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THE SUSTAINABLE TRANSITION FROM QUALITY 4.0TO QUALITY 5.0: A ROLE OF SUSTAINABLE, SPIRITUAL AND INTELIGENT LEADERSHIP IN CREATION OF INTANGIBLE CAPITAL FOR FUTURE

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A B S T R A C T

A world is in process of rapid changing in all areas of living. In all of them exists old and new problems with urgent needs for solving. Transition from Industry 3.0 to Industry 4.0 changed view on industry in 21st century and also there are challenges based on Quality 3.0 and Quality 4.0 concept. In last ten years is developed concept of Japan's „Society 5.0" which needs Quality 5.0 concept. This is main motive for researching possibility for transition quality into Quality 5.0 concept.In the paper are presented basic information about Industry 4.0 and Quality 4.0 based on new challenges in 21st century. Based on literature and own research is defined concept of Quality 5.0 and ways of transition to Quality 5.0, specially in transition counties as Serbia in next 30 years. The first analysis pointed out that it is possible with using intanagle capital-including smart technologies, smart leadership, smart people and other smart „things" for achieving smart/integrated quality, quality of life, resilience and all human-centric achivities.The new concept of Quality 5.0 needs new role of leadership (Sustainable, Spiritual, Intelligent Leadership), the new model of the efective transition from Quality 4.0 to Quality 5.0 and creating quality capital needed for the future..

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1. INTRODUCTION

A digital future is started in 21. century and in four waves Tompston N. (2014) is recognized as key for resolving different socio technological challenges. It practically means that is necessary to review existing and create new business models and paradigms as. (1) Sustainable Intelligent, and Spiritual Leadership (SISL), (2) Industry 4.0, (3) Quality 4.0, (4) Quality 5.0 and (5) untameable for it transition.

In new digital era business and social environment is also changing because concepts of Industry 4.0 and Society 5.0 need new view of a future of civilization. Now is necessary to include redesigned old and created new paradigms related to intangibles capital as: SISL capital, knowledge capital, intellectual capital and other with mutual impact on quality and society as whole. In area of leadership are developed Intelligent Leadership, ICT Leadership, Cultural Leadership, Shared Leadership, Team Leadership, Change Leadership, Ethical Leadership, Complexity Leadership, Smart Leadership, Virtual Leadership and so on.

In Industry 4.0 concept of fourth industrial revolution dominant role have smart technologies, smart manufacturing, smart factories (enterprises), cyber-

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physical systems, cloud manufacturing, Internet of Things (IoT), and others.

Related to concept of Industry 4.0 is developed concept of Quality 4.0 which covers aspects of technologies for quality, human resources for quality and processes related to quality. These aspects are analyzed in future chapters using identified sub-variables.

In concept Quality 5.0 defined by works of Arsovski S. (2019) are included soft factors related to cultural, social and eco-environment. On maturity top level of Quality 5.0 impact has a man with his spiritual, biological and social performances.

A capital needed for efficient and effective transition from Quality 4.0 to Quality 5.0 is key for this transition. For it is more important intangible capital. All emphasized factors are more detailed described in next chapters.

The purpose of the research presented in the article is to integrate a key enablers for efficient and effective transition from Quality 4.0 to Quality 5.0 in a Enterprises.

The goal of presented research is threefold, i.e.. (1) defining concept of SISL, (2) defining model of smart transition from Quality 4.0 to Quality 5.0, and (3) simulate impact of SISL and maturity level of Quality 4.0 on Quality 5.0 concept in praxis..

In the presented research are used the new research model with four independent variables (SISL), Quality 4.0 maturity, Intangible capital, and Quality 5.0 as dependent variable. For creating the model is used Grounded theory, reframing organization concept and Process Modelling approaches.

The theoretical novelty includes: (1) model of transition from Quality 4.0 to Quality 5.0, (2) defining SISL, (39) analysis of key enablers in the proposed model using statistical methods Artificial Neural Network (ANN) and DEA methods for predicting the success of transition.

The practical novelty are results of case study based on research of 235 enterprises in potential for the transition and simulation of impact of key enablers on transition process.

2. LITERATURE REVIEW

The literature review is made based on levels of maturity of new quality concepts (figure 1). Among them are common areas and time for resolving dilemmas, goals, needed intangible capital and so on. In Serbia, as developing country, dominant role has Quality 3.0 concept in last ten years. The process of transition to Quality 5.0 is very complex and is described partly in literature with emphases soft factors as SISl and intangible capital.

The first identified variable in the model is SISL related to new role of leadership.

A leadership in the digital age according Khan S. (2016) has three interconnected concepts i.e.: (1) value based leadership, (2) transformational leadership, (3) authentic leadership.

Fry L. (2016) defined model of spiritual leadership with impact on spiritual well-being and triple bottom line. It starts from hope/vision, inner life and altruistic love. In the middle of the model are calling and membership. At the end are life satisfaction, social responsibility, performance excellence, organizational productivity, organizational commitment, and employee engagement.

Fry l. And Matherly L. (2006) in one exploratory study analyzed spiritual leadership and organizational performance on the proposed model, using SLT survey questions they find high correlation among variables: (1) hope/faith and altruism love, vision, (2) vision to altruistic love and calling meaning, (3) meaning/calling for achieving sales, organizational commitment, (4) membership to organizational commitment and productivity).

