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The Influence of Competencies of Managers on Job Satisfaction of Employees in the Hotel Industry

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Background and purpose: The importance of soft-skills that managers can use to promote job satisfaction of employees is well known. Previous research has shown several different ways how managers can influence job satisfaction of employees, mostly in the form of external factors. Very little research is available on internal factors. This led us to the following research question: How managers' competencies influence job satisfaction of employees?

Design/Methodology/Approach: We have performed a pencil-paper survey among employees in the hotel industry sector. The questionnaire asked respondents to evaluate the competencies of their supervisors; later, we asked respondents to evaluate what influences their job satisfaction, and, in the final part, we collected some demographical data.

Results: The results show a weak, but still detectable, positive correlation between the competencies of managers and job satisfaction of employees in the factor that we have labelled "work itself". We have not found any correlation between the competencies of managers and job satisfaction of employees with regard to working conditions or possibilities of career development.

Conclusion: The competency of managers has an influence on job satisfaction of employees with regard to work itself. Although correlations that we have found are weak, they do exist, and have to be taken into account when it comes to discussing job satisfaction of employees. Managers who understand this core competency and promote it onwards to their employees will influence the job satisfaction of employees through this competency.

Keywords: competencies, managers, job satisfaction, influence, hotel industry.

1 Introduction

People are a key component of every organisation. When we are talking about the hotel sector (that fits into the broader Travel and Leisure sector), the importance of employees is even higher. On the one hand, we have seen successfully running fully automated hotels where guests have no interaction with actual employees (although such cases are rare); on the other hand, there is the importance of the so-called human touch within the Travel and Lei-

sure industry that is increasing (Santos, Veiga, & Águas, 2016). Another trend worth mentioning is the desire of customers to experience local products and services, with the emphasis being on the authenticity of the experience itself (Paulauskaite, Powell, Coca-Stefaniak, & Morrison, 2017). There is no doubt that trends are changing, however, because when people come to a hotel they are expecting a warm welcome, hospitable behaviour, understanding of their needs, personalization of service and comfort (Ariffin & Maghzi, 2012). Within the hotel industry customer satisfaction is going even further, as Torres and Kline (2013)

suggest, it is moving towards customer delight, that includes taking care of the guests' needs, exceptional friendliness, professionalism of staff, employees going outside of the call of duty and problem-solving skills. In order to achieve such standards of care for guests, employees must experience job satisfaction themselves, since, as Lam and Chen (2012) suggest, job satisfaction of employees tends to increase their levels of service quality.

There have been many studies stating that job satisfaction is influenced by several different factors, such as: Work content (McPhail, Patiar, Herington, Creed, & Davidson, 2015), pay and rewards (Sarwar & Abugre, 2013), employee engagement (Yeh, 2013), work environment and conditions (Pan, 2015), career development possibilities (Ko, 2012), relationship with supervisors (Jang & George, 2012) and leadership style (Kara, Uysal, Sirgy, & Lee, 2013).

Although relationship with supervisors and leadership style have an influence on job satisfaction and is related directly to managers, no study has investigated the area of competencies of managers themselves. This brought us to the following research question: Is there any influence of competencies of managers on job satisfaction of employees?

We decided to conduct the study within the hotel industry for two reasons; firstly, the hotel industry is a substantial part of the Slovenian Travel and Leisure industry. The Travel and Leisure industry is on the rise, and currently presents indirectly about 12% of total GDP, and employs one out of every ten employees within the sector; secondly, there is an indication in a recent study by Golubovskaya, Robinson, and Solnet (2017) that has shown that: »*a hospitality workforce tends to favour service management and service processes as the guiding paradigm. The essence of what it means to be hospitable, and the host-guest model, appears to be largely absent in practice*«. This finding shows a gap between trends on one side and standards employees within the same sector prefer to operate by.

2 Literature review

Based on the stated research question, we conducted a more in-depth review of literature about two key segments: Competencies and job satisfaction.

2.1 Competencies

Competencies have been one of the focal points of discussion within Human Resources Management for the past two decades. They can be found in different textbooks (Bratton & Gold, 2012; Snell, Morris, & Bohlander, 2015) provided for scholars and academics, as well as books intended for managerial use (Collins & Porras, 2005; Prahalad & Hamel, 2006). One of the first discussions about

competencies was made in the mid-1970s, when it was proposed to test people for their competencies rather than their intelligence (McClelland, 1973). In this sense, competencies were defined as knowledge that an individual has gained (McClelland, 1998). Understanding of competencies evolved through time, and various researchers added additional content to competencies. An overview is shown in Table 1.

Competencies are being reflected in the behaviour of individuals. Behaviour, in turn, is the result of individuals' upbringing (Dunleavy, Milton, & Crawford, 2010), knowledge (Snell et al., 2015) and experiences (Bratton &

Table 1: Views on competencies through time.

Competencies are a mixture of individuals' motives, abilities, self-image, social role and knowledge that a person uses in social interactions.	(Boyatzis, 1982)
Competencies are not just the knowledge, but also personal characteristics that have evolved through the educational process and were shaped further by work in an organisation.	(Hartle, 1995)
Competency is an individual's demonstrated knowledge, skills, or ability.	(Ulrich, Brockbank, Yeung, & Lake, 1995)
Competencies are individuals' behaviours in a certain situation.	(van Klink & Boon, 2003)
A competency is defined as a capability or ability.	(Boyatzis, 2008)
"Competency" is a commonly used term for people's asserting of their working potential in real activities.	(Königová, Urbancová, & Fejfar, 2012)
Competence is seen as something grounded in an idealised reconstruction of childhood and upbringing, education, and family values.	(Luthar & Trdina, 2015)

Gold, 2012), thus, we can say that competencies are being reflected in the behaviour of individuals.

In the Travel and Leisure industry, competencies are, in some cases, understood as a mixture of soft skills that were found to be among the most important competencies in this sector (Christou, 2002), behavioural skills, generic attributes (Spowart, 2011). All these are of extreme importance for the employees in the Travel and Leisure industry (Moolman & Wilkinson, 2014).

Chung-Herrera, Enz, and Lankau (2003) explored the

required competencies of successful leaders in the Travel and Leisure industry, and listed 99 competency items, 28 competency dimensions, and 8 factors. In order of importance, the factors include self-management, strategic positioning, implementation, communication skills, relationships, leadership, and industrial knowledge.

Potočnik Topler (2017) stresses the importance of linguistics` competence as a part of a communication skills set for the positive perception of a destination by customers. Many of these competencies can be labelled as "soft-skills". The importance of soft skills in managing Human Resources in the Travel and Leisure industry was researched by (Spowart, 2011). They (he) proposed four categories of soft skills that can be identified and also related to competencies` clusters that managers need for performing their jobs. These are: (1) Leadership/people/relationship skills, (2) Communication, (3) Management and organisation and (4) Cognitive skills and knowledge.

Very similarly, (Wong & Lee, 2017) identified that commitment and awareness of quality are two of the most important competencies within Human Resources management in the Travel and leisure industry. With sustainability being a very important concept within the Travel and Leisure industry, it is seen as an important competence (Pereira, 2017).

Based on the related research, we can conclude that competencies are a mixture of knowledge, abilities, skills, experiences, and values of an individual gathered during their primary socialization, various levels of education and work life.

2.2 Job satisfaction

In the second part of this literature overview we are focusing on job satisfaction of employees. Job satisfaction is seen as an individual's perception of his or her experiences with the company as a whole, part of the company, company procedures and fellow employees (Vroom, 1957). Another commonly used definition of job satisfaction sees it simply as how content an individual is with her job; simply whether she likes the job or not (Spector, 1997).

Understanding of job satisfaction evolved through time, and various researchers highlighted various aspects of it. An overview is shown in Table 2.

The importance of job satisfaction within a service sector such as the hotel industry is very clear, since the nature of service delivery means that the human element has a relevant role in achieving excellence, and, therefore, the satisfaction of employees is a must (Nogueira Novaes Southgate & Mondo, 2017). While job satisfaction has a positive influence on standard performance (Rich, Lepine, & Crawford, 2010), we have seen research stating that job satisfaction does not necessarily lead to employees' willingness to exert extra effort (Kim & Brymer, 2011).

Table 2: Views on job satisfaction through time.

Job satisfaction is a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences.	(Locke, 1976)
Simply stated, the more a person's work environment fulfils his or her needs, values, or personal characteristics, the greater the degree of job satisfaction.	(Ellickson & Logsdon, 2002)
Job satisfaction is a psychological response to one's job that includes cognitive, affective and behavioural components.	(Hulin & Judge, 2003)
Job satisfaction refers to satisfaction with everyday work tasks and conditions.	(Christen, Iyer, & Soberman, 2006)
The term job satisfaction refers to the attitude and feelings people have about their work.	(Armstrong & Taylor, 2014)
Job satisfaction can also be seen as a range of issues which affect an individual's experience of work, or their quality of working life.	(Tomaževič, Seljak, & Aristovnik, 2014)
Job satisfaction was defined as satisfaction with the intrinsic and extrinsic aspects of the employees` role.	(Tongchaiprasit & Ariyabuddhiphongs, 2016)

Researchers have determined many different factors that influence job satisfaction. Furnham (1994) suggests that we should not talk about individual factors, but rather about groups of factors. In the first group, there are factors related to organisational behaviour, such as: Management systems, decision-making procedures, system of promotions and rewards. In the second group, there are factors related to job specifics, such as: Autonomy at work, use of specific knowledge and information feedback. In the last, third group, there are factors related to individuals' characteristics, such as: Self-esteem, stress management and ability of critical thinking. Different factors were identified as the ones affecting job satisfaction. We have focused on research within the broader sector of Travel and Leisure. In this sector, Tutuncu and Kozak (2007) identified work itself as the primary factor affecting job satisfaction, and career development as another very important factor, while Yeh (2013) identified working conditions as a factor of major importance to job satisfaction.

To summarise the literature review, job satisfaction is an emotional state of an individual that is influenced by numerous factors that are affected by the individual's experience of work, their quality of working life, and other characteristics related to how their work is being managed.

3 Research question and hypotheses

The research question is whether there is any influence of competencies of managers on job satisfaction of employees?

In order to answer this research question, the following research hypotheses were set up based on the knowledge gained in the theoretical overview:

H1: There is no statistically significant influence of competencies of managers on job satisfaction of employees with regard to satisfaction with the work itself.

H2: There is no statistically significant influence of competencies of managers on job satisfaction of employees with regard to satisfaction with working conditions.

H3: There is no statistically significant influence of competencies of managers on job satisfaction of employees with regard to satisfaction with the possibilities of career development.

We are basing our research question, as well as the hypotheses, on the existing link between competencies and job satisfaction. A study (Çetin, Karabay, & Efe, 2012) has shown that negative leader-employee interactions that are based on knowledge skills and abilities – we could call them competencies of managers – present stress for the employees, and so create job dissatisfaction. However, we cannot say that there is only a negative side to it. A study has shown that different leadership styles can have positive influence on job satisfaction (Voon, Lo, Ngui, & Ayob, 2011), and, since it is proven that leadership styles are influenced by the competencies of leaders (Müller & Turner, 2010), we can see the influence of leadership styles on job satisfaction of employees. There is also the issue of career development being discussed by (Kong, Cheung, & Song, 2012), who have found a link between career competency and career development satisfaction.

4 Research methodology

4.1 Sample and instrument

The population of the selected sector (hotel industry) was determined by the data of Republic of Slovenia Statistical Office: A total of N=9,117 persons were employed in 2013 in Slovenia's hotel industry (STAT.SI, 2013), the same year that the research was conducted. Someone might argue that the data are relatively old; however, since there was no major technological or other change in society, data are not obsolete, thus, they are still appropriate for use. In order to get relevant representation of this sample, we have decided to use random sampling of organisations. We have created a list of organisations for each region in the country, and then selected every 5th organisation, and asked them to participate in the survey. We have been granted consent by several organisations that employ a total of 2,762 people. We distributed in total 1,100 pencil-paper questionnaires between randomly selected employees; for this purpose, we used a simple random sampling method. All the organisations asked to participate in the survey were selected randomly within the sector, making sure that, geographically, we covered the entire country. Within the 60-day period set for the survey, 388 out of 1,100 questionnaires were returned, which represents 35.27% of all questionnaires sent out, and 4.26% of the entire population.

