industrial companies is the fact, which also guided Martinez-Costa et al. (2009), that ISO 9001 was originally intended for those companies. The population of Serbian industrial companies whose predominant activity is production totals 1699 companies. The initial size of the sample in the present work is 500 randomly selected industrial companies operating in production, maintenance, warehousing etc., which accounts for nearly 30% of population. Of the 500 questionnaires distributed, 112 companies responded. One questionnaire was unusable due to lack of a data and error in control question, so the response rate was 22.22%. Response rate to personal delivery was 90 (36%) of 250 research instruments, whereas response rate to emailed questionnaires was significantly lower, only 21 of 250 emailed (8.4%). Serbian industrial companies operate within the following groups: 1. processing industry, 2. traffic, warehousing and communications, 3. production and distribution of electricity, gas and water, and 4. construction industry. The sample covers 79% of processing companies and around 7% of other groups each, similar to the population. It

accounts for 59% of large-sized, 17% of medium-sized and 24% of small-sized companies. As for ownership structure, the highest percent of companies is private-owned (83.78%), and there are also state- and social-owned ones. Average period of time certified to ISO 9000 is 2.69 years with standard deviation 3.69 years. Distributed questionnaires were largely filled in by managers, directors or supervisors functions. Persons responsible for delivered responses have, on average, 14.6 years of practical experience in the field and, for the most part, have university qualifications. Geographically, research instruments were delivered to industrial companies in all Serbian districts.

Some more prominent characteristics of companies comprised by the sample are as follows:

1. The sample involved companies with at least 2 to the maximum of 20,857 employees, 586 employees on average,
2. The total income of the sampled companies was in the 500,000 to 66 billion dinars range, 4,718,146 Euros on average,
3. The age of the sampled companies is in the 2 to 94 years range, 28.94 years on average,
4. The sampled companies owned the certificate 11 years at the most, 3.69 years on average, which is insufficient for performance analysis within the model framework,
5. The companies' business operations are performed in heterogeneous, dynamic, restrictive environment (these are more pronounced environment factors),
6. The companies are characterized by a fairly high-level IT application (the highest mean value in the technology concept),
7. The dominant strategy component is to achieve the leading role by means of price, that is. the strategy of costs,
8. Average number of hierarchical levels in the overall organizational structure is 4.9, and ranges from 2 to the maximum of 9 hierarchical levels,
9. Average management span of the general manager amounts to 5.24 employees, and ranges from 1 to 32 employees,
10. The companies are characterized by poor strategic decentralization (4.1 and 5 denotes total decision-making centralization),
11. The companies are characterized by fairly strong management staff's proactivity (the factor having the highest mean value in the management style concept),
12. The companies are characterized by fairly strong employees' proactivity (the factor having the highest mean value in the employees' behavior concept),
13. The companies give prominence to the application of process approach and management support in quality program implementation, while cooperation with suppliers is a factor of QM with the lowest mean value.

Data analysis

Data analysis was performed through data reduction and structural equations modelling. The aim of data reduction process was to reduce number of variables and parameters to a reasonable number in respect of sample size and number of estimated parameters. Structural equations were used to examine simultaneous relations between contingency factors and QM, that is. direct and indirect impacts of contingency factors on QM.

Data reduction process

Preliminary data analysis

The time period of data collection is characterized by three waves of data reception. In the first group responses were received from respondents whom it took less than a month to collect data, the second group comprised those who collected data 1 - 3 months,

while the third batch arrived only after the researcher reminded the respondents by email or telephone. The differences between groups of received responses were tested by t test hypothesizing that samples are independent. Testing was conducted for difference of means between two populations at 0.05 level of significance for variables, such as: number of employees, total revenue, duration of certification to ISO 9000, IT application, production type, strategy elements, environmental heterogeneity, maximal number of hierarchy levels in organizational structure, General manager span of control, leadership and management support for quality program, documentary evidence for quality system, supplier quality management, process approach application etc. Data obtained by analysis indicate that there are no significant differences between companies that delivered their responses by the first and second group.