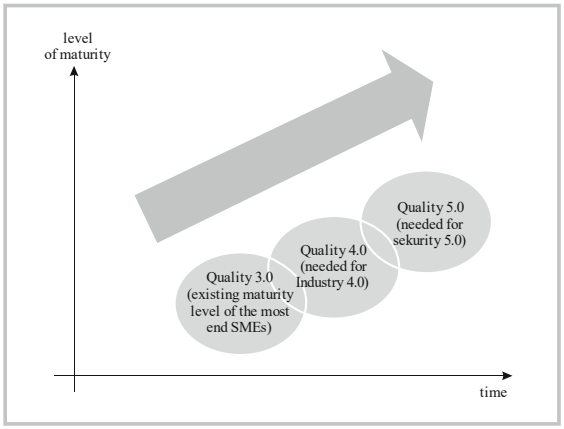


Figure 1. Levels of maturity

For new age in the work of Khan S. (2016) are proposed perspectives of holistic leadership, virtual leadership and hub-and networked-based leadership.

Sustainable leadership is based on theory of sustainability through three types of indicators: (1) economic, (2) social and (3) environmental in different business and social areas (Brandt E., 2016; Malik H., Mahmood M., 2022., Kanters N., 2013). According standard ISO 9004:2009 are emphasized five maturity level, i.e.: (1) the leadership is reactive and based on top-down instructions, (2) leadership is reactive and based on decisions by managers at different organization levels, (3) leadership is proactive and the authority to take decisions is delegated, (4) leadership is reactive with high involvement of the employees in decision making, (5) leadership is reactive and learning-oriented with the empowerment of people at all levels. In this standard a sustainable structure is related to following components used for the own research: (SS1) organizational effectiveness for achieving desired sustainable levels, (SS2) knowledge and skills of the staff, (SS3) motivation of the staff and (SS4) social,

environmental, legal and business pressures for achieving desired level of sustainability.

Intelligent leadership is concept developed for intelligent organizations, as organizations in concept Industry 4.0 (Sydänmaanlakka P., 2003). In proposed leadership model a intelligent leadership can be defined as follows: „Intelligent leadership is a dialogue between leader(s) and followers where they come together in a certain situations in order to achieve shared vision (purpose) and take place in a certain team and organization which is shaving same values and culture. The macro environment-industry and society-also affects this process“. On this way is possible to achieve an efficient, learning and well-being organization. For this role of leaders have to develop a lot of new competences, including digital oriented knowledge, artificial intelligence, orientation to change, what is used as components for own research.

Spiritual leadership (SL) is developed as incorporation of spirituality into leadership concept (Burke R., 2006). He analyzed different aspects of leadership and introduced role of spirituality which included ethical, responsible sustaining, hope inspiration and purpose. Fry L. and Kriger M. (2009) introduced term spiritual intelligence as a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill or test-taking smarts. Rather, it reflects a broader and deeper capability for comprehending our surroundings – „catching on“, „making sense“ of things, or „figuring out“ that to do.

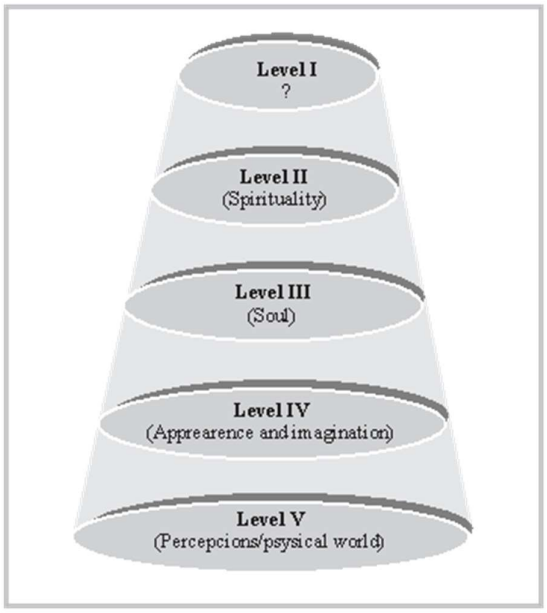


Figure 2. Levels of leadership and human being

All of them are used as components SL They made hierarchy with five levels of spiritual intelligence: (5) the sensible/physical world, (4) images and imagination, (3) the soul, (2) spirit, and (1) SQ based on in the nondual in oneness and constant reconciliation of apparent opposites (figure 2).

2.1 Performances related to Industry 4.0

According study of Deloitte (2008) the fourth industrial revolution (Industry 4.0) has four main characteristics:

1. Vertical networking of smart production systems,
2. Horizontal integration using a new generation of global value-creation network with integration of business processes in business environment (business partners, customers, new global business and cooperation models),
3. Engineering throughout the entire value chain in the entire product life cycle,
4. Acceleration through emerging technologies capable for mass-market application with increased compatibility based on productivity, security, safety, reducing risks and vulnerability, quality etc.

Government has to promote to radical innovation, as condition sine qua non for long term captivity and sustainability (Kelly R., 2019). using bibliometric and bibliographic analysis they identity research fields and stage of growth necessary for radical innovation.

An Industry 4.0 environment exists with smart enterprise in center connected with after smart elements as: smart mobility, smart grid, smart logistics, smart buildings, smart homes, social web, business web, cyber-physical production systems (CPPs), and smart people with smart specialization. On the periphery are: Internet of things, Internet of services, Internet of people, and Internet of data.

