

Djordje Mijailovic
Yury Klochkov
Milan Mistic
Aleksandar Djordjevic¹
Bojan Stojcetovic
Aleksandar Pavlovic
Marija Zahar Djordjevic

Article info:

Received 01.02.2021.

Accepted 27.06.2021.

UDC – 005.336.3

005.511

DOI – 10.24874/IJQR16.01-12



ICT LEADERSHIP AS ENABLER OF BUSINESS PERFORMANCES: AN INTEGRATIVE APPROACH

Abstract: *Different aspects of development and implementation of ICT (Information and Communication Technology) have been analysed in previous period dominantly from the viewpoint of theory and practice related to information systems (IS), management information systems (MIS), information technology (IT), as well as management, teamwork, quality and many different approaches, methods, techniques, and tools. These researches missed analysis of leadership process related to developing and using an ICT covered by term ICT leadership in organisations. On the other sides, previously researches regarding leadership are concerned with the role and benefits of applying ICT in organisations, dominantly based on leadership traits.*

This paper is based on the process approach. An ICT leadership is treated as a subprocess, as ICT management and other processes and subprocesses, based on organisations' process map. By integrating ICT leadership and other business processes, it is possible to assess the quality of processes and the quality of ICT and their impact on the net benefits of ICT. It is the primary purpose of the paper.

The research's primary goal is to model ICT leadership with other business processes and use multi regression analysis to find relationships among them. The statistical analysis results proved the primary hypothesis about ICT leadership and ICT management's impact on business performances.

Keywords: *ICT Leadership; ICT Management; Business processes; Quality; Quality of ICT; Benefits of ICT.*

1. Introduction

A leadership approach is closely connected to management, but there are many differences between leadership and management (Podsakoff & Podsakoff, 2019). It is recognised as one of the unavoidable factors for enhancement of quality (Chang et al., 2021), competitiveness (Marangu et al., 2017), and sustainability of organisations (Bendell et al., 2017). A leadership role in the digital era is a much broader sense in effective

communication across the organisation and the environment. On the other side, rapid development and implementation of ICT in organisations need a lot of leader's knowledge and skills to be faster, more efficient and effective, and thus competitive (Saiz-Alvarez, 2017). A leadership role is now broader for the ICT aspect. In practice, a problem arises because old fashion-leaders and managers do not know enough about ICT and do not use advantages of comprehensive ICT in own business process.

¹ Corresponding author: Aleksadnar Djordjevic
Email: adjordjevic@kg.ac.rs

Through ICT, organisation leaders use a variety of communication channels to get their messages internally or externally. Because of that, ICT changes the individual and organisational relationship. ICT is less related to controlling and performing a transaction in the digital economy and enabling social interaction through various channels. A rapid change of information environment in the sense of massive data, changing a decision environment needs new problems, but opportunities for improving the quality and speed of decision of new leaders. They could use ICT more effectively to integrate enterprise values, organisational structure and processes with obvious and unanticipated partners (Bresciani et al., 2018).

In the last two decades, the business environment has been rapidly changed. Leaders and managers' roles have to be complex because needs and requests become more unpredictable, frequent and sophisticated. They now have to overreach needed knowledge and skills based on comprehensive approaches, methods, and resources. In the age of the digital economy, ICT becomes *conditio sine qua non* for sustaining and developing enterprises. An ICT asset could be viewed as emergent capabilities, strategic potential, and a fundamental element for organisational resources' synergy (Queiroz et al., 2018).

This new situation needs to review our "old" approaches about ICT or IT impact on business performances. The management role, including ICT management, has been investigated in a previous period (Cajander et al., 2021).

On the other side, leadership in enterprises has been broadly investigated from different aspects, using different approaches (Sun et al., 2018; Xie et al., 2018; Meixner & Pospisil, 2021), but there is not enough research about ICT leadership. There are no models and other results about ICT leadership and ICT management's synergic effect on business performances. The consequences of

the synergistic relationship depend on business processes directed by leadership and management. That means the authors of this paper needed to measure this synergic effect. Authors have to analyse the quality of leadership and management from one side and the quality of ICT from the other side, and their impact on the net benefit of ICT. In this way, the quality of business processes is a missing connection between ICT leadership and ICT management through general leadership, management, and ICT quality.

The research problem is very complex, theoretically and practically. It is partly investigated without focusing on ICT leadership. The methodology approach in the paper is based on (1) development of ICT leadership model, (2) development of integration model and (3) conduct statistical analysis for testing the model based on a sample of 156 organisations in Serbia. This methodology integrated previously developed leadership models, management, quality of other processes, quality of ICT, and ICT benefits based on the process approach.

The research results point to the relatively high impact of ICT leadership on ICT net benefits through variables: (1) quality of other processes, (2) strategic leadership, (3) ICT leadership, (4) ICT management, (5) quality of ICT in practice.

The paper's contribution is in the developed model of influences of ICT on business performances using new variables in quality and ICT strategy fields, based on the process approach.