However, the third group of responses differs from the two preceding, and it comprises companies having a larger number of employees and higher total revenue that is. they are bigger companies, which was expectable. Those companies also had a higher number of hierarchy levels and higher management range, which is a logical outcome of their size. It took bigger companies much more time to deliver responses, because research instrument circulated around departments where assumed data were filled in. Research questionnaires received in the last group were delivered by companies certified to ISO 9000 for a longer time, possessing advanced technological level and advanced IT application. Those companies focus less on cost-based leadership strategy and have better indicators for a higher number of QM factors.

Preliminary data analysis was carried out on a sample of 30 companies. Until the end of data collecting from 30 industrial companies, research instruments were delivered for two employees in each company. When 30 industrial companies were collected, the response of each respondent pair was analyzed for the same company, a very high correlation between responses was obtained, and since then only one research instrument was distributed to each company. Bivariate correlation analysis for the first 30 companies in the sample indicates that product complexity, production program diversification and company spatial differentiation do not correlate with any of QM indicators at the $p \leq 0.05$ level of significance, so they were excluded from further analysis.

Data reliability and validity analysis

Reliability as a degree to which dimensions participate in describing the concept is estimated by calculating Cronbach α coefficient (Hair et al. 1998). Validity was investigated through non-dimensionality (it is studied by exploratory factor analysis), content validity (degree to which research problem is based on previous theoretical works is provided), criterion validity (degree of association between means of exogenous and means of endogenous concepts by correlation analysis is provided), convergent validity (study of bivariate correlations per concept means to prove affiliation of dimension to a certain concept was carried out), and discriminant validity (measures the degree to which a construct and its indicators are different from another construct and its indicators, which was also carried out). Validity boundary for significant values of correlation coefficients is 0.30. Factor loading as a correlation between construct and its describing factor, for the sample size in the present research and considered number of factors on the 0.40 level is significant for the test power 0.80 and 0.50 level of significance assuming that errors presuppose double values of conventional correlation. Exploratory factor analysis is performed by principal components method, and checking confirmed that common factor method produces nearly identical results. Missing data were considered by method of pairwise deletion of missing values. Reliability analysis and factor analysis reduce the studied model because the following dimensions are rejected for further analysis

(insufficient factor loading – below 0.40 or eigen value lower than 1 or Cronbach's alpha below 0.55):

- i. Ownership structure
- ii. Dynamism and environmental hostility and restrictiveness
- iii. Elements of risk strategy
- iv. Production type
- v. Strategic decentralization
- vi. Preference for delegation, level of detail in decision making and risk preference
- vii. Power decentralization and participation of employees, and
- viii. QM dimensions L5, L6, L7, OB1, SIST2, PROC4, ISP1 and PK2.

The other concept indicators in the assumed model described in above research hypotheses will be tested by structural equation modeling technique.

Structural equation modeling

Analysis was performed by means of the module SEPATH of the program package Statistics for Windows /w. 5.0/. Parameter values obtained by completely standardized network model are mutually comparable, because they are always in standardized units (Hair et al. 1998). Higher parameter value indicates a stronger causality (Hair et al. 1998). Results obtained by model testing are presented in Figure 1.

Table 4 shows indicators of model adequacy for relationship between organizational contingency factors and QM obtained by structural equation modeling. The values obtained can be considered, pursuant to the recommendations from literature, as indicators of the model's good adequacy.

Competing model for contingency factors and QM critical factors

Hair et al. (1998) recommend the application of "competing" model strategy to emphasize the advantages of a "better" model. Competing model is a respecification of a proposed model obtained by adding or deleting a certain relation. Consequently, analysis was carried out of the parallel model, where relation of environmental impact on strategy was added, because not infrequent are works proving such relation. For all constructs the indicators in the parallel model are identical with those in the proposed model.

In the competing model, inadequate values for model adequacy indicators were obtained, whereby it was shown that addition of a given relation does not generate improved model adequacy indicators.