In study of Deloitte (2018) are analyzed Switzerland readiness for Industry 4.0. On scale 1 – 5 in most enterprises are recognized needs for digital transformation to Industry 4.0 (more then 80%), but feeling the impact in company on Industry 4.0 were between 3 – 4 (more than 52% answers), high involvement of customers in process transformation into Industry 4.0 (more than 67%), middle range of resource efficiency for analyzing production process (between 2,3,4 about 75%), and high cyber risk (more than 86% of answers). Also, dominant current transformational segments and future potential on scale 1-5 were highest in: (1) research and development 43%, (2) procurement and purchasing -39%, (3) production (30%), warehousing and logistics -26%, (4) marketing -29%, (5) sales -39%, (6) services -45%, and internal enterprise administration -26%. in this transformation is emphasized innovation processes, corporate venturing and the learning organization with higher role of leadership based on knowledge and motivation of employees.

All of previous sub-variables are related to global characteristics of Industry 4.0: (1) vertical networking, (2) horizontal integration, (3) through-engineering, and (4) acceleration through exponential technologies (Deloitte, 2018). On global business scene are lot new

and old aspects and variables related to global business environment, as global competiveness, opportunities and threats, resource used, future potential of the market, new technologies etc.

A global economy has different names according main goals. So knowledge economy (Saisana M., Munda G., 2008) defined measures and drivers for it for EU countries. They emphasized key indicators: (1) production and diffusion of IT, (2) human resources, skills and creativity, (3) knowledge production and diffusion, (4) innovation, entrepreneurship, creative production, (5) economic outputs, (6) social performance, and (6) internationalization. All of them is included in proposed model of smart enterprise because knowledge is included in concept of smart enterprise.

2.2 Literature review of Quality 4.0/Quality 5.0 concepts

According Jacob D. (2017) research in a Quality 4.0 has 11 axes, i.e.:

1. data,
2. analytics,
3. connectivity,
4. collaboration,
5. application development,
6. scalability,
7. management systems,
8. compliance,
9. culture,
10. leadership, and
11. Competences.

On this approach Quality 4.0 is transformed in CIA (Connectedness, Intelligence, and Automation). In focus of this system are Neural Networks and Deep Learning. Mourtzis D. et al. (2019) emphasized aspects of internal and external complexity and relations in Cyber-Physical Systems) of Industry 4.0.

Relations among Quality management in the 21st Century and Industry 4.0 are analyzed in work of Gunasekaran A., Subramanian N., and Ngoi E. (2018) with emphasized following quality topics for Industry 4.0, i.e.:

1. economic aspects,
2. decision models for quality,
3. business model with integrated quality,
4. human aspect in quality (including leadership and culture), and
5. Technological aspects in quality.

In smart society is higher role of ethical and well-being aspects. Ethical government realizes through: (1) impact of regulative, (2) regulation of collective actions, (3) building/modernising existing regulation, (4) anticipating strength of transformation of collective adaptive systems (ACS), (5) balancing government decisions, (6) deciding adaptive government, etc.

Transition of concept Industry 4.0 to Society 5.0 has impact on planning big social transformation in Japan with destroying five walls related to:

- ministries/agencies,
- legal system,
- technology,
- human resources and
- Social acceptance.

A transition from Industry 4.0 to Industry 5.0 is practically transformation of digital manufacturing to digital society (Skobelev P.O., Borovik S.Y., 2017) with convergence of science and technologies in society 5.0 from technology to society.

A concept of enterprise value management defined for smart enterprise in Industry 4.0 could be make broader for Society 5.0 and Quality 5.0 (Fujitsu Consalting, 2002).

According Kearney A.T. (2017) value dimensions from converging technologies have levels:

- value for the factory,
- value to the firm (enterprise),
- value to the industry,
- value to society, and
- value to the individual.

In all of the levels are included elements of Quality 4.0 (level 1, 2 and 3) and Quality 5.0 (level 4 and 5).

Kueper D. et al. (2019) analyzed Quality 4.0 and concluded that cca 63% companies had not decision or plan for it, but only 16% had some form of implementation. The challenges of implementation were: (1) cost of quality check, (2) first-pass yield, (3) defect rate, (4) rework rate, (5) on-time delivery, (6) customer satisfaction, (7) warranty claims, and (8) product-related complaints. All challenges are base for Quality 4.0 and Quality 5.0, also on levels 1 and 2 in value creation.

2.3 Literature review of intangible capital needed for sustainable transition from Quality 4.0 to Quality 5.0

A intangible capital resources needed for sustainable transition from Quality 4.0 to Quality 5.0 consist from: (1) human capital, (2) cognitive capital, (3) intellectual capital technologies, (4) scientific capital, (5) social capital, (6) financial capital, (7) environmental capital, (8) spiritual capital, etc.

According to Deloitte (2019) Global Human Capital Trends are emphasized trend importance for industry: (1) learning, (2) human experience, (3) leadership, (4) talent mobility, (5) HR cloud, (6) talent access, (7) rewards, (8) super jobs, (9) teams, and (10) alternative workforce.