Before the questionnaire was administered on the full scale, we tested it on a smaller sample and made appropriate modifications.

In the first part, there were 48 statements regarding competencies of managers – this part was self-created based on competencies defined by the Slovenian Institute for Vocational Training (a list of competencies for Hotel Managers). In the second part, there were 25 statements regarding job satisfaction – in this part, we used a pre-existing questionnaire by Mihalič (2008), where the only change we made was the use of a 5 stage scale (from 1 - I do not agree at all, to 5 - I fully agree; 2,3 and 4 presented the in-between values). Next to that, we also collected some demographical data of respondents, such as age, gender, and level of education.

Some statements were created intentionally in a negative form to test the respondent's attention. Before we conducted analyses, we recoded the values of these variables appropriately, although the text remained the same. Next, we also collected some demographical data of respondents, such as age, gender, and level of education.

4.2 Data analyses

The data were analysed using SPSS version 21 (IBM Corporation, Armonk, NY, USA). We considered differences to be significant at $\alpha < 0.05$ level, with Bonferroni correction where applicable.

5 Results

5.1 Demographic results

The sample which was used for the purpose of this paper contained 133 (34.3%) male respondents and 213 (54.9%) female respondents, and 42 (10.8%) people who did not respond to the question regarding gender. The average age of respondents was calculated at 38.17 years of age. The sample contained 34 (8.8%) respondents with completed elementary school or less, 83 (21.4%) respondents with vocational high school, 121 (31.4%) respondents with high school, 80 (20.6%) respondents with a college degree, 35 (9.0%) respondents with a university degree or more, and 35 (9.0%) respondents who decided not to disclose their level of education.

5.2 Sample validity and reliability

In order to be able to generalise the results to the entire population, we first performed tests to establish the validity of the sample. For this step, we did the chi-square test of significance on the demographic information data that we had for population, as well as for the sample. These were: Gender, education and age. For the variable gender, (one degree of freedom) chi-square was calculated at 0.598, and significance level at p = 0.434, for the variable education (four degrees of freedom), the chi-square test value was calculated at 9.296 with significance level at p = 0.054, the final variable age (seven degrees of freedom) provided a value of 13.971, and the level of significance was at p = 0.052. Based on the findings, we can conclude that the research sample could be generalised to the whole population (Spruill, 1976).

For the next step, we tested the reliability of the questionnaire using the Cronbach's alpha test, calculating the coefficients for the set of variables. We performed this test on variables that measured values, and calculated the value of 0.859. This value indicates great reliability of measurement (Cronbach, 1951).

Based on the tests, we can conclude that our sample is representative of the population of employees in the Slovenian hotel sector, and of sufficient reliability.

5.3 Factor analysis

Before actually conducting the factor analysis of variables related to competencies we performed a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, and Bartlett's test of sphericity. The results show KMO value of 0,950 and significance of 0,000 for Bartlett's test of sphericity, thus indicating the appropriateness of the sample for factor analysis.

In the first step, we conducted a factor analysis on the set of the first 48 variables that measured competencies. Out of 48 variables, 30 of them had positioned themselves in 6 different factors with suitable weights, while the other 18 had either not positioned in any of the factors, or had a minimum weight in two or more factors. That is why we have removed them. With the help of factor analysis, we were able to explain 54.96% of variability of competencies with 30 variables in 6 factors. Results are shown in Table 3.

Based on the factor analysis we have determined six different factors, in factor one variables such as: my manager communicates with customers respectfully, my manager supervises compliance of external and internal regulations, my manager monitors the results of the organisational unit, and several others were positioned. These variables indicated responsible behaviour, thus we have decided to name this factor CR – Competencies Responsibility. In the second factor variables such as: disrespectful communication with employees is typical for my manager, immoral conduct is typical for my manager, my manager's conduct creates a negative atmosphere and several others were positioned. These variables indicated ethical behaviour, thus we have decided to name this factor CE – Competencies Ethics. In the third factor variables such as: encouraging changes to the procedures at work are typical for my manager, my manager monitors the implementation of tasks, my manager resolves demanding complaints professionall, and several others were positioned. These variables indicated innovative behaviour, thus we have decided to name this factor CI – Competencies Innovation. In the foruth factor variables such as: my manager does not supervise the work process, my manager does not control the quality of performed work, my manager orders the work of employees irresponsibly and several others were positioned. These variables indicated quality oriented behaviour, thus we have decided to name this factor CQ – Competencies Quality. In the fifth factor variables such as: providing instruction to new employees at work is typical for my manager, my manager participates as a mentor to new employees, my manager advises employees at work and some others were positioned. These variables indicated emmployee oriented behaviour, thus we have decided to name this factor CEm – Competencies Employees. In the final sixth factor variables: my manager prepares special market outlets, my manager monitors customer loyalty and my manager monitors supply on the market were positioned. These variables indicated customer oriented behaviour, thus we have decided to name this factor CC – Competencies Customers.

Table 3: Factor analysis of variables that measured competencies

Variable	Factor					
	CR – Competencies Responsibility	CE – Competencies Ethics	CI – Competencies Innovation	CQ – Competencies Quality	CEm – Competencies Employees	CC – Competencies Customers
My manager communicates with customers respectfully.	.719					
My manager supervises compliance of external and internal regulations.	.544					
My manager monitors the results of the organisational unit.	.516					
My manager works in accordance with the environmental protection measures.	.509					
My manager distributes the work of subordinates according to workload.	.487					
My manager takes care of the importance of contacts with customers.	.481					
My manager takes care to ensure rational use of energy, materials and time.	.455					
Disrespectful communication with employees is typical for my manager.		.696				
Immoral conduct is typical for my manager.		.581				
My manager's conduct creates a negative atmosphere.		.580				
My manager fails to ensure good relationships with customers.		.538				
My manager has a discriminatory attitude towards employees.		.494				
Encouraging changes to the procedures at work are typical for my manager.			.652			
My manager monitors the implementation of tasks.			.495			
My manager resolves demanding complaints professionally.			.474			
My manager encourages employees to perform better at work.			.465			
Timely identification of new forms of work is typical of my manager.			.443			
My manager does not supervise the work process.				.771		
My manager does not control the quality of performed work.				.566		
My manager orders the work of employees irresponsibly.				.506		
My manager is not able to deal with tasks in a timely manner.				.467		
My manager is unprofessional at organisation of work within the unit.				.456		
Providing instruction to new employees at work is typical for my manager.					.802	
My manager participates as a mentor to new employees.					.702	
My manager advises employees at work.					.653	
Caring for the continuous development of employees is typical of my manager.					.539	
Resolving the concrete problems in the process is the nature of my manager.					.466	
My manager prepares special market outlets (discounts, credits, etc .)						.465
My manager monitors customer loyalty.						.374
My manager monitors supply on the market.						.351

Table 4: Factor analysis of variables that measured job satisfaction.

Variable	Factor		
My job satisfaction is influenced by …	SWI – Satisfaction with Work Itself	SWC – Satisfaction with Work Conditions	SPCD – Satisfaction with Possibilities of Career Development
... My work challenges.	.828		
... Forms of motivation that my manager uses.	.820		
... Possibility to develop my competencies.	.749		
... Interpersonal relationships within the organisation.	.706		
... Strict discipline within the organisation.	.706		
... Professionalism at work.	.687		
... Possibilities to co-create decisions within the organisation.	.671		
... Caring for my well-being in the organisation.	.653		
... Feedback that I get regarding my work.	.606		
... Status that I have within the organisation.	.514		
... Possibilities of creative work.	.477		
... Intensity of rewarding that I am receiving.	.426		
... Possibilities for improving my level of education.	.422		
... The amount of work I do.		.852	
... Working hours that I have.		.821	
... Leadership style of my manager.		.656	
... Type of work I do.		.653	
... My immediate co-workers.		.550	
... Physical working conditions.		.458	
... Level of safety and security of my job.		.442	
... Work space where I work.		.357	
... Pay that I receive.		.349	
... Manager`s efforts for my career development.			-.843
... Possibilities of career development.			-.735
... Health and safety at work.			-.411

We performed the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity on 25 variables from the second part of the questionnaire related to job satisfaction. The results show a KMO value of 0,961 and significance of 0,000 for Bartlett's test of sphericity, thus indicating that the sample is appropriate for factor analysis. All 25 variables had positioned themselves in one of the three factors. We were able to explain 56.23% of variability of competencies with these 25 variables in 3 factors. Results are shown in Table 4.

Based on the factor analysis we have determined three different factors, in factor one we can see variables influencing job satisfaction such as: my work challenges, forms of motivation that my manager uses, possibility to develop my competencies and several more. These variables describe the content of work, thus we have decided to name this factor SWI – Satisfaction with Work Itself. In the second factor we can see variables influencing job satisfaction such as: the amount of work I do, working hours that I have, leadership style of my manager and few others. These variables describe working conditons, thus we have decided to name this factor SWC – Satisfaction with Work Conditions. In the final third factor we can see the following variables influencing job satisfaction: manager's efforts for my career development, possibilities of career development and health and safety at work. These variables describe how satisfied employees are with career development possibilities, thus we have decided to name this factor SPCD – Satisfaction with Possibilities of Career Development.

5.4 Correlation analysis

Further interest was related to measuring the correlation between merged variables of competencies of managers and job satisfaction, therefore, Pearson's correlation coefficient was used. Results are shown in Table 5.

Among data shown in Table 5, we can see that there is a weak correlation between all six groups of competencies and the newly formed variable SWI – Satisfaction with Work Itself. Both of the other job satisfaction variables did not show any correlation with variables representing competencies. From Table 5? it is clear that the existing correlations are positive, though weak (Cohen, 1988). The highest recorded correlation was between CC – Competencies Customers and SWI – Satisfaction with Work Itself, this was measured at 0.204.

Since correlation studies only show correlations between the before mentioned variables, but not the numerical relation between variables, we proceeded with the linear regression analysis to understand better the internals of the connection.

5.5 Linear regression analysis

We conducted a linear regression analysis, where the influence was analysed between independent variables and dependent variables. The influence of each of the independent variables was evaluated, so that it is not dependent on influences between various independent variables. Table 6 presents the values of regression among pairs of independent variables (competencies) and dependent variables (Satisfaction with Work Itself).

Table 6 shows the results of linear regression. All the pairs have shown statistically significant influence ($p<0.05$). In the first pair, we put together independent variable "CQ – Competencies Quality" and dependent variable "SWI – Satisfaction with Work Itself". The results ($\Delta R^2= 0.017$; $F= 6.757$; $p= 0.010$) show that, with variable "CQ – Competencies Quality", we can explain 1.7% of variability for "SWI – Satisfaction with Work Itself". In the second pair, we put together the independent variable "CI – Competencies Innovation" and dependent variable "SWI – Satisfaction with Work Itself". The results ($\Delta R2= 0.016$; $F= 6.485$; $p= 0.011$) show that with, variable "CI – Competencies Innovation", we can explain 1.6% of variability for "SWI – Satisfaction with Work Itself". In the third pair, we put together independent variable "CR – Competencies Responsibility" and dependent variable "SWI – Satisfaction with Work Itself". The results ($\Delta R^2= 0.020$; $F= 7.520$; $p= 0.006$) show that, with variable "CR – Competencies Responsibility", we can explain 2.0% of variability for "SWI – Satisfaction with Work Itself". In the fourth pair, we put together independent variable "CE – Competencies Ethics" and dependent variable "SWI – Satisfaction with Work Itself". The results ($\Delta R^2= 0.027$; $F= 8.920$; $p= 0.003$) show that, with variable "CE – Competencies Ethics", we can explain 2.7% of variability for "SWI – Satisfaction with Work Itself". In the fifth pair, we put together the independent variable "CC – Competencies Customers" and dependent variable "SWI – Satisfaction with Work Itself". The results ($\Delta R^2= 0.042$; $F= 13.932$; $p= 0.000$) show that with variable "CC – Competencies Customers" we can explain 4.2% of variability for "SWI – Satisfaction with Work Itself". In the final, sixth pair, we put together the independent variable "CC – Competencies Employees" and dependent variable "SWI – Satisfaction with Work Itself". The results ($\Delta R^2= 0.013$; $F= 4.471$; $p= 0.035$) show that, with variable "CEm – Competencies Employees", we can explain 1.3% of variability for "SWI – Satisfaction with Work Itself". Results are shown in Figure 1.