RESULTS AND DISCUSSION

Basic research hypotheses comprised by the model posited in this work are confirmed and shown in Table 5. From the 7 basic hypotheses in Table 5, another 5 hypotheses were derived, relating to contingency factors indirect impact. Indirect relation parameters are computed, by multiplying parameters β and γ found in the pathway between the observed concepts, and a higher threshold of significance being accepted. Thus, we obtain indirect impact as shown in Table 6. By confirming basic research hypotheses, through direct impact of organizational structure and employees' behavior, and by accessory

hypotheses for indirect impact of other contingency factors in the model, context-dependent nature of QM concept has been proved. The answer to the first research question RQ1 is that the QM concept is context-dependent. In this way, the present work has also proved the assumption that Saraph et al. (1989) and Sitkin and Sutcliffe (1994) mentioned in their studies in the early 1990s, considering that "universality of application causes great problems, because QM cannot be applied in identical way in all situations" (after Sitkin et al., 1994)]. At the same time, universality of ISO 9000 is brought into question, and possibilities of use, depending on context, are open along with a chance for fully successful quality program.

The answer to the second research question RQ2 – whether the QM concept is organic or mechanistic is that both approaches should be combined, while the answer to RQ3 - whether the QM concept is theoretical or practical in its essence is also offered by this work. Namely, there is no theory without confirmation in practice, nor is there practice that can be described without theory. The posed question is just exaggerated in the QM concept, because scientists most often deal with the theory, whereas managers and engineers apply the concept. Hence, when theorists and practitioners are linked by consultants, who apply ISO 9000 standard universally and unambiguously in the companies, a real confusion occurs.

CONCLUSIONS

QM as context-dependent concept

1. QM practice is better and TQM is applicable (QM critical factors level is higher) when organizational structure dimensions (horizontal and vertical differentiation, formalization and technocratic specialization) have higher values;
 2. QM practice is better and TQM is applicable when management style dimensions (proactivity, long-term planning, motivating the employees) have higher values;
 3. QM practice is better and TQM is applicable when employees' behavior dimensions (proactivity, good relationships, collectivism) have higher values;
 4. QM practice is better and TQM is applicable when strategy elements (innovating, cost-based leadership achievement and analyticity) have higher values;
 5. QM practice is better and TQM is applicable when company size and age are growing;
 6. QM practice is better and TQM is applicable when technology dimensions (automation level, IT application level and technological level) are higher;
 7. QM practice is better and TQM is applicable when unfavorable environmental dimensions (heterogeneity, uncertainty, insecurity and complexity) are lower.
- Therefore, it can be inferred that the best QM practice is found in large-sized companies (which are older as