According Deloitte (2015) a digital transformation included intangible capital for improvement of competitively flexible customer integration and boosting quality and efficiency, as well as ICT infrastructure, now forms of marketing etc. Smart and intelligent technologies cover data technologies smart-production technologies, artificial intelligence, cyber security technologies, IoT, etc. Other resources are described in broder literature (Hunter l., Webster E., Wyatt A. 2005; Rosman M.I., Nor L.A., Zizah C.S. 2010; Sharon S. (2015); Marphy E. (2022); Noghiu

A.A. (2015); Mantog A.M. (2021); Prett T., Shaw E., Dodd S.D. (2016); Gloor P. (2017); Mc Carter B., White B. (2013); Sydanmaanlakka P. (2003); Hazan E. et all. (2021); Sulliven P. JR., Sulliven P. SR. (2000).

3. THE PROPOSED METHODOLOGY

The proposed methodology has purpose to: (1) define process of transition from Quality 4.0 to Quality 5.0, based on analysis of existing Quality 4.0 model and goals of transition, (2) definition of the key variables for assessment levels of Quality 4.0 and Quality 5.0 based on Grounded Theory (Glaser, Straus, 2006), (3) defining the base model for transition, (4) assessment values of the key variables, (5) simulation effects of transition using statistical methods, DEA (Data Envelope Analysis) and ANN (Artificial Neural Network), (6) analysis effects of transition to Quality 5.0 and (6) forecasting the transition process in the future. It is presented in Figure 3.

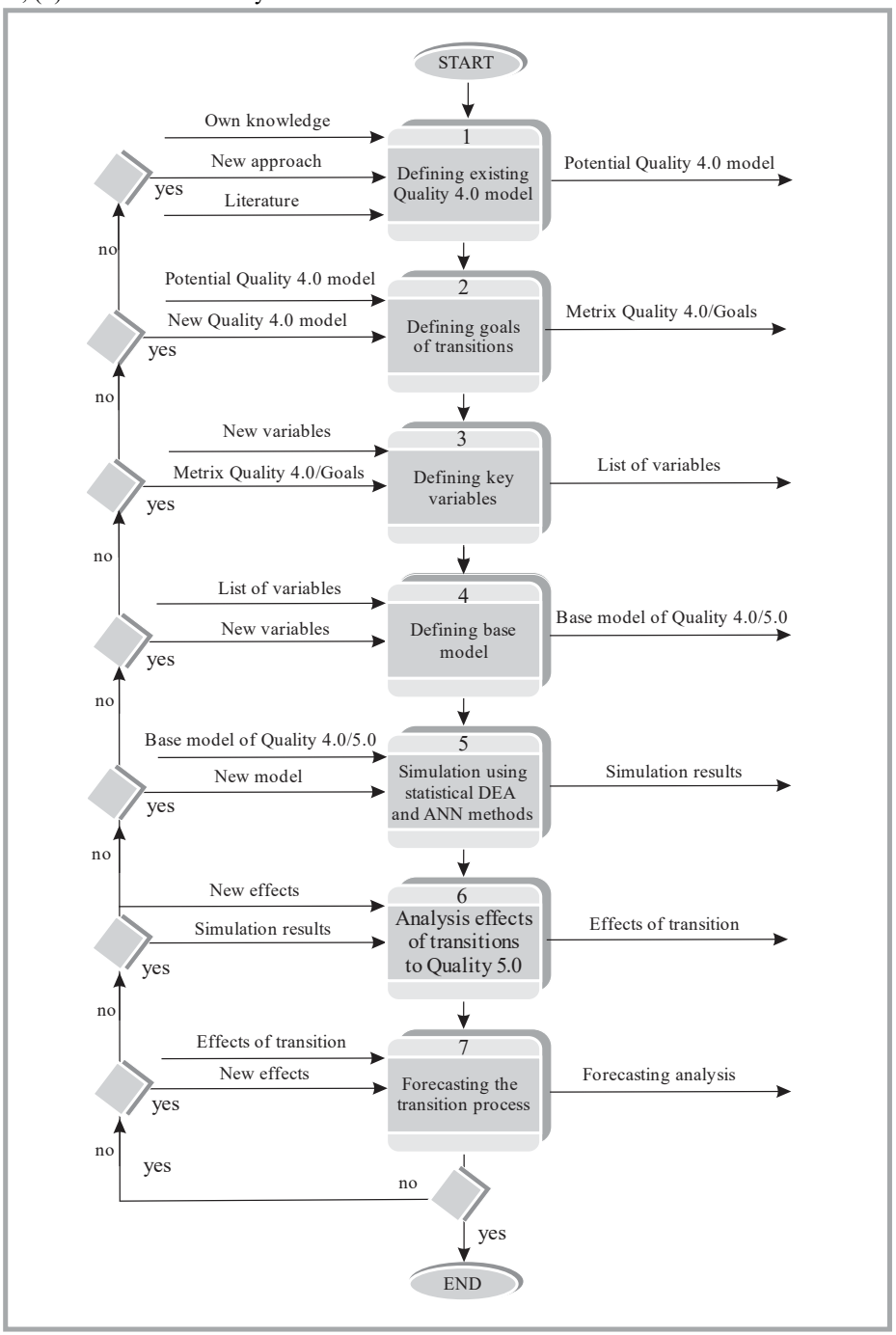


Figure 3. Model of transition Quality 4.0 to Quality 5.0

The first step is defining existing Quality 4.0 using literature presented in previous chapter. Based on it is proposed as outcome potential Quality 4.0 model based on work by Jacob D. (2017) with 11 axes (variables). The key sub-variables are level of Quality management system in broad sense. In second step are defined goals of transition from Quality 4.0 to Quality 5.0 and as outcomes are recognized matrix Quality 4.0/goals. In our research this matrix is presented in Table 1 with assessed weight of component goals.