Table 5: Correlation between individual merged variables.

	CQ – Competencies Quality	CI – Competencies Innovation	CR – Competencies Responsibility	CE – Competencies Ethics	CC – Competencies Customers	CEm – Competencies Employees
SWI – Satisfaction with Work Itself	0.143**	0.139*	0.150**	0.163**	0.204**	0.116*
SWC – Satisfaction with Work Conditions	0.021	0.010	0.064	0.053	0.052	-0.004
SPCD – Satisfaction with Possibilities of Career Development	-0.009	0.007	-0.021	-0.028	-0.069	-0.002

*   Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 6: Regression analysis between competencies and Satisfaction with Work Itself.

Regression - Organisational competencies – Satisfaction with Work Itself	ΔR^2	F	P
CQ – Competencies Quality	.017	6.757	0.010
CI – Competencies Innovation	.016	6.485	0.011
CR – Competencies Responsibility	.020	7.520	0.006
CE – Competencies Ethics	.027	8.920	0.003
CC – Competencies Customers	.042	13.932	0.000
CEm – Competencies Employees	.013	4.471	0.035

Figure 1: Linear regression model with results

6 Discussion

Based on the findings, we can **reject** the first hypothesis H1: There is no statistically significant influence of competencies of managers on job satisfaction of employees with regard to satisfaction with work itself. There is a clear, although weak, correlation between competencies of managers and job satisfaction (satisfaction with work itself).

On the other hand, we have found no correlation between competencies of managers and either of the other two job satisfaction factors, satisfaction with working conditions and satisfaction with possibilities of career development, thus we have to **retain** both H2 and H3 as there is no statistically significant influence of competencies of managers on job satisfaction of employees with regard to satisfaction with working conditions and with regard to possibilities of career development, respectively.

The answer to our research question: "Is there is any influence of the competencies of managers on job satisfaction of employees?", is "yes, partially". It is so only when it comes to job satisfaction related to the work itself.

We have found significant correlation between managerial competencies and employees' satisfaction with work itself. Competencies include the following aspects: Competencies Quality, Competencies Innovation, Competencies Responsibility, Competencies Ethics, Competencies Customers and Competencies Employees.

Each of these aspects were researched previously:

- Competencies Quality: Noe, Hollenbeck, Gerhart, and Wright (2006) found that employees who are being supported in providing high quality service are showing higher levels of job satisfaction.
- Competencies Innovation: Lok and Crawford (2004) have determined that promotion of innovative culture leads to job satisfaction; Uran Maravić, Križaj, and Lesjak (2015) stated: "*innovation is, because of its uniqueness and exclusivity, an important factor in economic development, and may represent a key competitive advantage for a tourism organisation or tourist destination*".
- Competencies Responsibility: Valentine (2001) determined that employees who perceive greater responsibility may, therefore, be more satisfied with their jobs.
- Competencies Ethics: Okpara and Wynn (2008) determined that ethical climate types (caring, rules, instrumental, efficiency) have a significant positive impact on various facets of job satisfaction.
- Competencies Customers: Noe et al. (2006) claim that managers with focus on customers will create more satisfied customers and, thus, also making employees satisfied with their work when dealing with high quality customer service that makes customers satisfied.
- Competencies Employees: Lee and Bruvold (2003) claim that employees will be more satisfied with the job and

more affectively committed to an organisation when the employer commits to developing employees.

Our results are unique, because we have shown in a single research that all these competencies are interrelated, and influence the satisfaction with work itself significantly. Additionally, we have shown that two other factors, satisfaction with working conditions and satisfaction with possibilities of career development, are not correlated to managerial competencies.

Our research had certain limitations. Firstly, while it is true that a questionnaire is the most appropriate tool for conducting research of this type, there is very little room for in-depth knowledge on certain subjects when using a structured questionnaire. Another limitation of this research is also the sample being limited to the hotel sector only. It is not certain whether research in a different sector would provide different results. At this point, however, we need to stress the validity of the research made in this single sector, and conclude that results can indeed be generalised if the selected sector is not specifically denoted by population assumptions (Hannan & Freeman, 1977). Another limitation to this research lies in the fact that it was conducted in a single country, hence, results may vary by different countries. All the limitations mentioned above are also suitable grounds for further research. Another possibility of further research would be focusing only on job satisfaction with work itself i.e. with variables that describe the content of work as shown in our research.

7 Conclusion

The importance of soft skills that managers can use to promote job satisfaction of employees is well known. Previous research has shown several different ways in which managers can influence job satisfaction of employees, mostly in the form of external factors. In the present work, we investigated if and how internal factors of managerial competencies influence job satisfaction and its three constituent parts, satisfaction with work itself, satisfaction with work conditions, and satisfaction with the possibilities of career development.

Our contribution has shown that competency of managers has an influence on job satisfaction of employees with regard to job satisfaction with work itself, but not with the other two factors (work conditions, career development).

The novelty of our research is two-fold. First, we have shown that managerial competencies do not influence all aspects of work satisfaction. Secondly, satisfaction with work itself can be explained mostly by managerial competencies with respect to customers. This is highly important in the hotel sector, because it is very much customer oriented and dependent.

Although correlations are weak, they do exist, and have to be taken into account when it comes to discussing

job satisfaction of employees. The highest recorded correlation was between competencies-customers and satisfaction with work itself (0.204). We firmly believe that this indicates that employees value very much the competencies of managers who promote the core idea of hospitality, i.e. taking care of customers. This also shows that employees understand the importance of hospitality for customers, and this provides them with their own job satisfaction.

The results clearly support the theoretical conceptualizations that managing job satisfaction of employees is important. This is even more critical within the hotel sector, since employees are in direct contact with customers. The hotel sector is, in this sense, even more vulnerable. Customers are seeking services that make them feel at ease and relaxed, and, with competition in the sector being fierce, managers must pay attention to all the small details that can make their guests enjoy their experience. For years we have lived with the idea that the customer is the king or queen, but, if managers treat their employees well and seek every opportunity to enhance job satisfaction of employees, these same employees will treat customers not only as kings or queens, but truly as royalty.

In practice many managers tend to favour investing their resources into factors that would provide satisfaction with working conditions in some cases even satisfaction with possibilities of career development, while forgetting that factors influencing job satisfaction related to work itself are also important. What we have shown through our research is, that work itself is the important component of job satisfaction and investing resources to make work itself interesting for employees' should be on the top or any managers list since based on our results it does have the highest impact on job satisfaction of employees.

Among all variables influencing job satisfaction with work itself we have seen work challenges of employee, managers must try to create work, itself full of challenges, while using appropriate means of motivating employees and allowing them to develop their competencies, since this will increase their value. It is also important for the managers to build good interpersonal relationships within the organisation and enforce reasonably strict discipline since this will help promote professionalism at work. For many people professionalism represents the meaning of work, they want to feel that their work matters. The feeling of being valuable to organization is very important for employee's managers must thus help include employees in decision making processes where that is possible since this will further increase their job satisfaction.

It is very important for practitioners to understand how important satisfaction with work itself is within the context of job satisfaction of employees. With the amount of time we are spending at work it is no doubt that any manager needs to use all the knowledge he or she has to help increase the job satisfaction of employees, this being even more important in service oriented industries.

Further research that we propose is to investigate job satisfaction among "employees" that manage their own apartments through platforms such as AirBnb, and we have to understand that jobs themselves are changing, Turnšek and Ladkin (2017) did extensive work on Airbnb that has hit the hotel sector hard in recent years, and noted that job satisfaction within the sharing economy, or platform economy, has a completely different position, that is why we propose this as an interesting area to conduct research in.

We have to understand that, not even the best managers can be overseeing how their employees treat their customers all the time. Thus, it is even more important that they can rely on their employees to provide the experience of hospitality for customers at every step of the way, since, as is seen by Rangus and Brumen (2016), the importance of tourism is, after all, visible in its huge impact on the local, national and global economies.

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Vpliv kompetenc managerjev na zadovoljstvo zaposlenih pri delu v hotelskem sektorju

Ozadje in namen: Poznavanje in razumevanje delovanja mehkih veščin, ki jih managerji lahko uporabijo za spodbujanje zadovoljstva zaposlenih je že dobro raziskana tema. Predhodne raziskave so pokazale več različnih načinov, kako lahko managerji vplivajo na zadovoljstvo zaposlenih pri delu, predvsem skozi tako imenovane zunanje dejavnike. Zelo malo raziskav je sicer na voljo o notranjih dejavnikih. To nas je vodilo do naslednjega raziskovalnega vprašanja: Kako lahko kompetence managerjev vplivajo na zadovoljstvo zaposlenih pri delu?

Zasnova/Metodologija/Pristop: Med zaposlenimi v hotelih smo izvedli pisno anketo. V vprašalniku smo anketirance prosili, naj ocenijo kompetence svojih nadrejenih; nadalje smo anketirance prosili naj ocenijo kaj vpliva na njihovo zadovoljstvo pri delu. Povsem na koncu smo anketirance prosili še za nekaj demografskih podatkov.

Rezultati: V raziskavi smo zaznali šibko, a še vedno zaznavno pozitivno povezanost med kompetencami managerjev in zadovoljstvom zaposlenih v dejavniku, ki smo ga označili kot »delo kot tako«. Med kompetencami managerjev in delovnimi pogoji ter možnostjo za razvoj kariere ni bilo zaznanih nobenih povezav.

Zaključek: V raziskavi smo ugotovili vpliv kompetentnosti managerjev na zadovoljstvo zaposlenih pri samem delu. Čeprav so korelacije, ki smo jih odkrili, šibke, obstajajo in jih je potrebno upoštevati pri razpravi o zadovoljstvu zaposlenih pri delu. Glavni namen vsake organizacije v hotelskem sektorju je, da služi svojim strankam – gostom. Managerji, ki razumejo to ključno dejstvo in ga na primeren način prenašajo tudi na svoje zaposlene, bodo na ta način vplivali tudi na zadovoljstvo zaposlenih z delom kot takim.

Ključne besede: kompetence, managerji, zadovoljstvo pri delu, vpliv, hotelski sektor.

Does Supply Chain Analytics Enhance Supply Chain Innovation and Robustness Capability?

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Background and purpose: Little are known about the nature of the interaction between supply chain analytics, supply chain innovation and robustness capability. The purpose of this paper is to examine the effectiveness of supply chain analytics in enhancing firms supply chain innovation and robustness capability in the Arabian context.
Design/Methods: Using knowledge-based view and survey data from line managers in supply and logistics departments, the present study uses variance-based structural equation modeling (PLS-SEM) to diagnose the association between supply chain analytics, supply chain innovation and robustness capability.
Findings: Results suggest that supply chain analytics exerted significant impact on supply chain innovation and not on robustness capability. It appears that supply chain innovation exerted a significant impact on robustness capability, in doing so, supply chain innovation mediates the link supply chain analytics and robustness capability.
Conclusion: The outcome of this study points to the importance of supply chain analytics as a functional tool for supply chain and/or logistic routes stability and success. The paper concludes supply chain analytics can help managers have access timely and useful data for greater innovation; and that supply chain innovation is reliant not only on data, but also on firms' analytic capabilities.

Keywords: Big data, supply chain analytics, supply chain innovation, robustness capability

1 Introduction

In the last decade, scholars and practitioners uncover that Big data analytics has significant business value for the success of their enterprises amid fierce competition (Chen et al., 2013). Big data analytics (BDA) refers to technology enabled capability to process large volume, high velocity, variability and varieties of data to extract meaningful and valuable insights that can help firms gain competitive advantage (Fosso et al., 2017). Thus, incorporating BDA into business process can help firms to use data to gain business insights known as supply chain analytics in supply chain management (Jeble et al., 2018; Zhu et al., 2018). Prior researches revealed that BDA is an important tool that can boost firm performance (Akter et al., 2016; Côrte-Real et al., 2016; Ramanathan et al., 2017).