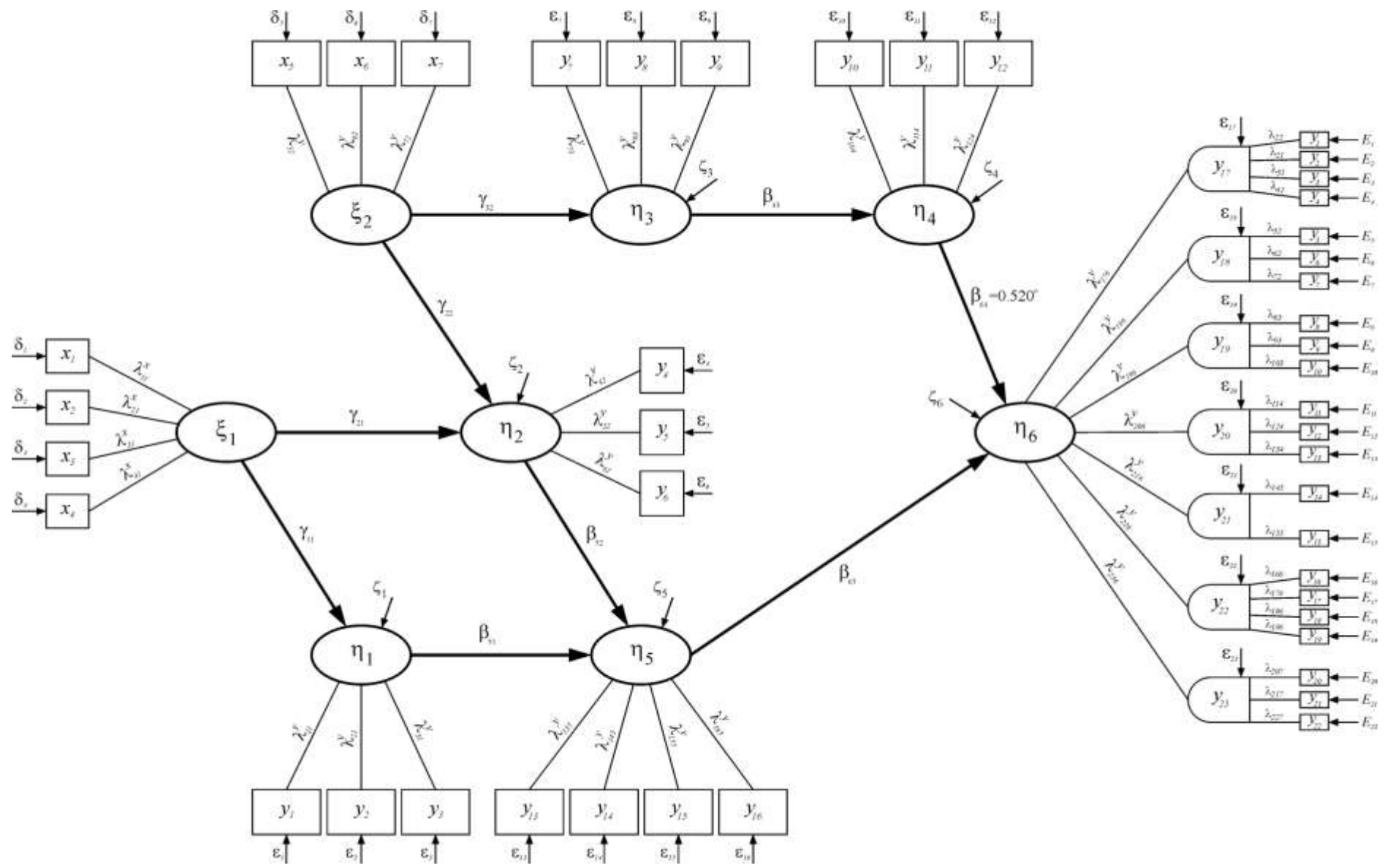


Figure 1. Theoretical model of the relation between organizational contingency factors and QM.