Table 1. Matrix of axis/goals for Quality 4.0.

No of axes	Goals					
	Quality level	Relation with customers	Integration with Industry 4.0	Social responsibility	Reduction resources	Higher safety and security
Data	10	5	10	5	5	5
Analitics	5	5	10	5	5	5
Connectivity	5	5	10	5	5	5
Collaboration	5	5	10	10	5	5
Application development	5	5	10	5	5	5
Scalability	5	5	5	5	5	10
Management system	30	20	10	20	30	20
Compliance	10	10	10	10	10	10
Culture	10	10	5	20	15	10
Leadership	10	20	10	10	10	10
Competences	10	10	10	10	5	5
Σ	100	100	100	100	100	100

According goals used in Technique Nominal Group (TNG) for defining key variables for achieving proposed goals of Quality 4.0 (step 3). The list of eleven variables are weighted and it is base for defining the base model for transition of Quality 4.0 into Quality 5.0 (Figure 4).

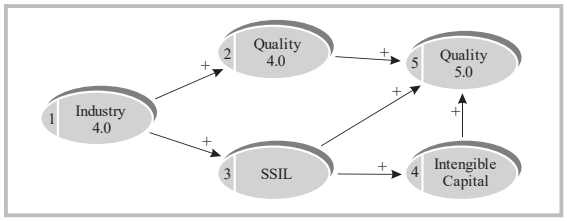


Figure 4. Base model for transition from Quality 4.0 to Quality 5.0

The variables are: (1) Industry 4.0 level, (2) Quality 4.0 level, (3) broader then structure of leadership in model of Quality 4.0. And Quality 5.0 is broader with interconnections with environment, and (4) intangible capital needed for transition and (5) Quality 5.0.

The matrix for variable SISL is presented in Table 2 with weights for assessing.

Using this matrix is calculated value of variable v3 (SISL).

Variable v1 (Industry 4.0) is also assessed based on literature review presented in previous chapter. The matrix for assessment Industry 4.0 level is presented in Table 3 (Yang K., 2018).

Table 2. Metrics for (Sustainable, Intelligent and Spiritual Leadership)

Weight / Enterprise	Spiritual leadership	Intelligent leadership	Sustainable leadership	Average value
Micro enterprise	20	10	5	13
Small enterprise	20	20	15	17
Medium enterprise	30	30	30	30
Big enterprise	30	40	50	40
Σ	100	100	100	100

Table 3. Metrics for assessing level of Industry 4.0

Weight / Enterprise	Cyber security	Smart logistics	Smart manufacture. systems	Big data/ AI, IoT	Mass custo-matization	System integration	Average value
Micro enterprise	5	10	15	10	10	15	12
Small enterprise	10	15	20	20	20	25	20
Mediu enterprise	20	30	30	30	30	35	30
Big enterprise	65	45	35	40	40	35	33
Σ	100	100	100	100	100	100	100

Variable v5 (Quality 5.0) is assessed based on Metrix presented in Table 4.

Table 4. Metrix for assessing Quality 5.0

Weight / Enterprise	Inclusion	Competi-tivity	Concern to customer	Government support	Strategy of digitalization	Quality of Life	Average value
Micro enterprise	10	15	15	25	10	10	15
Small enterprise	15	20	25	25	20	15	20
Medium enterprise	20	25	30	25	30	20	25
Big enterprise	55	40	30	25	40	55	40
Σ	100	100	100	100	100	100	100

Variable v4 (Intangibles needed for transition) is assessed based on Metrix presented in Table 5.

Table 5. Metrix for assessing v4 (Intangible capital needed for transition)

Weight / Enterprise	Human capital	Cognitive capital	HR capital	Scientific capital	Social capital	Spiritual capital	Sustainable capital	Average value
Micro enterprise	5	10	15	20	10	10	5	10
Small enterprise	10	15	20	20	25	25	20	20
Medium enterprise	20	25	30	20	30	30	30	30
Big enterprise	65	50	35	40	35	35	45	40
Σ	100	100	100	100	100	100	100	100

In step 5 (Figure 3) are calculated inputs data from sample, which will be explained in next chapter, made simulation using statistical methods, DEA and ANN methods. Outcome from this step are simulation results presented in next chapter.

On this way are related steps 6 and 7. At the end is proved realization of stated goals and eventually repeated some steps until achieving the common goal.

4. CASE STUDY

The case study is provided in Republic Serbia on sample of 235 enterprises with higher level of smartness's. For each enterprise the assessment on scale 1-10 gave quality manager, consultant, production manager, logistic manager. The final assessment is calculated as average value. In the data base are included average values of all assessed variables. Using simulation software SPSS v.21 is calculated average value for each variable and this standard deviation (Table 6). In the step 5 is calculated also regression coefficients (Table 7).