Other scholars embraced BDA to predict market trends and consumer demands (Miah et al., 2016), marketing efficiency (Xu et al., 2016), decision-making process (Abubakar, Elrehail, Alatailat, & Elçi, 2017; Marijn et al., 2017). The availability of modern data analytic techniques allows firms to have the know-how and use supply chain analytics, which in turn boost the strategic and operational performance (Wang et al., 2016). Traditional supply chain managers usually analyze routes and/or warehouse data to gain insights (Galbraith, 2014), because effective decision in supply chain is contingent on the availability of timely and quality route and/or warehouse data (Fosso et al., 2018). Quality data and ability to process the data can abate disruption and also reduce uncertainty (Papadopoulos et al. (2017). Thus, this can be extended via supply chain analytics.

Firms can improve innovation in their supply chain with competitive weapons namely; timely and quality data (Fernando et al., 2018). Despite these claims in the liter-

ature, the impact of supply chain analytics (SCA) has on supply chain management (SCM) is still an uncharted area (Lai et al., 2018). For instance, research linking supply chain analytics to supply chain innovation and robustness capability are scarce to come by. According to the authors' knowledge so far, Kwak, Seo, and Mason (2018) is the only research paper that linked supply chain innovation with robustness capability. Moreover, Waller and Fawcett (2013) encouraged scholars to link business and predictive analytics with logistics and supply chain management citing business opportunities for firms. This paper responds to this call. The extent discussions highlight the need for additional insights from logistics management perspectives, theoretically, this paper draws on knowledge-based view to diagnose the nexus between supply chain analytics, supply chain innovation and robustness capability in an Arabian setting. In doing so, the paper set out to catechize theory developed for and tested in Western settings. The purpose of this study is to examine the relationship between supply chain analytics, supply chain innovation and robustness capability, specifically how supply chain analytics boosts innovation and robustness. Accordingly, this study attempts to answer these research questions:

RQ1. How does supply chain analytics enhance supply chain innovation?

RQ2. How does supply chain analytics enhance robustness capability?

RQ2. How does supply chain innovation enhance robustness capability?

2 Literature review and hypotheses

The management of the flow of goods and services e.g., the movement and storage of raw materials, of work-in-process inventory, and of finished goods from point of origin to point of consumption is known as supply chain management (SCM). Whereas, logistics delineate the movement, storage, and flow of goods, services and information within the overall supply chain. Henceforth, logistics is an important component of SCM, as applicable to outsourcing (i.e., delegating parts of business operations to a specialist outside of the organization to manage) and offshoring (i.e., moving parts of business operations to another part of the world, firms can outsource without having to offshore). The common themes linking SCM with outsourcing and offshoring are desires for cost savings, demand for efficiency, increased turn-around time, sustainability etc. Resource-based theory (RBT) purports that firms' resources and competencies are the main drivers of competitive advantage (Barney, 1991). Firms' resources can be categorized into tangible (e.g., physical, monetary and human resources) and intangible (e.g., skills, knowledge and technical know-how).

Competence is used interchangeably with capability, resources build up firms' capabilities which in turn lead to competitive advantage (Grant, 1991). Resource-based theory has been linked with increased capability, innovation and performance (Verona, 1999) in situations where competitors are unable imitate, lack the knowledge, and specialization is scarce. Unlike RBT, knowledge-based theory (KBT) purports that firms excel as a result effective use of knowledge and not just possession. Possession of unique knowledge is not enough, rather firm's ability to capture, process and disseminate this knowledge to yield competitive differentiation is more important (Blome, Schoenherr & Eckstein, 2014; Grant, 1996). The present study is interested in supply chain analytics, which encompass iterative exploration of past knowledge, technologies and practices to gain insight. Thus, supply chain analytics can provide for inimitable resources, logically innovative and robustness capabilities.

2.1 Supply chain analytics and supply chain innovation

The rise in outsourcing and offshore productions comes with benefits such as cost advantage and access large markets, but also presents challenges for the supply chain ecosystem such as exchange rate and transportation risks, political and environmental uncertainty. Traditional supply chain managers usually respond to these challenges using SC risk management methods (Christopher and Lee, 2004). For instance, an analysis of the supply chain, this can only be achieved with the availability of timely data and information. This is the juncture at which Big data and supply chain management (SCM) intersected. Prior studies documented that BDA can improve supply chain performance by improving visibility, resilience and robustness, and organizational performance (Brandon-Jones, Squire, Autry, & Petersen, 2014; Schoenherr and Speier-Pero, 2015; Waller and Fawcett, 2013). The use of quantitative tools (i.e., statistical and machine-learning techniques), past and present data for predictive modeling to find meaningful information and improve operational performance in supply chain ecosystems is known as supply chain analytics (Gunasekaran et al., 2017). Whence, supply chain analytics is can viewed as a mixture of IT-enabled resources, data management and supply chain planning (Chae, Olson & Sheu, 2014).

In line with KBT, supply chain decisions are analytical and data-driven supported by information technology and data science techniques to improve supply chain planning and management. At best, supply chain analytics is mainly aimed at improving operational capability and reducing risk, but somehow may serve as innovation enhancer. Innovation is essential for organizational sustainability (Gao, Xu, Ruan & Lu, 2017). In supply chain, innovation is a complex process involving the identifications of new ways and methods and turning opportunities into

new ideas and the latter practice in the supply chain management (Lee, Lee & Schniederjans, 2011). Supply chain analytics is a complex process in which past and present data are processed with quantitative tools and techniques. Effective acquisition, transformation and storage of data; transforming the data into meaningful information that supports evidence-based decision-making. This process can unveil unknown information and knowledge, that can help managers in planning, monitoring, and forecasting; and time series comparisons. Such information can identify error spots and strategies to reduce delivery time, error rates and cost, and improve operational capability and efficiency. KBT the main theoretical anchor posit that processed knowledge is a source of competitive advantage. As noted earlier BDA denotes processing business data to gain competitive advantage, whereas, supply chain analytics denotes processing supply chain related data to procure meaningful and valuable insights that maybe useful for innovation or use as inputs for innovations. Thus, the following hypothesis is proposed:

H1: *Supply chain analytics will enhance supply chain innovation*

2.2 Supply chain analytics and robustness capability

Physical strength denotes robustness. However, in supply chain management and logistic literatures, robustness denotes certain features such as capability to withstand varied shocks, man-made errors and variability in business environment (Wieland & Wallenburg, 2012). Robustness plays an important role during disruption, because well-equipped supply chain and logistics networks with risk awareness can alleviate or eliminate the occurrence of risk (Kwak et al., 2018). In other words, robust supply chain and logistics networks should be able to endure, confront and control disruptions. Robustness can buy time for a firm to identify and implement control mechanism necessary for risk mitigation or elimination (Kwak et al., 2018). Interestingly, identification of risk mitigation and/or control mechanism is contingent on timely and reliable data. Researchers (e.g., Kache & Seuring, 2017; Sahay & Ranjan, 2008) noted that firms rely on data analytics to reduce cost, uncertainty and enhanced decision-making. Supply chain analytics concept signifies the extraction, transformation, cleaning and integration data generated and captured by supply chain systems into meaningful patterns for decision-makers (Tiwari, Wee & Daryanto, 2018). In line with KBT, the acquisition, transformation and extraction of meaningful information using supply chain analytics can inform decision-makers about the possibility of such risks; allow them to develop strategies to respond to varied shocks, enhance firm's pliability against changing environment and intense competition, and also increases supply chain and logistics networks efficiency. Thus, the

following hypothesis is proposed:

H2: *Supply chain analytics will enhance robustness capability*

2.3 Supply chain innovation and robustness capability

Supply chain innovation transpires in the form of new and advanced supply chain techniques and investments (Wagner, 2008). Research has shown that supply chain innovation can minimize risks and also foster resource and method reconfiguration to improve resilience (Ambulkar, Blackhurst, & Grae, 2015). Supply chain innovation needs changes of processes and rules, which may cause unexpected fluctuation in logistics operations. Whence, risk is often the price of innovation on one hand, and robustness is price of innovation on the other hand. For example, real-time supply chain and logistic channels tracking systems can increase firm's resilience against internal and external disruptions and potentials risks. Additionally, innovative vehicles, packages, agile and responsive processes appear to be an auxiliary mechanism by which supply chain and logistic firms use for risk management capabilities, logically enhancing resilience and robustness capacity (Waters, 2007). Supply chain innovation plays a very important role in providing opportunities for fortifying the capabilities of the firm's risk management (Kwak et al., 2018). Supply chain innovation needs continuous changes in supply processes, methods and arrangements, these changes offer considerable latitude for planning, monitoring, forecasting and replenishment, resulting in accurate, concrete and fast decision-making in the event of crises, thereby strengthening robustness and resilience of firms against (un)expected shocks. Consequently, higher accuracy and error-proofing supply chains can be facilitated by innovation (Kwak et al., 2018). Moreover, implementation of an innovative process can create an awareness of vulnerabilities and knowledge sharing with supply chain entities, which in turn enables a continuous process innovation to effectively reduce risk occurrence (Matook, Lasch & Tamaschke, 2009) and strategies to overcome and avoid adverse effects, technically, enhancing firm's robustness. Thus, the following hypothesis is proposed:

H3: *Supply chain innovation will enhance robustness capability*

3 Methods

3.1 Sample and procedure

Simple random sampling technique was utilized to obtain data from firms in United Arab Emirates. A survey was developed in English and subsequently back-translated to Arabic by two linguistic experts and several adjustments and modification were made. The respondents consist of line managers, they were briefed about the purpose and intent of the research and were subsequently told that the information they provided will not share with third parties. The participants voluntary participated in survey and were told that they can discontinued at any time. Nationwide, four hundred firms were targeted in the United Arab Emirates. The survey packets were randomly distributed to the line managers in supply and logistics departments because they have accurate knowledge on the supply chains of their firm. Prior suppl chain analytics (i.e., Wieland & Wallenburg, 2012; Zhu et al., 2018); supply chain innovation, risk management capabilities (i.e., Kwak et al., 2018) studies deployed the same strategy deployed in the present study. To increase response rate, the respondents were asked to complete the survey at their convenient time. We also assured them of confidentiality to reduce social desirability and common method bias. At the end, 245 survey forms were obtained, and 32 forms were discarded due to missing values, leaving the researchers with 213 valid forms.

3.2 Measures

Supply chain / business analytics is measured with triplet first order construct adapted from (Wang & Byrd, 2017) namely: (a) *effective use of data aggregation tools* (3-items) – Respondents were asked to rate the effectiveness by which their organization uses the supply chain data analytic tools to provide better services; (b) *effective use of data analysis tools* (4-items) - Respondents were asked to rate the effectiveness by which their organization uses the supply chain data analytic tools to provide better services and (c) *effective use of data interpretation tools* (3-items) - Respondents were asked to rate the effectiveness by which their organization uses the supply chain data analytic tools to provide better services using a 5-point scale 1-poorly developed and 5-well developed.

Supply chain innovation is measured with 6 scale items adapted from (Seo et al., 2014, Kwak et al., 2018) study. Respondents were asked to rate how much the pursue number of innovation activities using a 5-point scale 1-Strongly disagree and 5- Strongly agree.

Robustness capability is measured with 4 scale items adapted from (Kwak et al., 2018; Wieland & Wallenburg, 2012). Respondents were asked to rate at which they possess certain capabilities using a 5-point scale 1-Strongly disagree and 5- Strongly agree. The scale items are presented in the Appendix section.

4 Data analysis and findings

4.1 Demographic data

About 12.6% of the firms under investigation have less than 50 employees, 17.3% of the firms have between 51 to 100 employees and 69.6% have more than 100 employees; 31.3% of the sampled firms have between 1 – 5 years in operation, 23.4% have between 6 to 10 years and the rest have been operating for more than 10 years. In regard to the type of manufacturing / production / procurement process employed by the firms under investigation, 22.4% uses job shop method, 17.3% uses batch, 27.1% uses repetitive assembly and the rest uses continuous flow method. As for sector, 15.9% are in apparel and textile products sector, 13.1% are in automotive / spare parts sector, 15.9% are in vegetable / perishable goods sector, 20.6% are in supermarkets and households' product sector, 16.4% are in construction and building materials sector, 12.6% are in electric and electronics products sector, and the rest are in chemicals and allied products sector. The detailed information is presented in Table 1.