In the paper, leadership roles are analysed, with emphasises on leadership styles and competencies. By analysing enterprises' characteristics, desired leadership styles for different circumstances and groups of enterprises are defined. After this analysis, the model for assessing leadership level related to ICT knowledge, skills and agility based on ICT is presented. At the end of the paper, some investigation results for one group of enterprises in Serbia are presented.

The paper aims to define the role of ICT for effective leadership in enterprises and the appropriate model of ICT leadership. For the research system, approach and system modelling techniques and in-field analysis using questionnaires techniques are used. SME. Implications of the paper are theoretical and practical. Theoretical implication is the redefinition of leadership role related to ICT. Practical implications are related to the results of investigations of an ICT leadership role for a Serbian SME.

The paper's originality is based on a new developed integrative model that allows ICT impact on business performances assessment, with new variables in the process quality, ICT strategy, and ICT quality fields.

The paper is structured in five sections. After the introduction, the theoretical background is outlined, and then primary hypotheses stated. In the third part, the integrative model of ICT leadership is presented, based on previously developed models of (1) ICT leadership and ICT management, (2) quality of ICT, and (3) net benefits of ICT. For this purposes, systems modelling techniques are used. The fourth part is concerned with the results of an investigation in 156 Serbian organisations. For research is used questionnaires technique and IBM SPSS software for statistical analysis. At the end of the paper is presented discussion and conclusion related to research results.

2. Modeling a impact of ICT leadership on business performances

The new era needs a review of existing development and the introduction of new approaches and methodologies related to the role of ICT. At the end of the last century, many concepts were developed. The first aspect of the ICT role is connected with the quality of processes.

2.1 Quality of processes in organisations

"Classical" approach to processes is based on their importance according to operational effectiveness and strategic positioning. On the other hand, this approach is included in the quality of processes, which is derived from principles of quality management based on ISO 9000 standards. The organisation is presented as the processes' network, and each process has its metrics (Lamghari et al., 2019). According to business scope, each organisation develops its processes, i.e. critical processes producing added value according to stakeholders' demands and needs (Arevalo-Gallegos et al., 2017). The authors divided business processes based on their general (Marcinkowski & Gawin, 2019) or particular business purposes, according to the e-TOM (eTOM Business Framework). Figure 1 depicts a general process map with 14 processes for modern enterprises (APQC, 2019). The process listed as 7 refers to ICT (Manage Information Technology). This specification covers (1) management of the business of information technology, (2) development and management of the IT customer relationships, (3) development and implementation of the security privacy and data protection central policies, (4) management of enterprise information, (5) development and maintaining of information technology solutions, (6) deployment of information technology solutions, and (7) development and support of information technology services. In other processes, the authors of this paper included specific aspects of ICT that are built-in. It could be specially stated for ICT leadership refers dominantly to strategic leadership (Process listed as 13 – Leadership and management), but it could be connected with ICT leadership in other processes.

Quality of processes could be expressed using the set of indicators that measure the level of fulfilment of process stakeholders (internal and external). In the literature, this idea is well presented in the field of quality management (Pambreni et al., 2019). Quality

of the processes could be treated as part of the Kaplan-Norton approach's internal perspective (Kaplan & Norton, 2015). Using this approach, the quality of processes becomes part of corporate strategy (Velikorossov et al., 2020). The general process model is not always appropriate for a specific context, but some level of consistency should exist to guarantee defined and effective communication and fulfilment of process stakeholders. Process designers should find a trade-off between the strictness of a consistent notation and the process model's appropriateness (Di Ciccio et al., 2017).

Based on the analysis of mentioned papers, it could be concluded that process management is connected with quality, strategy, and ICT implementation. The importance of these relations depends on the number of variables, especially key business processes, levels of leadership and management, and the number of constraints in the HR and financial resources fields of competencies. Accordingly, three hypotheses could be stated:

- H1: level of strategic leadership positively influence the quality of the other processes,
- H2: level of ICT management positively influence the level of quality of other processes and vice versa,
- H3: level of quality of other processes positively influence on net benefits of ICT.

It should be underlined that other processes cover all processes from the process map except processes 7 and 13.

2.2 Quality of management processes

Quality of management as a process which is improved in all 14 typical processes in the company it is usually structured as (1) strategy, (2) tactical, (3) operational processes. Some of these processes, such as no. 14 (Leadership and Enterprise

Management), are strategic, while others are usually performed combined on the strategic, tactical and operative level. Therefore process management is structured, that besides process management on the corporate level, process management exists in the following fields: (1) deploying strategy into processes, (2) process government, (3) project/process development, (4) project/process execution, and (5) project/process improvement (Arsovski et al., 2012).

These management activities are directed toward the improvement of process performances. According to Jeston and Nelis (Jeston & Nelis, 2014), it is performed in eight steps: (1) increase business process management, (2) reward determination and establishment, (3) understand process responsibility, (4) process measures, (5) monitor performance, (6) manage the process, (7) continuous improvement, and (8) communication. Companies have the main task to fulfil market demands. It is necessary to include processes of leadership and management.