Table 6. Descriptive statistics

Descriptive Statistics							
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
V1	235	3,79	1,66	5,45	3,6351	,86574	,750
V2	235	4,20	2,20	6,40	4,3771	1,01361	1,027
V3	235	4,66	1,85	6,51	4,3399	1,09214	1,193
V4	235	4,35	2,08	6,43	4,9531	,99759	,995
V5	235	3,97	2,39	6,36	4,1308	,94980	,902
Valid N (list wise)	235						

Table 7. Regression coefficients

Correlations					
	V1	V2	V3	V4	V5
V1	1	,692	,573	,535	,367
V2		1	,644	,676	,671
V3			1	,622	,552
V4				1	,726
V5					1

The correlation among v5 and other variables are between 0.367 until 0.726 what is very high values.

For predicting impact of independent variables v2, v3 and v4 on dependent variable v5 are presented model summary for v1 (table 8), impact of v1 on v2 (table 9), impact of v3 on v4 (table 10), model summary for predictor v3, impact of v3 on v4 (table 11), and model summary for predictors v2, v3 and v4 (table 12). All impacts are positive effects. Impact of v3 (SSIL) is 0.050 and impact of v4 (Intangible Capital) is 0.485. Aftor analysis is possible to recognise that impact of SSIL is relative low (because is not recognized by persons) and impact of intangible Capital is much higher (0.485) and it can be used as base for successful transition from Quality 4.0 to Quality 5.0.

In next phase is performed DEA (Data Envelope Analysis based on DEAP version 2.1). Efficiencies plotted on diagrams (figures 5, 6 and 7) pointed out that exists groups of assessment near optimal values. On this base view is possible to find optimal way for improving transition to Quality 5.0 (variable v5) in dependence of variables v2, v3 and v4. This prediction is based on existing state of level of variables in sample.