SEM is a statistical technique that can be used to assess the factor structure of a set of observed variables, in addition to this, SEM allow scholars to test for construct validity (i.e., convergent and discriminant validities) as noted by Bagozzi and Heatherton (1994). Modern scholars have embraced SEM because it is useful for evaluation, weighing of scale instruments and testing the significance and associations of variables in the measurement model. In this paper, partial least squares structural equation modeling (PLS-SEM) was used to analyze and test the proposed model because of the sample size and complexity of the model (Hair et al., 2013). Smart PLS 3.0 software was used to evaluate the researched variables reliability and convergent validity. The factor loadings (outer model) of each item exceeded the benchmark of .70. See Figure 1. Cronbach's alpha (α), composite reliability (CR) and average variance extracted (AVE) exceeded 70, .70 and 0.5, respectively (Hair et al., 2013). See Table 2. Table 3 shows that the square root of AVE values (diagonal values) for each construct is greater than its correlation coefficients with other constructs, which satisfies Fornell and Larcker's (1981) criterion. These outcomes convey evidence of convergent and divergent validity.

Table 1: Respondent profile

Variables	Frequency	Percentage
Number of employees		
Less than 50	27	12.6%
51 - 100	37	17.3%
Above 100	149	69.6%
Total	**213**	**100%**
Firms age		
1 - 5 years	67	31.3%
6 - 10 years	50	23.4%
10 years and above	96	44.9%
Total	**213**	**100%**
Manufacturing / production / procurement process		
Job shop	48	22.4%
Batch	37	17.3%
Repetitive assembly	58	27.1%
Continuous flow	70	32.7%
Total	**213**	**100%**
Sector / Industry		
Apparel and other textile products	34	15.9%
Automotive / spare parts	28	13.1%
Vegetables / perishable goods	34	15.9%
Supermarkets and households' products	44	20.6%
Construction and building Materials	35	16.4%
Electric and electronics products	27	12.6%
Chemicals and allied products	11	5.1%
Total	**213**	**100%**
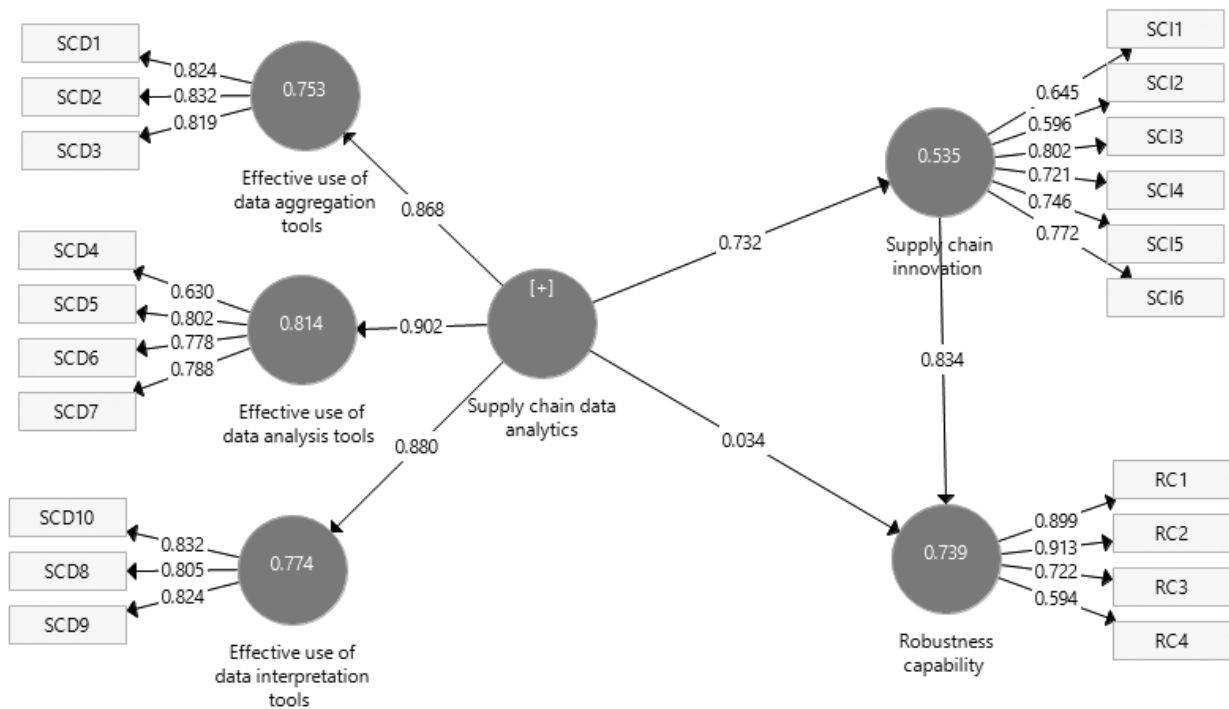
Figure 1: Scale items factor loadings (outer links) and directs effects (inner links). Please refer to the Appendix for explanation of the scale items.
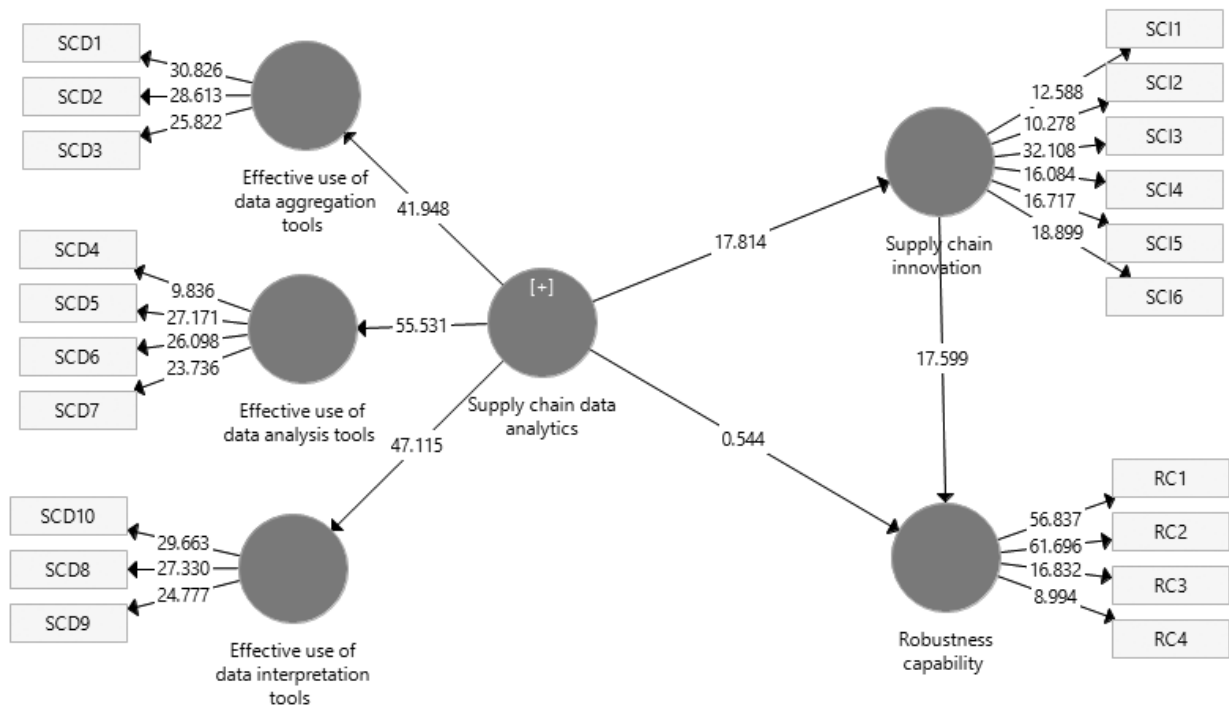
Figure 2: T-values of the coefficients in Figure 1.

Table 2: Reliability and convergent validity

Variables	α	Rho	CR	AVE
Effective use of data aggregation tools	0.77	0.77	0.87	0.68
Effective use of data analysis tools	0.74	0.76	0.84	0.57
Effective use of data interpretation tools	0.76	0.76	0.86	0.67
Supply chain data analytics	0.89	0.89	0.91	0.49
Supply chain innovation	0.81	0.83	0.86	0.51
Robustness capability	0.79	0.83	0.87	0.63
Average variance extracted	.735	.743	.729	.731

Table 3: Discriminant validity

Variables	1	2	3
Fornell-Larcker Criterion			
Supply chain analytics	.703		
Supply chain innovation	.732	.717	
Robustness capability	.645	.860	.793

Figure 1 depicts the direct effects (beta estimates) in inner links; the factor loadings are illustrated in the outer model links and the R square estimates for each effect is illustrated on the blue circles. The beta estimates significance level is illustrated in Figure 2 (inner model) and the significance of the factor loadings are illustrated in the outer model. These results demonstrate that supply chain analytics has a significant impact on supply chain innovation ($\beta = .73$, $\rho = .000$) and but not robustness capability ($\beta = .03$, $\rho = .586$). Supply chain innovation has a significant impact on robustness capability ($\beta = .83$, $\rho = .000$). Although, this study did not hypothesize the mediating role of supply chain innovation on the relationship between supply chain analytics and robustness capability. This paper specifically used bootstrapping analysis with a resample of ($n = 5,000$) as recommended by (Hair et al., 2013). Prior studies have utilized similar approach (i.e., Abubakar et al., 2018; Behravesh et al., 2019; Jahmani et al., 2018). The present outcome highlights that supply chain innovation mediates the link between supply chain analytics and robustness capability ($\beta = .61$, $\rho = .000$) with the following intervals (Bias=.004; 2.5% = .53; 97.5% = .69

5 Discussion

The objectives of this paper are to fill the voids in the extant literature by providing empirical justification for the effects of supply chain analytics on supply chain innova-

tion and robustness capability. *First*, this paper found that firms that uses supply chain analytics were more likely to develop supply chain innovation capabilities. The result is in line with Fernando et al. (2018) claims, that Big Data analytics is a strong determinant for supply chain innovative capability. From KBT perspective, this finding suggest supply chain innovation is contingent upon acquiring, transforming, storing information and quantitative analyzing such data. This assertion is also consistent with Gunasekaran et al. (2017) claims, that Big data and predictive analytics are strong determinants for organizational performance and competitive intelligence. *Second*, contrary to the existing claims; data analysis revealed that supply chain analytics did not influence robustness capability. Implying firms that use supply chain analytics were less likely to develop robustness capability. Prior study (e.g., Zhu et al., 2018) draws on information processing theory to link supply chain analytics with operational supply chain transparency (i.e., monitoring of operational activities and managing supply chain risks). Similarly, Papadopoulos et al. (2017) found that predictive analytics provides firms with information which allows them to mitigate and respond to threats, thereby allowing the firms to create a resilience capability and strategies. This paper aim was to extend this claim by using KBT and robustness capability as a response variable. Surprisingly, this claim was not supported, the cultural (e.g., Arabian) and service climate might be the reason. For instance, Hofstede (2011) highlighted uncertainty avoidance as the degree to which the

members of a society feel uncomfortable with uncertainty and ambiguity. It is possible that Arabian firms specifically, UAE firms are less inclined to uncertainty avoidance as oppose to Western firms. About 52.4% of the firms are mostly customer-oriented firms, more specifically apparel and other textile products (15.9%); vegetables / perishable goods (15.9%) and supermarkets and households' products (20.6%). Thus, the nature of service climate for these kinds of firms may have affected their perception of robustness. More research is needed to affirm the present outcome.