Evaluation of the level of functionality of customer/market could be performed in many different ways. Authors used a comprehensive approach (Kadlubek & Grabara, 2015), which covers the following items: (1) level of methods for determining existing requirements and expectations of customers, (2) level of methods for determining future requirements and expectations of customers, (3) level of methods for identifying customer groups and market segments, (4) level of relationship practices including complaint management, (5) level of improvements of CRM practices, (6) level of determination of contact requirements and deliver to the customers, (7) level of management of customer satisfaction, (8) level of benchmarking, (9) level of integration in clusters, value chains etc., and (10) level of position on the market, including branding, close with customer etc.

2.3 Strategic Leadership

Strategic leadership is based on the following assumptions: (1) leader is the initiator of social changes which could fulfil needs of followers, (2) leader must integrate future changes based on experiences of changes which were happened in the past, (3) leader must create a balance between short term results and long term vision, and (4) successful transformation is a test of leadership skills, which is created by forming a coalition for changes and development of vision.

Strategic leadership is related to top management. Organisational learning leadership requires strategic leaders to frequently perform roles involving transformational and transactional behaviours under different conditions.

There are different approaches to strategic leadership; however, it has been proved that strategic – transformational leadership with strategic change and strategic – transformational behaviours and strategic – vision develops leadership behaviours.

According to further research (Hirtz, Murray & Riordan, 2007), there is a high correlation between quality and leadership. In the field of strategic management influence of Inspirational Motivation quality is 0,341.

Author (Zhang & Cheng, 2015) analysed the effort of trust and shared vision of leader needed for effective knowledge transfer and proved hypotheses about its positive impacts, especially in inter-organisational context. On the other side, shared vision is more influential in an intra-organizational relationship.

In leadership literature, most cited are contingency leadership theories and models.

All the theories lead to models appropriate for different purposes or situations. The article presented the original ICT leadership model tested in Serbian enterprises.

Leadership level could be measured in different ways. The model of Kanji (Kanji G.

2008) (Leadership Excellence Model - LEM) starts from Organisational Values, which influence on Vision, Mission, Strategy and Key Issues, having Leadership Excellence Index (LEI).

According to the previous analysis, relations between Strategic Leadership with Quality of other processes, Quality of Management and ICT leadership are determined. The first two relations have already been stated in the listed hypothesis so that another hypothesis could be stated:

- H4: strategic leadership is positively correlated with ICT leadership.

2.4 ICT Leadership

An ICT leadership is not enough investigated area. Most researches refer to ICT providers and less to companies that use ICT in their business. Considering that most of the companies belong to the second group, the authors of this paper have considered the second group of companies.

According to (Evangelista, 2014), ICT leadership has the following domains/subprocesses:

- ICT vision, mission and goals,
- ICT Strategy,
- ICT planning,
- ICT development,
- ICT maintenance and redesign,
- ICT for Executive IS/Experts Systems/Decision Support System (EIS/ES/DSS),
- ICT for business continuity,
- ICT for collaborative work,
- ICT for change support (CS).

The authors (Lucas et al. 2013) analysed transformation criteria of IT related to process, new organisations, relationship, user experience, markets, customers, and disruptive impact, all on a micro level (individual), mezzo (organisation), and macro-level (economy/society).

According to general transformational leadership theory and practice, ICT leadership significantly improved ICT roles:

- (1) Fundamental change traditional ways of doing business with the redesign of business processes,
- (2) strategic entry with new capabilities on new or existing markets, and
- (3) making competitive advantage.

A leadership function is at the centre of the model and connected with the process (through architecture), customer (through commitment), strategy (through vision/and performers/ through alignment). They also analysed the impact of leadership initiative on transforming IT into a strategic partner and find that people are critical to this transformation. Thus, many IT people should be involved in leadership programs, articulate and communicate for commitment, and involved in changes.

A management area and leadership area are interconnected. The measured value of leadership effectiveness is at the end of one cycle and starts judgments for the new cycle of improvements with the assessment of the new shareholders, stakeholders, and measurement needs.

Vision creation starts with a view of how the competitive environment of business will change in the future and how it should create an advantage. Based on business vision in the next step, leaders answer on next questions and make fundamental business strategy decisions for the future.

These business priorities were then reviewed with management and ICT management's business vision with emphasis on: network, IS, needed ICT knowledge/skills of staff, business environment, human and other internal assets, and value chain analysis.

In this activity is assessed informational architecture for leaders and reviewed by ICT leaders. They make practical planning guidelines, which is the starting point for creating the ICT strategic plan approved by

ICT and business leaders. This starting point is crucial for the success of ICT strategic leadership.

Leadership has to respect ICT trends related to internet access, mobile broadband connections to the internet, electronic sales, enterprises turnover from e-commerce, use of RFID (Radio Frequency Identification) technology by different economic activity.

From the aspect of internet access, there is a high potential for ICT leadership in SME.

According to interdisciplinarity and multidisciplinary of development and implementation of ICT in companies, the same has been implemented through working teams, so it is necessary to develop the concept of ICT teamwork.

In the literature, there is some research connected with ICT leadership (Van Wart et al. 2017). Different aspects of leadership in terms of working effectivity, the importance of leadership skills and emotional intelligence were analysed.