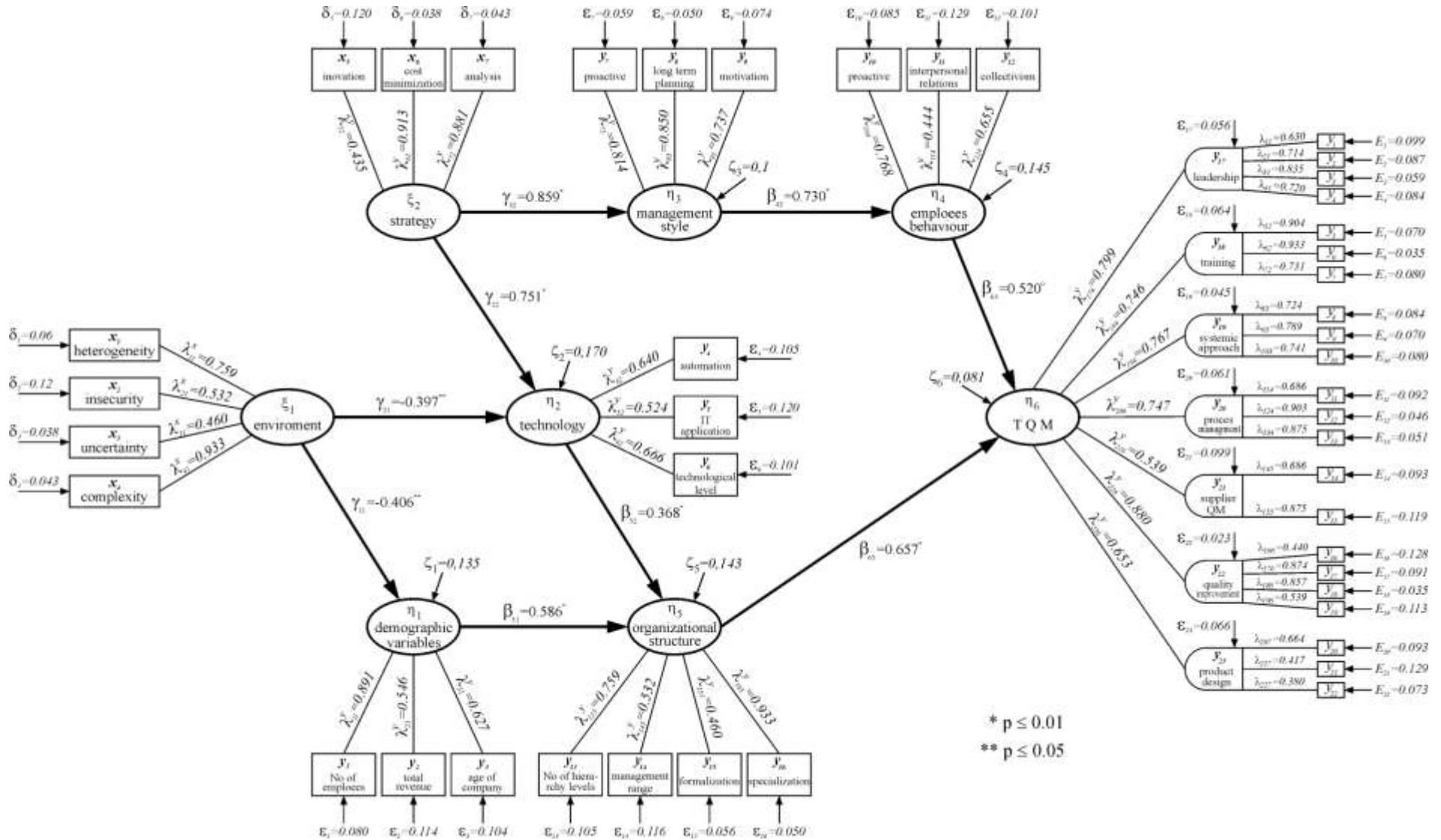


Figure 2. Structural model of the relationship between organizational contingency factors and QM.

Table 4. Indicators of model adequacy for interdependence for relationship between organizational contingency factors and QM obtained by structural equation modeling (SEPATH).

Indicator of model adequacy	Value	Recommendation (Hair et al., 1988)
Joreskog GFI	0.933	Above 0.90
Joreskog AGFI	0.895	Above 0.90, acceptable 0.80
RMSEA	0.076	Below 0.08
PGI	0.870	Above 0.80
APGI	0.884	Above 0.90, acceptable 0.80
RMS standardized residual	0.095	Below 0.10

Table 5. Confirmation of basic research hypotheses.

Hypothesis	Path coefficient	Standard error	Level of significance
H ₁ : Environmental factors affect directly and negatively demographic variables and technology.	-0.406 for demographic variables -0.397 for technology	0.167 0.160	p≤0.05
H ₂ : Strategy affects directly and positively technology and management style.	0.751 0.859	0.104 0.058	p≤0.01
H ₃ : Demographic variables affect directly and positively variables used to describe company organizational structure.	0.586	0.117	p≤0.01
H ₄ : Technology affects directly and positively variables used to describe company organizational structure.	0.368	0.129	p≤0.01
H ₅ : Management style affects directly and positively employees' behavior.	0.730	0.099	p≤0.01
H ₆ : Organizational structure variables affect directly and positively QM critical factors in the company.	0.657	0.081	p≤0.01
H ₇ : Employees behavior variables affect directly and positively QM critical factors in the company.	0.520	0.095	p≤0.01