Third, this paper found that firms that possess high supply chain innovation capabilities are more likely to develop robustness capability. The result is in line with Wang and Byrd (2017) work, that draws on RBT to link Big data analytics with firm absorptive capacity. García-Sánchez et al. (2018) further demonstrated that organizational desire for innovation can nurture its absorptive capacity. Similarly, our finding shows that as firms' capabilities in innovation increases, in response the firms robustness capability increases through chances in processes and rules. The present study has documented the link between supply chain innovation and robustness capability. Fourth, this paper found that supply chain innovation mediates the link between supply chain analytics and robustness capability. Specifically, supply chain analytics nurture supply chain innovation capabilities through data aggregation, data analysis, and data interpretation; all of which enhances effective decision-making. Effective decision-making has been shown to mitigate risks and serve as a shock observer (Matook et al., 2009). Innovation capabilities serve as a reminder of firm's vulnerabilities through which robustness can emerge as firm strive to bypass disruptions (Kwak et al., 2018). In sum, the current study documents the link between supply chain analytics and supply chain innovation capability, and between supply chain innovation capability and robustness capability using KBT.

5.1 Implication for theory and practice

Successful innovations, technology or innovative breakthrough and/or competitive advantage require a great deal of information from various stakeholders. This primarily because rapid change in market trends, fierce competition, continuous and non-stop technological breakthrough. These factors do not only increase environmental complexity and uncertainty, but also puts pressure on firms to acquire, analyze, interpret the information or intelligence and/or make decision in a timely manner (Dehghani et al., 2018). In docile markets, managers are tasked with retrieving huge amount of digital information depending on the speed with which each of the key elements' changes. For instance, Xu et al. (2016) argued found that using BDA enabled smartphone manufacturers mine what consumers want in social media e.g., waterproof, solar panel, battery life etc. In doing so, the manufacturers were able to re-

spond to and meet consumers demand in their future products.

Gao et al. (2017) added that in supply chain and logistic industry, data analytics approaches allow firms to consider the need of all stakeholders along the supply chain and channel, thereby creating a sustainable innovation cycle. This paper confirmed this claim; thus, this makes supply chain analytics a form of digital information source important for supply chain managers. By highlighting the importance of supply chain analytics, this study has offered guidance to the supply and logistics managers on how to leverage the power of data for innovation and robustness. Second, this paper offers some interesting insights that by making investments, collecting hordes of data, and having access to world class technology can foster innovation and robustness capability in supply chain. Similar arguments were echoed by (Jeble et al., 2018).

This put forth that organizations that have strong supply chain innovation has a higher level of robustness capability. The finding is consistent with prior studies that argued that risk management capability can be enriched by the adoption of new technologies and innovative supply chain practices (Grant, 1991). Similarly, firms supply chain innovation is likely to enhance firm's resilience capability (Kwak et al., 2018). Wang et al. (2016) added that predictive analytics allow firm bypass supply disruptions and demand uncertainty, thus, supply chain analytics can enhance network capacity. This study extends this claim to the domain of robustness capability.

The outcomes of this paper indicate that supply chain analytics can be an effective aid to survival in competitive markets (Likoum et al., 2018), particularly by enhancing innovation and robustness capability. In essence, this paper shows that merging the field of information systems, supply chain and logistics, innovation and strategic management can be fruitful, because firms can acquire capabilities to innovate and rapidly adjust to external demands (e.g., optimize business processes, supply routes and channels). Henceforth, this paper suggests that value creation process can be acquired by supply and logistics firms if they invest in BDA activities like supply chain analytics. This implies that supply chain analytics can foster greater competitive performance through innovation, which in turns creates agile and robust business process. Future studies can embrace predictive models such as artificial intelligence techniques (i.e., neural network) as suggested by (Abubakar et al., 2018; 2019).

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Appendix

Supply chain analytics
Effective use of data aggregation tools
SCD1: "Collect data from external sources and from various supply chain channels and systems throughout your organization"
SCD2: "Make supply chains records consistent, visible and easily accessible for further analysis"
SCD3: "Store transaction or channel data into appropriate databases"
Effective use of data analysis tools
SCD4: "Identify important business insights and trends to improve the supply chain value"
SCD5: "Predict patterns of each channel in response to each supply chain need"
SCD6: "Analyze data in near-real or real time that allows responses to unexpected events"
SCD7: "Analyze social media data to understand current trends from a large population"
Effective use of data interpretation tools
SCD8: "Provide systemic and comprehensive reporting to help recognize feasible opportunities for supply chains channels and service
improvement"
SCD9: "Support data visualization that enables users to easily interpret results"
SCD10: "Provide near-real or real time information on public operations and services within organization and across other supply chain systems / organizations"

Supply chain innovation (SCI)
SCI1: "We pursue a cutting-edge system that can integrate supply chain information"
SCI2: "We pursue technology for real-time tracking of our supply chain and channels"
SCI3: "We pursue innovative vehicles, packages or other physical assets"
SCI4: "We pursue continuous innovation in core global supply chain processes"
SCI5: "We pursue agile and responsive processes against changes in our supply chain"
SCI6: "We pursue creative supply chain methods and/or service"

Robustness capability (RC) - Our supply chain and logistics networks
RC1: "Our supply chain and logistics networks can remain effective and sustain even when internal/external disruptions occur"
RC2: "Our supply chain and logistics networks can avoid or minimize risk occurrence by anticipating and preparing for them"
RC3: "Our supply chain and logistics networks can absorb a significant level of negative impacts from recurrent risks"
RC4: "Our supply chain and logistics networks can have sufficient time to consider most effective reactions"

Ali analitika dobavne verige izboljšuje njeno inovativnost in robustnost?

Ozadje in namen: O naravi interakcije med analitiko dobavne verige, inovacijami v dobavni verigi in njeno robustnostjo je malo znanega. Namen tega dokumenta je preučiti učinkovitost analitike v dobavni verigi pri izboljšanju inovativnosti in zanesljivosti dobavne verige podjetij v arabskem kulturnem kontekstu.
Zasnova / metode: Z uporabo na znanju temelječih pogledov in anketnih podatkov zbranih od vodij linij v sektorjih oskrbe in logistike smo izdelali model strukturnih enačb na osnovi variance (PLS-SEM) za diagnosticiranje poveza-ve med analizo dobavne verige, inovacijami v dobavni verigi in robustnostjo zmogljivosti.
Ugotovitve: Rezultati kažejo, da je analiza analitike v dobavni verigi pomembno vplivala na inovacije v dobavni veri-gi, ne pa na njeno robustnost. Pokazalo pa se je, da so inovacije na področju dobavne verige pomembno vplivale na robustnost, pri čemer inovacije v dobavni verigi posredujejo povezavo med analitiko dobavne verige in robustnostjo.
Zaključek: Izsledki študije kažejo na pomembnost analitike dobavne verige kot funkcionalnega orodja za stabilnost in uspeh dobavne verige in / ali logističnih poti. V članku predstavljena analiza dobavne verige lahko upravljavcem pomaga pri dostopu do pravočasnih in koristnih informacij za večjo inovativnost; inovacije v dobavni verigi so odvi-sne ne le od podatkov, ampak tudi od analitičnih zmogljivosti podjetij.

Ključne besede: *veliki podatki, analitika dobavne verige, inovacije v dobavni verigi, zmogljivost robustnosti*

Evaluation of Product Competitiveness: A Case Study Analysis

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Background and Purpose: The existing frameworks provide a superficial approach to the evaluation of product competitiveness which reveals the linkage between the level of product competitiveness and quantitative as well as qualitative factors that have the most significant impact thereon. Given this fact, the purpose of this paper is to elaborate a model for evaluating the competitiveness of sunflower packaged oil, considering both quantitative and qualitative factors that may alter it. Further, this model is being implemented to examine the most demanded Ukrainian sunflower oil brands in order to reveal possibilities for enhancing competitiveness.

Design/Methodology/Approach: The general methodology of the research includes elements of theoretical, empirical, qualitative and quantitative analyses. The theoretical analysis aims to shed light upon a different understanding of "the evaluation of competitiveness", as well as approaches and tools for analysing it. Empirical analysis focuses on observing official statistical data of the export of sunflower oil and future trends. Qualitative analysis consists in the identification, systematization and description of factors that affect the competitiveness of sunflower oil packaged. In turn, quantitative analysis is based on usage of the Fuzzy logic tool in order to evaluate the impact of complex and partial factors on the level of product competitiveness.

Results: This paper provides a business case for product competitiveness evaluation of a particular sunflower oil brand. Based on usage of the Fuzzy logic toolkit, the impact of complex and partial factors on competitiveness level was analysed. As a result, simulation of the competitiveness sensitivity of a particular oil brand on relevant complex factors that determine it competitiveness level was presented. This business case may help managers to channel their efforts and resources in the proper particular direction to increase product competitiveness and product positioning on the market.

Conclusion: The results of this research would be useful to practitioners in their assessment of product competitiveness, modelling future levels, and understanding hidden possibilities for enhancing product competitiveness. The framework offered might be adopted for other types of products.

Keywords: product competitiveness, general and partial factors, fuzzy logic.

1 Introduction

Nowadays, the highly competitive entrepreneurial environment - as well as market fluctuations - are noticeably observed in modern conditions of uncertainty, imbalance and disproportion between the expected and actual state of the market (Shpak et al., 2016). It demands business be focused on a number of aspects, e.g. CSR in its operations (Bhana, 2018; Sroka & Vveinhardt, 2018; Kliestikova et al., 2018; Meyer, 2018), inter-organisational cooperation, both bilateral and multilateral (e.g. Kozma,

2017, Šebestová et al., 2017), as well as coopetition, i.e. simultaneous cooperation and competition with competitors (Mohalajeng & Kroon, 2016; Cygler & Sroka, 2017; Cygler et al., 2018). The issue which is more and more important, especially in the developed countries, is also employment of older generation employees (Kolářová et al., 2017; Kubíčková et al., 2018). However, a matter of crucial importance for businesses is the production of a strongly competitive product. At the same time, product competitiveness is a broad phenomenon which is being considered from numerous points of view and related interdisciplinary areas. It is worth mentioning that different areas of business or industry branches create specific conditions and hence have a significant impact on product competitiveness. Considering such peculiarities, it is logical to focus research on a certain product.

One of the most important directions for economic development is to enhance product exporting and to promote national trademarks on international markets (Meyer & Meyer, 2017; Meyer & De Jongh, 2018). On the domestic market, each industry has in-demand and well-known products or trademarks. Nevertheless, Ukrainian companies are struggling on the global market. Such a situation is considered to be related to the level of product competitiveness for national trademarks in particular.

Observing the results of Ukrainian product exporting revealed that sunflower oil is one of the most in-demand products on the international market (SSSU, 2018). In particular, the share of Ukrainian oil production on the global market exceeds 50%. However, sunflower oil contributed only one-third of the total Ukrainian exports (UCAB, 2018). The lack of this type of product in the export structure is caused by certain constraints.

In the face of increasing competition on the Ukrainian market, producers should pay considerable attention to improving the competitiveness of their products. From this perspective, the aim of the research is to investigate the relationship between the competitiveness of a particular product and numerous factors that affect the given product. Regarding all the above mentioned factors, assessing the competitiveness of sunflower oil allows researchers to compare different brands and to distinguish the most significant factors.

Our paper is structured as follows: Firstly, we present the theoretical background. Secondly, we present the methodology that was applied in this research. The next part of our paper presents the research results. Finally, we present the conclusions and limitations of our study.

2 Theoretical background

Product competitiveness discourse is the subject of heated debates by academics and practitioners (Oral & Kettani, 2009; Roostika et al., 2015; Androniceanu, 2017; Popp et al., 2018a, 2018b). Nonetheless, there are some aspects that have been left untouched due to different purposes of investigation. The present paper proposes an overview of Ukrainian and international academics' scientific work pertaining to an evaluation of product competitiveness. The question of quantitative assessment of product competitiveness is always relevant for producers in order to determine strategy, namely to increase and / or expand their positions on both domestic and foreign markets.

An analysis of scientific publications reveals numerous models and frameworks for the evaluation of product competitiveness. The main approaches may be summarised as follows (Pastushchin, 2013: 232-240):

1) Methodology of the evaluation of product competitiveness through calculating its rating. According to this approach, product rating is dependent on product quality indicators (Kobilyatsky, 2003; Pomffyová et al., 2017; Dvorsky et al., 2018). Such a point of view brings some limitations because, in this case, managers neglect other product characteristics and internal and external environmental conditions (Androniceanu & Popescu, 2017).