According to the previous hypothesis for relation with ICT leadership is stated:

- H5: ICT leadership is positively correlated with ICT management.

2.5 ICT management

ICT management could be derived from the strategic planning of information systems (Ziemba, 2019) as a part of ICT management. Outputs from the process of IS strategic planning are:

- ICT management strategy,
- business ICT strategy, including: (1) ICT strategy and policies, (2) application portfolio, and (3) a set of models supporting the strategy, and
- ICT strategy establishing.

ICT management strategy could be derived from the process of strategic ICT planning. From the strategic planning framework influence of ICT management could be derived as a complementary ICT management strategy, containing: (1) scope

and rationale, (2) ICT organisation, (3) investment and prioritisation policies, (4) vendor policies, (5) human impact policies, (6) ICT accounting policies.

Business ICT strategy is based on analysis of the business environment, ICT environment and business ICT demand. "Soft" factors (management and leadership style, values, skills, resources, business practices) and application portfolio have been specially analysed.

ICT strategy establishing includes the procedure, which covers the following elements (Jeston & Nelis, 2014): (1) the process of strategic alignment, (2) the strategic choices, and (3) documenting the strategic choices and consequences for defined process architecture.

For the definition of ICT strategy, appropriate competencies were needed. According to (Sabherwal et al., 2019), there are the following competencies: (1) definition of priorities, (2) adjustment of ICT strategy, (3) design of particular processes, (4) improvement of unique processes and (5) innovation of systems and processes.

The previous text relations between ICT strategy and ICT leadership, Quality of management, Investment in ICT, and Customer /Market have been analysed. Additionally, the authors of this paper could state the following hypothesis:

- H6: level of ICT management is positively correlated with the Quality of ICT in practice.

2.6 Quality of ICT in practice

Quality of ICT in practice consists of information quality, quality of ICT systems, quality of service based on ICT, and ICT security.

Information Quality

According to (Van Cauteret et al. 2017), information quality consists of (1) content, (2) availability, (3) accuracy, (4) timeliness,

(5) conciseness, (6) convenience. That means including both internal and external stakeholders. In literature, the most frequently emphasised stakeholders of information quality (IQ) are managers and customers.

Quality of ICT systems

Different approaches could define the quality of ICT systems. Dominant is quality based on ICT approaches as a system, according to (Prybutok et al. 2008). In this paper's presented study, broader metrics of quality of ICT systems has been used: (1) reliability, (2) ease of use, (3) accessibility, (4) usefulness, (5) flexibility, (6) resilience, (7) openness, and (8) support to leadership and management processes.

Quality of service based on ICT

Service quality is related to the quality of ICT services in praxis, meaning that ICT services quality is defined as the difference between expected and perceived service performance. The authors (Jun & Cai, 2010) differ internal customer services quality from external customer service quality. Internal service quality dimensions are (1) customer intimacy, (2) reliability/competence, (3) team-based continuous improvement, (4) requisition process, (5) communication, and (6) tangibles.

According to (Sing & Soltani 2010), Service quality consists of: (1) service quality control, (2) service recovery and (3) service process.

ICT security

ICT security is part of the security management system in each enterprise. According to Bakari et al. (2007) process of security improvement consists of 10 steps: (1) support of CEO and top management, (2) support of technical departments, (3) address the ICT security problem and establishing the ICT security problem and establishing the ICT security task teams, (4) scan of ICT-

related risk and their consequences for enterprises, (5) involving management in the ICT security area, (6) getting the current status of ICT security documented, (7) conduct awareness-raising session among users, (8) carry out a risk assessment and analysis, (9) define mitigation plan, and (10) develop ICT security measures.

Measurement of the level of ICT security is done using questionnaires to evaluate security measures.

2.1. Net benefits of ICT

Net benefits of ICT are divided into the satisfaction of stakeholders and other benefits of ICT.

Satisfaction of stakeholders

Satisfaction of stakeholders is the non-financial measure of ICT effects. It is based on the demands and needs of stakeholders according to ICT. These demands are numerous because in each company, we have: employees, owners, managers, customers, suppliers, state and other stakeholders with often confronted and divergent demands.

In this paper, the authors will stay on the "big three": Customers, Employees, and Owners. Metric of quality is defined for each of them (Arsovski & Arsovski, 2008; Arsovski et al., 2013). For employers: (1) competitive compensation, (2) safe work condition, (3) pleasant work environment, (4) career development, (5) other work-related benefits and (6) quality of internal information and communication.

For customers: (1) quality of products/services, (2) safety of product/services (3) customers service of product and services during the life cycle, (4) price, (5) delivery terms and (6) quality of external information and communication.

For owners: (1) return of investment, (2) liquidity, (3) stability, (4) attention, and (5) transparency related to business events.

Each company defines priorities in fulfilment

of stakeholders' demands and metrics for each group of stakeholders. By answering the questions from the questionnaire, the mean value of stakeholders satisfaction could be defined. Value of stakeholders is an objective evaluation of the quality of processes connected with ICT in companies.