usual) operating in homogeneous, certain, safe and simple environment, with automated technologically advanced production, using IT, having clearly defined analyzing strategy relying upon cost-based leadership with a smaller-scale innovations, where managers are proactive, plan long-term and motivate employees, who are also proactive, having good personal relations, spirit of fellowship and cooperation. Organizational structure of those companies is mechanistic, with high technocratic specialization and formalization. On the other hand, if company operates in unfavorable environment, it most often grows slowly, invests less in technology, and has simpler organizational structure. However, it can improve its QM practice by properly defined strategy, organic management style and employees behavior. Also, success

success of quality program in the company operating in favorable environment and having all prerequisites for growth can be diminished by poor selection of technology, reactive management style, deficiency of planning, poor employees interpersonal relations, etc. Actually, efforts made to improve quality can produce better or worse results, depending on contingency factors impact.

The presented conclusions are meaningful and are not in favor of standardization in the area of quality. The QM concept was developed in Japan to be applied in large companies. So, today the most successful application of the concept is encountered in large and multinational companies, which is the result of this work. Later, what has been only done with the highest number of principles,

Table 6. Confirmation of derived research hypotheses.

Hypothesis	Path coefficient	Calculation	Level of significance
H ₈ : Demographic variables indirectly (through organizational structure) and positively affect QM critical factors in the company.	0.38	$\alpha_1 = \beta_{51} \cdot \beta_{65} = 0.38$	P≤0.01
H ₉ : Technology affects indirectly (through organizational structure) and positively QM critical factors in the company.	0.24	$\alpha_2 = \beta_{52} \cdot \beta_{65} = 0.24$	p≤0.01
H ₁₀ : Management style affects indirectly (through employees' behavior) and positively QM critical factors in the company.	0.38	$\alpha_3 = \beta_{43} \cdot \beta_{64} = 0.38$	p≤0.01
H ₁₁ : Strategy affects indirectly (through organizational structure and employees' behavior) and positively QM critical factors in the company.	0.50	$\alpha_4 = \gamma_{32} \cdot \alpha_4 + \gamma_{22} \cdot \alpha_2 = 0.50$	p≤0.01
H ₁₂ : Environmental factors affect indirectly (through demographic and technology variables) organizational structure and negatively QM critical factors in the company.	-0.26	$\alpha_5 = \gamma_{11} \cdot \alpha_1 + \gamma_{21} \cdot \alpha_2 = -0.26$	p≤0.05

developed for application in larger companies, was obviously their transfer to universal use. The problem of suppliers for large companies, who should also have a solid practice in QM and are small- and middle-sized companies, is solved by the choice of "a small number of reliable suppliers". We should turn back again to the origin of QM principles, to the famous gurus of quality who developed the QM concept by combining the principles from American and Japanese companies. Associations with suppliers were taken over from the Toyota factories and a part of the Just-in-time concept (Martinez Lorente et al., 1998). The quality system set up, benchmarking and the like were taken over from American companies (Martinez Lorente et al., 1998). Combining the principles from entirely different economic conditions necessarily involves the analysis of contingency factors, because two antagonistic concepts are blended.

The conclusion of this research gives an answer that small- and medium-sized companies can not achieve solid QM practice through the pathway of demographic variables (because the concept was originally developed for large companies) and organizational structure, therefore it is recommendable to take "alternative road" through clearly defined strategy without risk elements, which further impacts technology (so it can alleviate unfavorable environment impact) and furthermore management style and employees behavior. Also, it is noticeable that in more favorable environment small-sized companies will additionally strengthen technology

impact and thus achieve better QM practice.

Mechanistic-organic nature of QM concept

On the basis of experimental research using the sample of 111 industrial companies, the present work indicates that it is needed to combine mechanistic and organic principles. High organizational structure with high formalization and specialization is a feature of mechanistic approach. Proactive behavior of employees with a strong spirit of collectivism is a typical feature of organic type.