2) Methodology of the evaluation of product competitiveness through the volume of sales. This approach assumes that the volume of sales reflects consumer demand, which is why it might be the most significant criteria for its competitiveness. This approach focuses only on one product competitiveness characteristic which makes it rather narrow. Under modern conditions, a high volume of sales might be the result of a weak competitive environment and the absence of similar products on the market.

3) Methodology of the evaluation of product competitiveness through a complex index with multiple foci (Fatkhutdinov, 2000; Chepurnoy, 2005). According to this approach, a complex index of product competitiveness should include a set of partial indicators which generalise the following characteristics of product competitiveness: consumer requirements, technical requirements, enterprise expenses.

4) Methodology of the prediction index of competitive strength of alcohol brands based on Fuzzy logic (Shtovba, 2007). The authors offered a fuzzy model of brand competitiveness index which is based on expert knowledge bases (quality of the brand product, image of the brand product, and service connected with the brand product) and so on.

On the basis of the given literature analysis, one can make a sweeping assumption that today there is an absence of an acknowledged approach that suits all aspects of the evaluation of product competitiveness. Scholars often use individual qualitative indicators which reflect different parameters of product competitiveness (e.g. Ivanenko, 2012; Stavenki & Zhurilo, 2009), or group and integral indicators which generalise different characteristics of product competitiveness – consumer needs, competitor products that best meet consumer needs, the image of the enterprise, a hypothetical sample, and a group of analogue products (Litvinova, 2013; Massey et al., 2018).

It should be noted that models and frameworks for the evaluation of product competitiveness developed, first of all, separately for different industry branches. Such a variety of different approaches brought about specific peculiarities of each business area or market. Thus, it is hard to offer a unique model or framework that suits all peculiarities of the Ukrainian domestic market and might be adopted for different company/product characteristics.

In contrast, different holistic approaches for the evaluation of product competitiveness have been proposed in the literature. For example, Fumio (1985) introduced the scaling method based on rivalry comparison. He proposed the use of the maximum correlation ratio method for selecting the most significant characteristics of product competitiveness. In turn, Chang & Yeh (2001) developed an approach to evaluating airline competitiveness based on the utilisation of the multiattribute decision-making model. This approach addressed the issue of identifying five dimensions of competitiveness and appropriate performance measures. To solve the problem of inconsistency during the validation procedure, the authors decided to use the additive weighting method, weighted product method and to allocate preferences according to similarity to the ideal result (providing the minimum expected loss of value). Such a combination of methods helps to reveal the competitive advantage of a particular company in comparison to its competitors. Oral & Kettani (2009) proposed the industrial competitiveness model highlighting key points such as:

-     adopting "scientific models" and "practical frameworks" in order to improve modelling of firm competitiveness for strategy formulation,

-     developing a formal model – Integrated competitiveness model (ICM), which consists of four sub models and six indices,

-     developing sub-models and indices: actual output sub-model, comparative actual sub-model, potential sub-model, comparative potential sub-model, actual mastery index, actual cost superiority index, potential industrial mastery index, potential cost superiority index, actual competitiveness index, and potential competitiveness index,

-     forming a competitive strategy according to links between companies' actual and potential competitiveness.

In general, one may conclude that many authors have highlighted the necessity of combining different methods in order to obtain a relevant evaluation of product competitiveness. Nevertheless, the models or frameworks considered, whether taken separately or in combination, do not comprehensively reflect the characteristics of product competitiveness. Along with complications in the Ukrainian economy, an evaluation of product competitiveness should be based not only on assessing set metrics that reflect peculiar characteristics, but should also include the internal and external environment of the particular companies.

3 Methodology

Existing dilemmas in the evaluation of product competitiveness provide the basis for a further contribution to solving this problem, in particular, developing a model for its assessment which might be applicable under changing environmental conditions. The conducted literature analysis has shown that the usage of economic-mathematical and expert methods, separately or in combination, for the evaluation of product competitiveness does not allow researchers to consider all product features (both quantitative and qualitative characteristics) and to eliminate the dependence of expert assessments on the subjective judgments of experts. So, it is logical to apply such a method that allows researchers to:

- simulate complex systems under conditions of insufficient information and randomness of processes,

- solve problems of aggregation of ambiguous, subjective and inaccurate expert judgments about the state of a particular parameter,

- reflect a complex nature of the evaluation of product competitiveness,

- consider numerous factors that affected product competitiveness.

As noted by a number of scholars (e.g. Pedrycz, 2011; Xianbo, et al., 2013; Marcos Duarte Jr., 2018; Moravcikova et al., 2017), the fuzzy logic toolkit provides an opportunity to obtain a fairly objective assessment as it takes into account all factors (both quantitative and qualitative), as well as the level of confidence of the experts who carry out the evaluation. Given this fact, this method was applied in our paper.

The methodology structure consists of two parts. The first stage was to choose the subject of research, in particular, the type of product for the evaluation of its competitiveness. For this purpose, the empirical analysis of packaged sunflower oil was conducted. In addition, factors that had the most significant impact on product competitiveness were identified and described. The second part was to construct a model for the evaluation of the competitiveness of sunflower oil by means of fuzzy logic tools. MATLAB software was used for modelling.

The construction of the model using the Fuzzy Logic Toolbox package consisted of the following steps:

1.   the definition of linguistic variables and their corresponding term sets,

2.   the construction of the fuzzy set adjective, which includes: determining the range of changes in the data pertaining to competitiveness factors and the output variable – product competitiveness; choosing the type of fuzzy set adjective for each variable and justifying its parameters,

3.   the formation of fuzzy knowledge bases,

4.   assessing the adequacy of the model based on the training sample, adjusting its parameters and making a decision on the final version.

4 Empirical analysis of sunflower oil exporting

According to secondary financial data obtained from the State Statistics Service of Ukraine (SSSU, 2018), oil production and exports have been one of the most significant such items on the global market over the past few years. For instance, sales volumes of sunflower oil on international markets increased by 16% (597 million $) in 2017 (Table 1).

In the course of the study, it was established that Ukraine has significant potential for increasing oil exports as it lacks restrictions on the export of various sunflower oil processing products to the foreign market. Meanwhile, the consumption of high quality, healthy food (including sunflower oil) has grown significantly. Taking into account the results of the study, packaged sunflower oil was selected for practical implementation of the process of evaluating product competitiveness.

Table 1: Input and output variables for the fuzzy inference system

Year	Total	CIS countries	EU	Asia	Africa	America	Australia and Oceania
2006	1628820,61	188594,15	861562,49	415846,54	162504,95	312,21	0,28
2007	1923240,61	22947,81	982733,04	366905,45	342025,55	2098,28	0,17
2008	1339557,44	205308,41	527647,63	398777,09	167907,69	39915,96	0,66
2009	2333842,54	153718,89	629739,06	1052483,37	478161,11	19714,68	25,43
2010	2688562,35	273224,57	716578,71	1175242,87	522797,75	587,92	130,53
2011	2333842,54	153718,89	629739,06	1052483,37	478161,11	19714,68	25,43
2012	3589606,45	112015,75	699046,84	2025268,68	736049,93	17221,23	3,99
2013	3199506,79	108935,62	403363,34	2181825,95	479139,88	26134,50	107,49
2014	4339490,34	87530,30	817372,41	2990921,31	433976,18	7039,77	2650,37
2015	3938555,37	58851,57	744343,01	2818297,43	303438,00	12259,79	1365,57
2016	4842064,81	44372,45	1396170,77	3071259,42	305086,75	21085,65	4089,70
2017	5757344,05	35297,74	1812147,70	3615398,20	264153,71	24834,30	5512,39

4.1 Factors determining the competitiveness of packaged sunflower oil

To ensure that all factors which influence product competitiveness were included in the evaluation process, an expert survey was conducted. The main aim of the survey was to identify a group of factors that determine product competitiveness. This survey reached 35 Ukrainian sunflower oil manufacturers, independently operated with different sizes and market shares, to obtain a relevant result. For the purposes of data collection, questionnaires were sent by e-mail to different groups of employees who have expertise connected with the company or product competitive-

ness. In particular, the respondents were directors, CEOs, sales managers, marketers, and social media marketers.

Interviewees answered the following questions:
- which of the following factors affects the competitiveness of sunflower oil?
- what is the significance of each partial factor (significance was described verbally: important and irrelevant) ?
- what is the nature of the relationship between each factor and the level of competitiveness: direct or inverse?
- what are possible combinations of factors based on their levels (levels were described verbally:

low, medium, high) ?

- what is the range of change in quantitative factors (the range was determined based on the secondury data analysis) ?

Questionnaires included the title and description of numerous factors with possible combination of all complex and partial factors. It is worth mentioning that during preparation of the survey questionnaires (and complex factors identification in particular), existing Ukrainian frameworks on a given issue were used (Shtovba, 2007; Shtovba & Shtovba, 2005) and secondary data analysis. Therefore, among these factors, only price might be presented in quantitative terms. Quality, image, and service belong to qualitative factors. In addition, they are complex (aggregated), since each of them depends on a number of partial factors.

After collecting all filled-in questionnaires, the researchers revised the interviewer's responses.
As a result of the analysis of the questionnaires, we identified complex and partial factors that influence the level of competitiveness of sunflower oil.

On the basis of the survey results, partial factors, both quantitative and qualitative ones, were established. Table 2 illustrates the final list of the complex and partial factors of the competitiveness of packaged sunflower oil, together with their description.

4.2 Definition of linguistic variables and their corresponding term sets

Quality, image and service are complex factors and each of them depends on a number of partial factors. Considering the important for decision making to have assessments of complex factors, we decided to build a separate fuzzy knowledge base for each complex factor and fuzzy knowledge base for assessing the level of competitiveness. In addition, Shtovba (2005) and Miller (1956) argue that in the case of a large number of expert input it is difficult to describe causal relationships with fuzzy rules. Therefore, they recommend building fuzzy knowledge bases that have no more than 5-7 input parameters. As a result, the

Table 2: Factors that affect the level of competitiveness of packaged sunflower oil. Source: own

Complex factors	Partial factors	Factors characteristics
Quality (F_1)	Genetic seed purity (F_{11})	Sunflower seeds characterise genetic and physiological information, primarily about the ratio of spare and biologically active substances. The genetic purity of the seeds is determined not only by its genetic component but also by the conditions of cultivation and cultivation (cleansing, calibration, protrusion, and packing) of seeds.
	Primary product quality (F_{12})	It depends not only on the seeds but also on the conditions of growing sunflowers, the time of harvesting, transportation, further storage, and processing. All products must comply with the regulatory requirements of the National Standards of Ukraine 4694-2006. Depending on the criteria for the quality of sunflower seeds, it may be categorised as higher, first or second class. Olive factories buy sunflower, the humidity of which varies from 6% to 8%, with a content of garbage impurity - 3%, which is not infected with pests, except infection of the second mite. The sunflower seeds must not be bitter, are discarded by colour and odour, and the maximum allowable dose of residual quantities of pesticides, chemicals, and heavy metals is determined.
	Innovation of production and logistics technologies (F_{13})	Production assets renovation funds the usage of new recipes, modern storage methods and means for transportation of oils
	Staff quality (F_{14})	Qualification, staff motivation, discipline in the production process
	Degree of burnout during usage(F_{15})	Determined by how much oil is needed, especially when cooking products that require frying

Table 2: Factors that affect the level of competitiveness of packaged sunflower oil. (continued)

Image(F_2)	Implementation of socially responsible projects tend towards external company environment (F_{21})	Participation in charity events; Level of care for packaging recycling
	Implementation of socially responsible projects tend towards internal company environment (F_{22})	Taking care of staff, their development, and general working conditions
	The level of distribution of negative reviews about a particular trademark (F_{23})	Spreading negative information about the company and its products on the Internet and at retail intermediaries
	The level of green technologies used in production (F_{24})	The technological process must be safe for the environment and anticipate the use of alternative energy sources
	Foreign investment share in registered capital (F_{25})	Allows firms to invest more in socially responsible activities, green technologies, and improve sales and logistics
	Number of international quality certificates (F_{26})	Certificate of Quality Management System, Certificates of Compliance with International Requirements Kosher P1 and P2, Certificate of production according to European organic requirements, Certificates for the food safety system, namely ISO 22000:2005, ISO/TS 22002-1:2009 and additional requirements FSSC 22000, availability of Eco standard. Management systems should be certified in accordance with international standards such as ISO 9001 (quality) and ISO 14001 (environmental protection)
Service (F_3)	Product availability in retail trade (F_{31})	The number of retail intermediaries involved in product sales; distribution geography
	Frequency of shares held by the producer together with the trade intermediaries for the final consumer (per year) (F_{32})	Carrying out actions to stimulate sales - providing discounts on products; drawings among consumers for the best dish recipes
	Information support to intermediaries and final consumers (F_{33})	Providing intermediaries with information about their products, their quality parameters and outdoor advertising media; advertising in mass media, and on the Internet, presence in social networks with the offer of original recipes; information content of the site; informing intermediaries and producers about sales promotion incentives, producer participation in exhibitions and fairs
Price (F_4)	Retail price	Determined by the cost of oil production, the profitability of production and trade margins of intermediaries, as well as consumer demand

fuzzy model for assessing the competitiveness of oil will include four expert knowledge bases.