Other benefits of ICT

Starting from segmentation of ICT solutions (Hiziroglu, 2013) on (1) substitutive for improving efficiency, (2) complimentary for improvement of productivity and effectiveness, and (3) innovative, for obtaining and sustaining the competitively, five primary techniques for evaluation of benefits could be used: (1) cost/benefit analysis, (2) value linking (3) value acceleration, (4) value restructuring, and (5) innovation evaluation.

In the proposed model, net benefits of ICT related to ICT leadership consists of (1) economic benefits, (2) social benefits, (3) environmental benefits, (4) energy benefits, and (5) safety benefits. All five types of benefits and means on a scale of 1 – 10 are used for the level of benefits related to the ICT domain for considered enterprises.

Based on previous research, stated following hypotheses:

- H7: Quality of ICT in practice is positively correlated with Net benefits of ICT.

In this paper, the authors used the control variable V0 – the enterprise's size expressed as the logarithm of the number of employees for basis 10.

3. Modeling a integration of ICT leadership, ICT management and quality

Based on the analysis presented in section 2, using the method of conceptual modelling (Conceptual Modeling), three interconnected sub-models could be defined (Fig. 1): (1) ICT

leadership and management, (2) quality of ICT, and (3) net benefits of ICT. This model's central place has ICT leadership, which is directly connected with strategic leadership and ICT management. Previously the influence of the control variable is tested (size of an enterprise) and integrated into the model only as a variable of influence of ICT leadership, so the hypothesis is stated:

- H0: Size of enterprise has a positive impact on the variable quality of other processes.

To confirm this hypothesis, a representative sample that contains 156 enterprises was obtained (Table 1).

According to previous research, three sub-models were developed (Figure 1). It is the starting point for defining the organisations' vision and strategy and the ICT leadership level. The second sub-model refers to the model of quality for other processes. According to the level of quality of other ICT processes, the net benefits of ICT could be achieved.

Table 1. Structure of the considered companies based on the number of employees

	Size/number of employees							
Sector	< 10	10 – 25	25 – 50	50 – 125	125 – 250	250 – 500	> 500	Total
Industry	7	11	12	13	5	6	7	61
Service	14	9	6	12	3	6	6	56
Food	4	4	11	8	3	5	4	39
Total	25	24	29	33	11	17	17	156

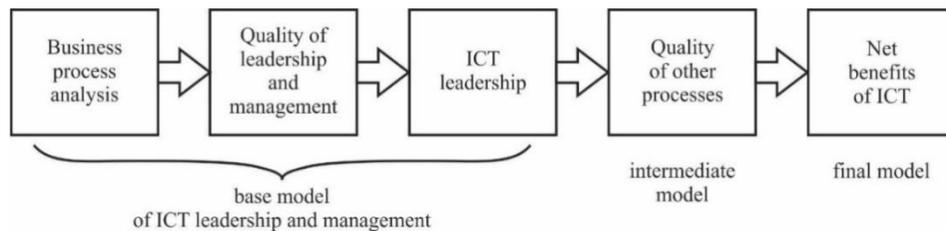


Figure 1. Integration of ICT related submodels

The relationships between the first and the second sub-model are determined based on the H1 and H6 hypothesis. Furthermore, the second and third sub-model relationships are determined based on the H3 and H7 hypotheses (Figure 2). Each relationship in the figure is associated with the adequate hypothesis, the correlation coefficient, and the variables' impact in the linear regression model.

Integration of ICT leadership with other variables dominantly is performed in the first sub-model (model of ICT of leadership and management) and over-identified and approved relation (based on a statistical analysis of gathered data). Verification of the model is performed based on analysis of statistical analysis results using data from

analysed companies. So some of the relations which are not significantly important will be removed from the final model.

4. Results of investigation

First, the statistical analysis of the model for evaluating zero hypotheses about the influence on companies' size on other variables were tested. This analysis logarithm scale was used with the ten bases for the companies' sizes expressed by the number of employees.

Based on the mentioned analysis, the low level of Pearson coefficient of correlation was calculated (less than 0.4) and Significance (2 - tailed), so this control variable is eliminated from the analysis (Table 2).