If we turn back again to the period and area of the QM concept development and to the Toyota factories, where the principles of quality were applied first and with outstanding results, Mond's model (1983) of organizational structure answers the question on how to combine mechanistic and organic principles, and confirms the validity of our conclusions. In the Toyota factories the formal mechanistic organizational structure has the organized structure of quality circles in parallel, whose aim is to generate ideas about how to improve quality and build favorable business climate encouraging management and employees' proactivity, to inspire managers to long-term planning and motivate employees to contribute to the company's success, and to promote the spirit of cooperation and collectivism among employees.

PRACTICAL BENEFIT OF RESEARCH AND MANAGERIAL IMPLICATIONS

Within the framework of practical research a model of interdependence of QM on organizational contingency factors in Serbian industrial companies was posited. The model leads to new theoretical knowledge that further provides practical benefit to Serbian industrial companies. The network-diagram-shaped model gives opportunity for companies to identify their own characteristics in it. Serbian industrial companies should recognize that contingency factors, such as environment and demographic variables, are difficult to change (situational), with environment being less strong and significant factor, and find possibilities of improving QM and performances in other groups of contingency factors.

It is this research that makes clear the situation in scientific public and offers both optimistic (Martinez-Costa et al., 2008, Adam et al., 1997) and pessimistic views (Nakayo, Hikida and Sanada (1996), Hutchens (1996) and Sila (2007)) on the issue of ISO 9000 impact on companies' performances. This work infers that optimistic results come from harmonization of contingency factors of respective company with QM practice, while pessimistic ones can be explained by the lack of harmonization. Less drastic, but similar findings also hold for the application of TQM that could make improvements of performances possible, depending on contextual factors harmonization, in our opinion (Zain et al., 2001, Sila et al., 2001). Involving performances in the model is therefore the proposal for further researches. The proposal for companies is to direct attention, apart from contingency factors harmonization, to the following dimensions of the QM concept:

- i. Department managers should demonstrate care for quality,
- ii. Management should make effort to improve quality, not only to set up the system of quality,
- iii. Management must take care of quality goals, policy and procedure rules,
- iv. Employee training must be a priority and financial resources must be provided for it,
- v. it is of particular significance the employee training for quality tools application,
- vi. Data on quality should be available to each employee,
- vii. Data collected must be analyzed to improve quality,
- viii. Department or a person in charge of quality must be present,
- ix. Quality system must be documented,
- x. processes in the company must be set within their limits, described, and a measure of performance must be determined for each process,
- xi. Key processes must be continuously monitored and improved,
- xii. Suppliers certified for quality system should be chosen,

- xiii. Suppliers should participate in product development and innovation,
- xiv. There must be steady trends to eliminate internal processes leading to waste of time and money,
- xv. IT application is a must to ensure better data analysis and prioritizing of quality improvement,
- xvi. Quality system documents should be revised if needed,
- xvii. Quality tools should be used as much as possible,
- xviii. Employees from different organizational units must cooperate in the product development process,
- xix. Quality of a new product should be given priority, and
- xx. In product development attention should be directed particularly to production and cooperation possibilities.

It can be inferred that practical contribution of the research mirrors itself in benefits for:

- a) researchers in the respective field of science (testing and further development of the proposed model is expected to involve company's performances as well and thus to confirm it),
- b) managers and engineers working in industry (by applying the model in practice the model will be tested and the QM concept will be applied more successfully), and
- c) consultants engaged in QM system implementation (the model should make their job easier and reduce a negative practice of imitating, as found in Yaacob, 2010).

PROPOSAL FOR FURTHER RESEARCH

The guidelines for further research are multiple, because this paper arrives at a number of new conclusions raising many questions to be considered. Firstly, further research can be directed to interdependence of QM critical factors, because the present work shows that they are correlated. Secondly, it is possible to include individual relations between contingency factors and all QM critical factors into the model, which will require a considerably larger sample than that used in the present work. Thirdly, the model proposed should comprise business performances. Lastly, it would be useful to longitudinally check the conclusions of the present and proposed three lines of researches, which would be the start of experimental stage for Donaldson's neocontingency theory. Limitation of this research is that it is cross-sectional, so the sample could be replicated in different time period to check for generalisations.

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