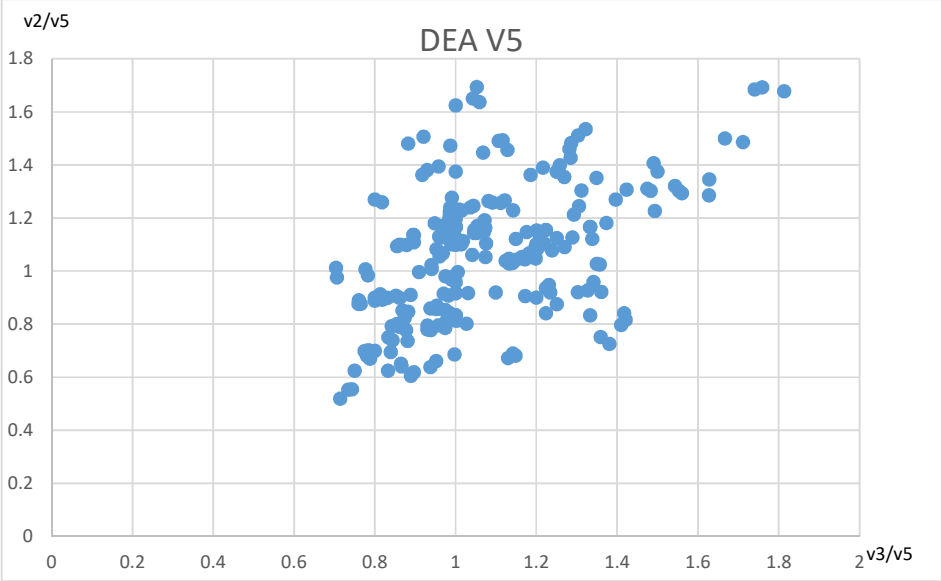


Figure 5. Impact V2 and V3 on V5

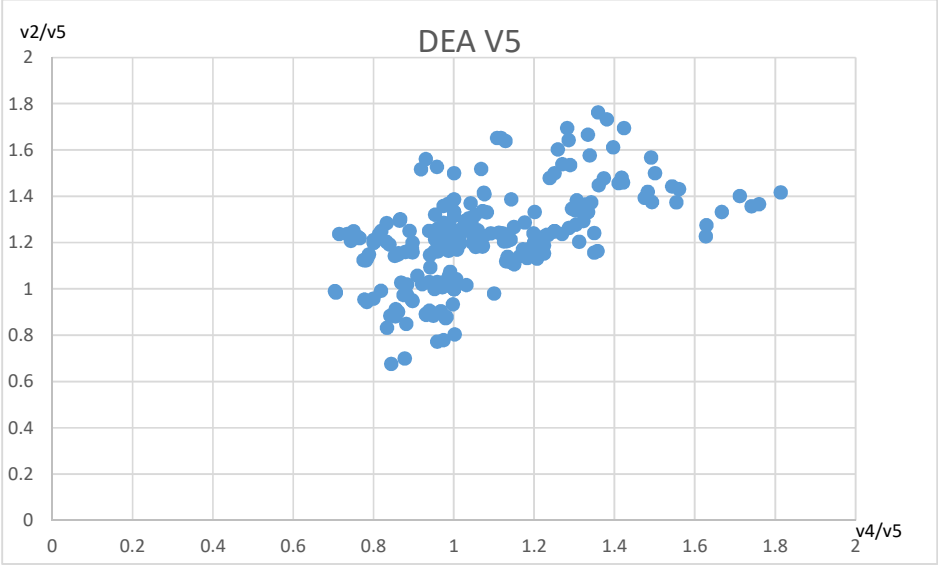


Figure 6. Impact V2 and V4 on V5

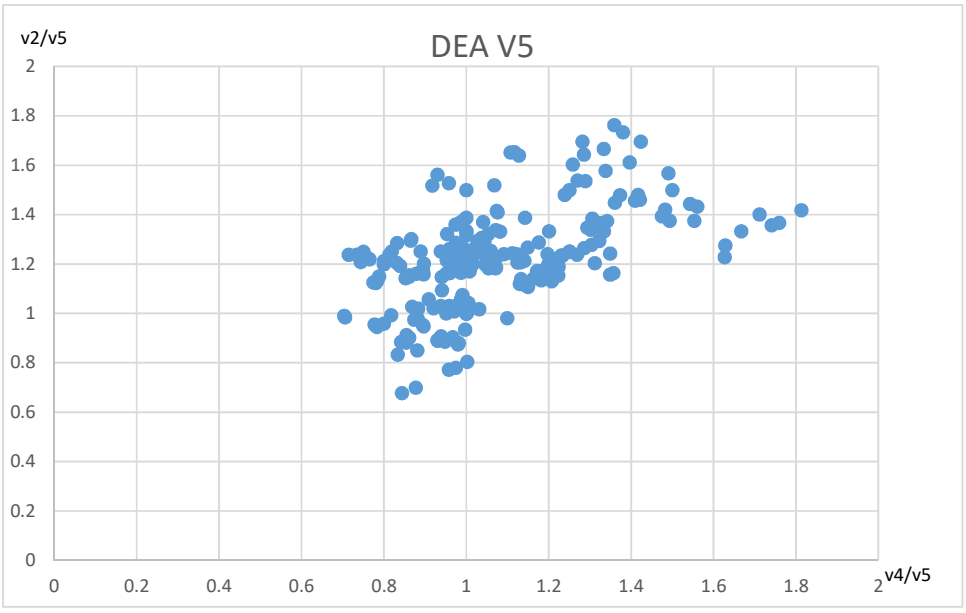


Figure 7. Impact V3 and V4 on V5

In purpose to predict level of Quality 5.0 in the future is used ANN (Artificial Neural Network) be using base model, key variables and variation of their impact in the future (figures 8, 9, and 10).

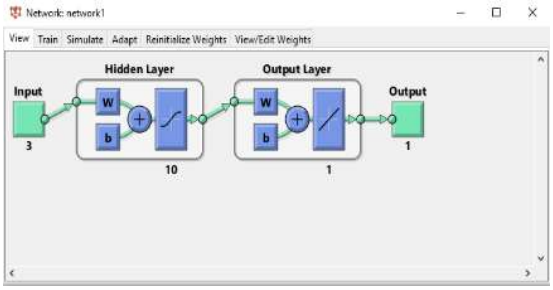


Figure 8. Layers in ANN model

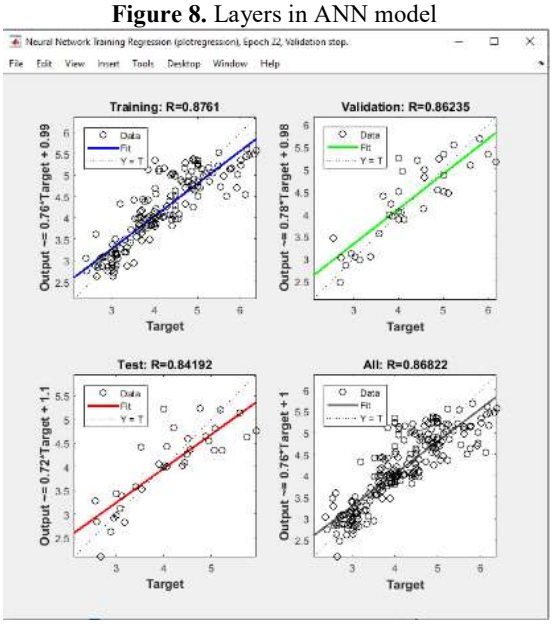


Figure 9. Validation of ANN model

Based on five imputes and one output is defined structure of neural network (Figure 8) with ten hidden layer and one output layer. Using appropriate software is made training of neural network (Figure 9). Results of training of neural network proved high correlation between output and target value (R=0.8761). On this way is proved that exists conformity among real and forecasting values (Figure 10).

Using this approach is conducted ANN predictions which also pointed out that are prediction of value of Quality 5.0 is very high for all 235 cases in sample.

In next step is analyzed impact of independent variables v1, v2, v3, and v4, on dependent variable v5. For purpose to demonstrate accuracy of ANN in Figures 10 are presented ANN predictions in comparison with real values for all cases in sample. Author pointed out that in all cases are very high conformity among them.

5. CONCLUSION

A concept of Quality 4.0 is emerging in different aspects but is related with a lot of dillemas and different aproaches. On the other side according concept Society 5.0 author made one step more to develop concept at Quality 5.0. This attempt is investigated in Center for Quality (CQM) last in four years from theoretical and applicative approaches.

In the research presented in the article is used scientific approach from Quality Science (Arsovski S., 2017) and using it avoid „sciles and haribdes“ in this new research thema „Quality 4.0/5.0“.