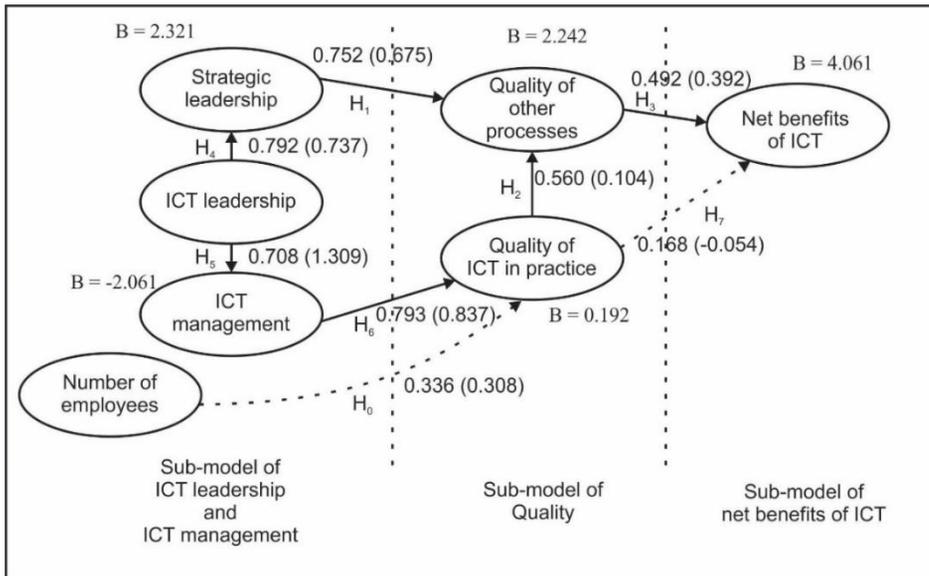


Figure 2. Integrated model of ICT leadership

Table 2. Correlation for all variables

	Quality of other processes	Strategic Leadership	ICT Leadership	ICT management	Quality of ICT in practice	Net Benefits of ICT	Number of employees
Quality of other processes	1	0.752**	0.688**	0.621**	0.560**	0.492**	0.137
Strategic Leadership		1	0.792**	0.541**	0.556**	0.388**	0.234**
ICT Leadership			1	0.708**	0.659**	0.429**	0.300**
ICT management				1	0.793**	0.269**	0.258**
Quality of ICT in practice					1	0.168*	0.336**
Net benefits of ICT						1	0.151
Number of employees							1
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Based on the data from Table 2, variance is between 7.5% - 22.5%, which is satisfactory. The variable *Number of employees* variance is significantly higher, caused by significant differences in the size of companies in the sample.

Based on multicollinearity analyses, it has been determined that correlations among the independent variables are not strong. For detection of multicollinearity, a variation inflation coefficient (VIF) was applied.

Accordingly, if VIF for one of the variables has a value greater than 5, there is collinearity associated with the variable. According to statistical analysis, for all variables, VIF is less than 5.

According to the research results, it was concluded that a positive correlation exists between variables in the model.

For criteria of significance, the value of Pearson correlation coefficient 0.4 is selected. According to that:

- The influence of the number of employees is not significant, so hypothesis H0 is not proven,
- impact of ICT leadership on Quality of ICT in practice is indirectly related through ICT management (H5),
- impact of Quality of ICT in practice on Net benefits of ICT is not significant enough, and hypothesis H7 is rejected, but a part of this impact is achieved through relationships with quality of other processes (hypotheses H2),
- other hypotheses in the model have been proved.

5. Discussion

The influence of the company's size expressed as the number of employees was analysed in the first place because it was expected that in large companies, a higher level of knowledge and leadership competencies exists. Although in the sample were companies with implemented management systems according to ISO quality management, knowledge management and partial knowledge of leadership have important places; this influence was not proven. On the other hand, there was no significant increase in ICT leadership and strategic leadership in large companies because of companies from the public or state-owned companies.

Influence on variables in the model on the independent variable (Net benefits of ICT) was defined beyond expectation. After the

analysis, it was determined that reason was the dominant share of small companies, which exists in a condition of transition and economic crisis thanks to owners and managers' leadership skills. They participated in filling questionnaires, so the high level of Strategic leadership and partly ICT leadership and ICT management was defined.

A high level of quality of processes (without ICT leadership, Strategic leadership, ICT management) was expressed due to requirements for certification of standardised management systems.

Evaluation of Net benefit of ICT accompanied with the relatively low evaluation of Quality of ICT in practice was surprisingly high. The reason is that the long-lasting financial crisis contributed to companies' existing ICT infrastructure maximally being used and pragmatically directed toward realising business benefits.

6. Conclusion and limitations

Previous research in this field pointed to some partial relations connected with ICT leadership's influence on the Net benefits of ICT, especially in countries with intensive usage and ICT implementation. In transition countries, such as Serbia, with the current financial crisis and lack of knowledge for ICT investments, ICT implementation is essential for effective achievement. So in this paper, the influence of "soft" factors such as ICT leadership, ICT management and Strategic leadership were analysed.

The most important conclusion is that the synergic effect on the Net benefit of ICT expresses a higher coefficient of multiple correlation and influential factors. It "opens" space for future research in the field of improvement of ICT leadership by improving relationships with other processes' quality. Process approach from Strategic alignment on process level enables more complex analysis of the influence of ICT on each separate process, from the point of view of goals or resources.

The second conclusion refers to the positive influence of other variables on the Net benefit of ICT by the quality of other expected processes.

The third conclusion refers to the non-significant positive influence of companies' size on a variable in this model, so it was excluded from further analysis.

Constraints and limitations of this research refer to (1) scope of the model, (2) sample, (3) structure of sub-model and (4) composition of variables.

Scope of the model could be expanded with Net investment in ICT, Innovativeness in ICT solutions and related processes, knowledge, motivation etc. In this first iteration, we used narrow scope, and in the next period, the scope will be expanded.

Testing of the model was performed on a sample of Serbian companies. The sample was large enough but did not cover all sectors, especially the ICT sector, construction, etc. So in further research, the authors will expand the sample to provide the condition for inter-sector comparison of the influence of ICT

leadership and compare different transitional economies.

In this research, the authors selected a relatively simple structure of sub-models. According to the research goal in the first sub-model, the authors start from ICT leadership, in the second from Quality of ICT, which is an input for quality of other processes for making a total impact on the Net benefit of ICT. Each of the listed sub-models could be expanded. Authors will primarily focus on the first and the second sub-model, generally for all companies and develop sector sub-models. Additional statistical analysis will be provided with the expansion of the sample and implementation of other tools from the software IBM SPSS ®.

Starting from the idea of the definition of structure and significance of ICT leadership on Net benefits of ICT, developed model and empiric research confirmed stated hypothesis and open the new field of research, especially in ICT leadership as an essential factor in improving the business.

References:

- APQC. (2019). APQC Process Classification Framework (PCF) - Cross Industry - Excel Version 7.2.1. Retrieved 18 February 2021, from <https://www.apqc.org/resource-library/resource-listing/apqc-process-classification-framework-pcf-cross-industry-excel-7>
- Arevalo-Gallegos, A., Ahmad, Z., Asgher, M., Parra-Saldivar, R., & Iqbal, H. M. (2017). Lignocellulose: a sustainable material to produce value-added products with a zero waste approach—a review. *International journal of biological macromolecules*, 99, 308-318.
- Arsovski, Z. (2013). Determinants of the implementation of information and communication technologies in clusters of enterprises. *Ekonomskihorizonti*, 15(2), 103-119.
- Arsovski, Z., & Arsovski, S. (2008). The Quality Metrics of Information Systems. *International Journal for Quality research*, 2(2), 93-100.
- Arsovski, Z., Arsovski, S., & Nikezic, S. (2012). Development of quality management in enterprises of Serbia. *Technics Technologies Education Management*, 7(2), 944-949.
- Bakari, J. K., Tarimo, C. N., Yngström, L., Magnusson, C., & Kowalski, S. (2007). Bridging the gap between general management and technicians—A case study on ICT security in a developing country. *Computers & Security*, 26(1), 44-55.
- Bastida, L., Cohen, J. J., Kollmann, A., Moya, A., & Reichl, J. (2019). Exploring the role of ICT on household behavioural energy efficiency to mitigate global warming. *Renewable and Sustainable Energy Reviews*, 103, 455-462.

- Bendell, J., Sutherland, N., & Little, R. (2017). Beyond unsustainable leadership: critical social theory for sustainable leadership. *Sustainability Accounting, Management and Policy Journal*.
- Bresciani, S., Ferraris, A., & Del Giudice, M. (2018). The management of organizational ambidexterity through alliances in a new context of analysis: Internet of Things (IoT) smart city projects. *Technological Forecasting and Social Change*, 136, 331-338.
- Cajander, Á., Lárusdóttir, M. K., Lind, T., & Nauwerck, G. (2021). Walking in the jungle with a machete: ICT leaders' perspectives on user-Centred systems design. *Behaviour & Information Technology*, 1-15.
- Chang, H. T., Chou, Y. J., Miao, M. C., & Liou, J. W. (2021). The effects of leadership style on service quality: enrichment or depletion of innovation behaviour and job standardisation. *Total Quality Management & Business Excellence*, 32(5-6), 676-692.
- Di Ciccio, C., Maggi, F. M., Montali, M., & Mendling, J. (2017). Resolving inconsistencies and redundancies in declarative process models. *Information Systems*, 64, 425-446.
- Evangelista, A. B. (2014). Domains of leadership behavior of administrators as determinants of self-efficacy of faculty in engineering and ICT schools. *International Proceedings of Economics Development and Research*, 70, 115.
- Fernández-Guadaño, J., & Sarria-Pedroza, J. H. (2018). Impact of corporate social responsibility on value creation from a stakeholder perspective. *Sustainability*, 10(6), 2062.
- Hirtz, P. D., Murray, S. L., & Riordan, C. A. (2007). The effects of leadership on quality. *Engineering management journal*, 19(1), 22-27.
- Hiziroglu, A. (2013). Soft computing applications in customer segmentation: State-of-art review and critique. *Expert Systems with Applications*, 40(16), 6491-6507.
- Jeston, J., & Nelis, J. (2014). *Business process management*. Routledge. ISBN: 9781136172984.
- Jun, M., & Cai, S. (2010). Examining the relationships between internal service quality and its dimensions, and internal customer satisfaction. *Total Quality Management*, 21(2), 205-223.
- Kadlubek, M., & Grabara, J. (2015). Customers' expectations And Experiences Within Chosen Aspects Of Logistic Customer Service Quality. *International Journal for Quality Research*, 9(2).
- Kanji, G. K. (2008). Leadership is prime: how do you measure leadership excellence?. *Total Quality Management*, 19(4), 417-427.
- Kaplan, R. S., & Norton, D. P. (2015). *Balanced Scorecard Success: The Kaplan-Norton Collection (4 Books)*. Harvard Business Review Press.
- Lamghari, Z., Radgui, M., Saidi, R., & Rahmani, M. D. (2019). Defining business process improvement metrics based on BPM life cycle and process mining techniques. *International Journal of Business Process Integration and Management*, 9(2), 107-133.
- Lucas Jr, H., Agarwal, R., Clemons, E. K., El Sawy, O. A., & Weber, B. (2013). Impactful research on transformational information technology: An opportunity to inform new audiences. *Mis Quarterly*, 371-382.
- Marangu, M. W. N., Mwit, E., & Thoronjo, E. (2017). Analysis of Cost Leadership Strategy Influence on Organizations' Competitiveness of Sugar Firms in Kenya. *European Journal of Business and Management*, 9, 28.
- Marcinkowski, B., & Gawin, B. (2019). A study on the adaptive approach to technology-driven enhancement of multi-scenario business processes. *Information Technology & People*.