The results of research proved atractive goals, i.e.:

1. Defined new concept of Sustainable, Intelligent and Spiritual Leadership (SISL),
2. Defined Model of Smart Transition (MST) from concept Quality 4.0 to Quality 5.0 and

3. Assessed impact of SISL, in the transition process.

For the research are used concepts of Grounded Theory, Reframing organizations and Process Modeling approaches. In purpose to confirm proposed model is organised research in 235 with relative higher level of digitalization and quality. For each variable is defined metrics and answers of correspondens. Quality manager were collected and formed Data Base for further application of statistical method using IBM Softvare SPSS v21, DEA (Data Envelope Analysis) and ANN (Artificial Neural Network).

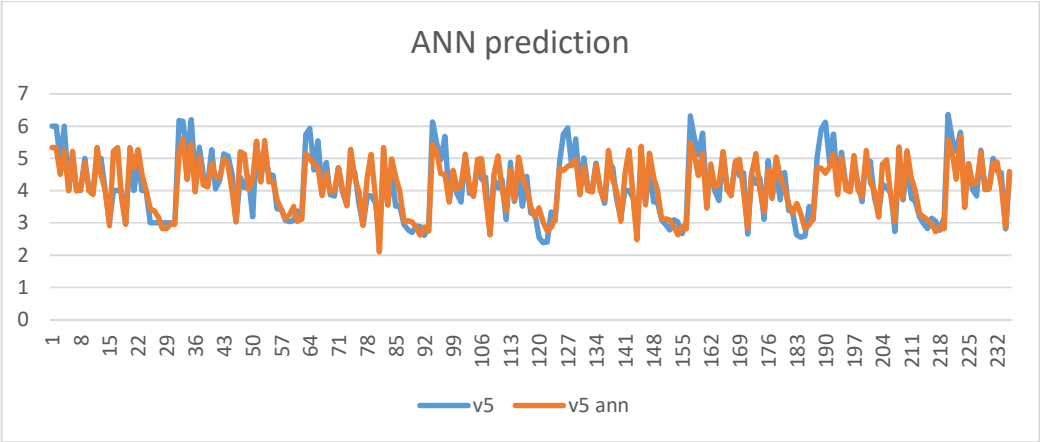


Figure 10. ANN prediction

Using ANN software are performed prediction of value v5 in all 235 enterprises.

Impact of independent variables v2, v3 and v4 is calculated according statistical analysis presented in table 10, i.e.:

$$V5 = 0.379 + 0.291 \times v2 + 0.044 \times v3 + 0.462 \times v4$$

For improvent in next five years for 10 percent the new espected value of v5 will be:

$$V5 = 0.379 \times 0.291 \times 4.8 + 0.044 \times 4.9 + 0.462 \times 5.5 = 4.532$$

This value of v5 is higher for 0.393 of mean value (4.1308) calculated by software SPSS v.21. It is improvement of 8 percent.

Results of statistical analysis proved base model with relative high correlation among independent and dependent variable v5 (level of Quality 5.0). In period of collecting input data of SISL authors recognised that correspondent dont persons adopt and recognize structure of SISL, they in many cases missundstand it and as result the impact of SISL on v5 small. In next period author plan to educate quality managers about significance of SISL and tray to improve their spirituality, smart intelligence and sustainable aspects of leadership. All variables had positive impact on v5 and with their positive improvement as results we can expect higher v5 in future. Level of improvement depends on possibility to investments in Intargible Capital and social support. In this time it is not sufficient in Serbia, as transition state, with relative small financial capacity. The greatest impact on v5 has v4 (level of Intargible Capital). Authors expected it because all analysed enterprises had establish with generaly high values of components of Intargible Capital.

Varibles V1, V2, V3 and V4 have impact on other enablers of V5 and its ipact in total on V5is much higher. For estimtion of this impact is not sufficient linear model used for calculating by software SPSS. Author proposed for further research using non-linear model and broather model of V5 based on monitoring key enablers (a new variables in model) in purpose to estimate small improvement in each of them and its sinergy and total impact on Quality 5.0. It is so caled „Buterfly efects".

Using DEA is analysed efficiency of impact of underdent variables on v5 (level of Quality 5.0). In all casses is calculate efficiency for each of 235 enterprises. Overal firm efficiency varied from 0.6 to 0.8, what is relative good results for the sample of 235 enterprises.

Through using ANN is also confirm that exist very good accuracy between real data of v5 and value of v5 calculate using ANN. This is base for conform the proposed methodology and impact of variables v1, v2, v3, and v4 on v5 (level of Quality 5.0) in the future.

This model is related with meny difficulties. The first, the assessing of SISL is conected with personal assessment without enough knowledge about Spirituality, Intelligent and Smart Leadership. On the other side knowledge related to Industry 4.0 are also relative on lower level and assessments were in some cases problematic. Next problem is support of goverment which is different for different enterprises and also were different investment from own financial sources.

All of previos difficulties can overridge in next research in four areas, i.e.:

1. higher education of SISL and other human resources of enterprises,
2. higher sample and providing analysis for different type of industries,

3. Using methods of Artificial Intelligence and cooporation with foreign research,
4. Including other independent variables and making new hierarchical model appropriated for application of new simulation tools,
5. Developing the new international project related to enabling factors on Quality 4.0/5.0 and their impact on Society 5.0 as answer on Millenium goals of our civilization.

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