- Meixner, T., & Pospisil, R. (2021). Personality, perceived leadership and commitment. *Proceedings on Engineering Sciences*, 3(2), 149-160.
- Pambreni, Y., Khatibi, A., Azam, S., & Tham, J. J. M. S. L. (2019). The influence of total quality management toward organization performance. *Management Science Letters*, 9(9), 1397-1406.
- Podsakoff, P. M., & Podsakoff, N. P. (2019). Experimental designs in management and leadership research: Strengths, limitations, and recommendations for improving publishability. *The Leadership Quarterly*, 30(1), 11-33.
- Prybutok, V. R., Zhang, X., & Ryan, S. D. (2008). Evaluating leadership, IT quality, and net benefits in an e-government environment. *Information & Management*, 45(3), 143-152.
- Queiroz, M., Tallon, P. P., Sharma, R., & Coltman, T. (2018). The role of IT application orchestration capability in improving agility and performance. *The Journal of Strategic Information Systems*, 27(1), 4-21.
- Sabherwal, R., Sabherwal, S., Havakhor, T., & Steelman, Z. (2019). How does strategic alignment affect firm performance? The roles of information technology investment and environmental uncertainty. *MIS Quarterly*, 43(2), 453-474.
- Saiz-Alvarez, J. M. (2017). Entrepreneurial ICT-based skills and leadership for business ethics in higher education. In *Handbook of Research on Technology-Centric Strategies for Higher Education Administration* (pp. 373-392). IGI Global.
- Sun, H., Geng, Y., Hu, L., Shi, L., & Xu, T. (2018). Measuring China's new energy vehicle patents: A social network analysis approach. *Energy*, 153, 685-693.
- Van Cauter, L., Verlet, D., Snoeck, M., & Cromptvoets, J. (2017). The explanatory power of the Delone& McLean model in the public sector: A mixed method test. *Information Polity*, 22(1), 41-55.
- Van Wart, M., Roman, A., Wang, X., & Liu, C. (2017). Integrating ICT adoption issues into (e-) leadership theory. *Telematics and Informatics*, 34(5), 527-537.
- Velikorossov, V. V., Maksimov, M. I., Orekhov, S. A., Huseynov, J. E. O., Khachatryan, M. V., & Kolesnikov, A. V. (2020). Integration as a corporate strategy. *DEStech Transactions on Social Science, Education and Human Science*, (icpcs).
- Xie, Y., Xue, W., Li, L., Wang, A., Chen, Y., Zheng, Q., ...& Li, X. (2018). Leadership style and innovation atmosphere in enterprises: An empirical study. *Technological Forecasting and Social Change*, 135, 257-265.
- Zhang, L., & Cheng, J. (2015). Effect of knowledge leadership on knowledge sharing in engineering project design teams: the role of social capital. *Project Management Journal*, 46(5), 111-124.
- Ziemba, E. (2019). The contribution of ICT adoption to the sustainable information society. *Journal of Computer Information Systems*, 59(2), 116-126.

Djordje Mijailovic

Faculty of Engineering
University of Kragujevac,
Kragujevac,
Serbia
djordje_mijailovic@yahoo.com

Aleksandar Djordjevic

Faculty of Engineering
University of Kragujevac,
Kragujevac,
Serbia
adjordjevic@kg.ac.rs
ORCID 0000-0003-2856-6578

Marija Zahar Djordjevic

Faculty of Engineering
University of Kragujevac,
Kragujevac,
Serbia
marija.zahar@kg.ac.rs
ORCID 0000-0003-4905-2728

Yury Klochkov

Peter the Great St. Petersburg
Polytechnic University,
Petersburg,
Russia
y.kloch@gmail.com
ORCID 0000-0002-7913-8285

Bojan Stojcetovic

Kosovo and Metohija
academy of applied studies -
Department Zvecan,
Zvecan,
Serbia
bojan.stojcetovic@akademijakm.edu.rs
ORCID 0000-0001-7418-6985

Milan Mistic

Kosovo and Metohija
academy of applied studies -
Department Zvecan,
Zvecan,
Serbia
milan.mistic@pr.ac.rs

Aleksandar Pavlovic

Faculty for Management
Novi Sad,
Serbia
aleksandar.pavlovic@famns.edu.rs