Firstly, complex factors are evaluated on the basis of partial factors, and then, based on the obtained estimates of complex factors, the level of competitiveness oil was estimated (the fuzzy values of the estimates of complex factors are defuzzificationed and their crisp values are already given to the fuzzy system of the next level). The output tree of the evaluation of the competitiveness of oil is presented in Figure 1.

Linguistic variables were defined on the basis of the output tree. Hence, the hierarchical model includes the following linguistic variables: at the 1st level – 14; at the 2nd level – 4; on the 3rd level – 1. We assigned the titles corresponding to the names of the highlighted competitiveness factors to the linguistic variables of the 1st and 2nd level. The output linguistic variable will be called "Oil Competitiveness Level". All linguistic variables may have three meanings: low; medium; high.

For each variable in the model, three terms were select-ed. This is due to the fact that a greater number of fuzzy terms with a large number of input variables would complicate the process of knowledge base formation.

In the future, the term set of all linguistic variables will be denoted accordingly {L, M, H}.

4.2.1 Construction of membership functions of fuzzy terms

In order to describe the linguistic terms "low", "medium" and "high", it is necessary to build membership functions. The construction of membership functions of fuzzy terms involves solving problems including (Shtovba, 2007; Matviychyk, 2005):

- determining the range of changes in the values of the input variables (competitiveness factors) and the output variable (the competitiveness of sunflower oil),
- selection of membership function type for each variable and the justification of its parameters.
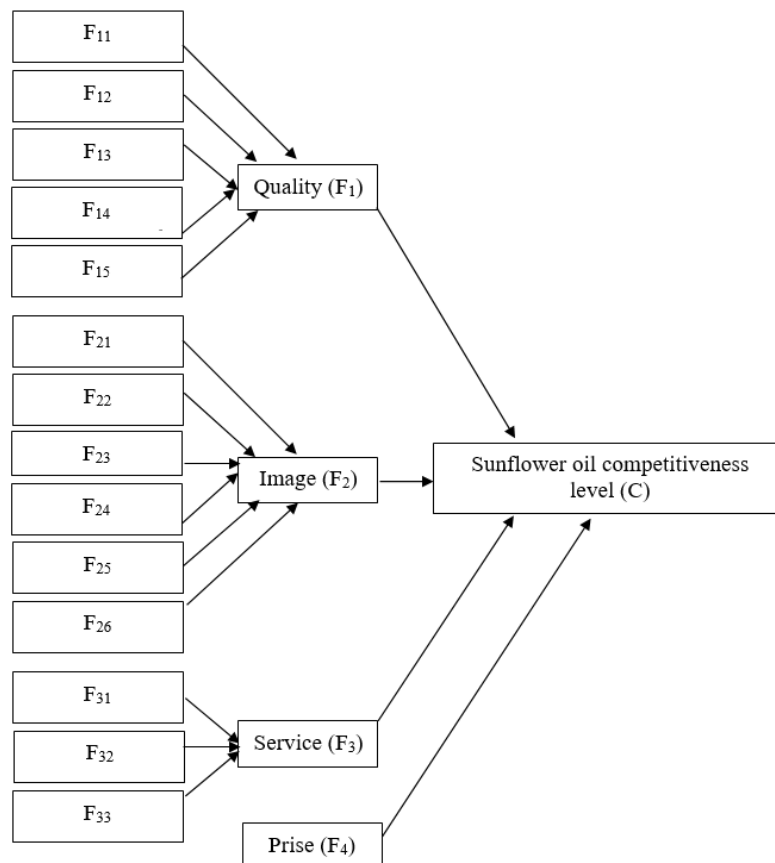

Figure 1: Graphic visualization of the relationship between factors of the competitiveness of sunflower oil. Source: own

The criterion pertaining to the level of competitiveness of oil is to choose the real number C, which belongs to the interval [0; 100]. In terms of an assessment of the qualitative factors of competitiveness (partial and complex), it is also advisable to choose actual numbers from the range [0; 100].

Among the highlighted competitiveness factors are the following quantitative ones, in particular: the share of foreign investment in the registered capital (F25), the number of international quality certificates (F26), the frequency of shares held by the manufacturer together with the intermediary for the final consumer (F32), and price (F4). Evidently, the share of foreign investment in registered capital (expressed as a percentage) may vary within [0; 100]. The range of changes in other factors we determined on the basis of a survey of experts: F26 ∈ [0; 10]; F32 ∈ [0; 12]; F4 ∈ [25; 40].

The higher the value of the number, the higher the oil competitiveness level or the factor affecting it. However, it is necessary to take into account that the relationship between factors and the level of competitiveness can be either direct or inverse. Most of the factors have a direct impact on oil competitiveness. Factors reducing the level of competitiveness include the following: the level of burnout during usage (F15), the level of negative feedback about the particular trademark (F23), and price (F4).

The fuzzy logic toolkit in the MATLAB package contains built-in membership functions. To assess the competitiveness of the oil, we used a number of qualitative vari-

ables that can only be evaluated by an expert. Therefore, we could not form a classic statistical sample. We have selected a symmetric Gauss curve. The advantage of this function is that only two parameters need to be specified for its construction, and it is sufficiently flexible.

In the Fuzzy Logic Toolbox, Gaussian membership functions are given as follows: (x, params), where x is the vector for which the membership levels are calculated; params is a vector of the membership function parameters that are set in such order [c b], where c is the curve's span, and b is the coordinate of the maximum of the membership function. The parameters of the membership functions are set automatically in such a way as to evenly cover the range of values of the linguistic variable. Taking into account the nature of the linguistic variables of our model, we leave the given parameters unchanged (Table 3).

4.2.2 Formation of fuzzy knowledge bases

In order to simulate the complex factors (quality, image, service) and the competitiveness of oil, fuzzy knowledge bases of the Mamdani type were formed (Mamdani & Assilian, 1975) (Tables 4-7).
All the rules contain only logical "And" operations and have weights equal to one.
Fuzzy rules were built as a result of expert's survey. Possible combinations of partial and complex factors regarding their levels were specified, as a result of expert's survey.
In Table 7, we took into account the risk of oil quality de-

Table 3: Membership function parameters for the evaluation of oil competitiveness. Source: own

Linguistic variables	Membership functions parameters
Quality Genetic seed purity Primary product quality Innovation of production and logistics technologies Staff quality Degree of burnout during usage	Range of all variables values change [0; 100] Params: «Low»: [21.23; -4.441e-16] «Medium»: [21.23; 50] «High»: [21.23; 100]
Image Implementation of socially responsible projects tend towards external company environment Implementation of socially responsible projects tend towards internal company environment The level of distribution of negative reviews about a particular trademark The level of green technologies used in production Foreign investment share in registered capital Number of international quality certificates	Range of all variables values change [0; 100] Params: «Low»: [21.23; -4.441e-16] «Medium»: [21.23; 50] «High»: [21.23; 100] Variable value change range [0; 10] Params: «Low»: [1.699; 6.939e-17] «Medium»: [1.699; 5] «High»: [1.699; 9.974]

Service Product availability in retail trade, Information support to intermediaries and final consumers	Range of all variables values change [0; 100] Params: «Low»: [21.23; -4.441e-16] «Medium»: [21.23; 50] «High»: [21.23; 100]
Frequency of shares held by the producer together with the trade intermediaries for the final consumer (per year)	Variable value change range [0; 12] Params: «Low»: [2.548; 1.11e-16] «Medium»: [2.548; 6] «High»: [2.548; 12]
Price	Variable value change range [25; 40] Params: «Low»: [3.185; 25] «Medium»: [3.185; 32.5] «High»: [3.185; 40]
Oil competitiveness level	Variable value change range [0; 100] Params: «Low»: [21.23; -4.441e-16] «Medium»: [21.23; 50] «High»: [21.23; 100]

The graph of fuzzy terms membership functions to the linguistic variable "Oil competitiveness level" is shown in Figure 2.
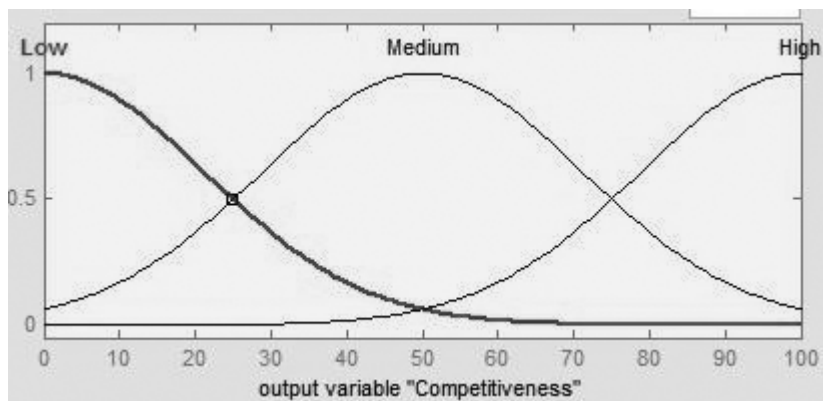
Figure 2: Fuzzy terms membership functions for the prediction of oil competitiveness level. Source: own

creasing, even when the manufacturer has a high image and provides a high level of service (although experts argue that such manufacturers carry out strict quality con-trol, and the likelihood of non-identification of oil quality mismatches to established national standards is very low).

Table 4: Fuzzy knowledge base for the evaluation of oil quality. Source: own

No.	If					Then
	F_{11}	F_{12}	F_{13}	F_{14}	F_{15}	Quality (F_1)
1	H	H	H	H	L	H
2	H	H	H	M	L	H
3	H	H	M	H	L	M
4	H	M	H	H	L	M
5	M	H	H	H	L	M
6	H	H	H	H	M	M
7	H	H	H	M	M	M
8	H	H	M	M	M	M
9	H	M	M	M	M	M
10	H	M	M	M	M	M
11	M	M	M	M	M	M
12	M	M	M	H	M	M
13	M	M	H	M	M	M
14	M	H	M	M	M	M
15	M	M	M	L	M	M
16	M	M	M	M	H	L
17	M	M	L	M	M	L
18	M	L	M	M	M	L
19	L	M	M	M	M	L
20	L	L	M	M	M	L
21	L	L	L	M	M	L
22	L	L	L	L	M	L
23	L	L	L	L	L	L

Table 5: Fuzzy knowledge base for image evaluation. Source: own

No.	If						Then
	F_{21}	F_{22}	F_{23}	F_{24}	F_{25}	F_{26}	Quality (F_2)
1	H	H	L	H	H	H	H
2	H	H	L	H	H	M	H
3	H	H	L	H	M	H	H
4	H	M	L	H	H	H	H
5	M	H	L	H	H	H	M
6	M	M	L	H	H	H	M
7	M	M	M	M	H	M	M
8	M	M	M	M	M	M	M
9	M	M	H	M	M	M	L

Table 5: Fuzzy knowledge base for image evaluation. (continued)

10	M	M	H	L	M	M	L
11	M	L	H	L	M	M	L
12	L	M	H	L	M	M	L
13	M	M	H	L	L	M	L
14	M	M	H	L	L	L	L

Table 6: Fuzzy knowledge base for service evaluation. Source: own

No.	If			Then
	F_{31}	F_{32}	F_{33}	Quality (F_3)
1	H	H	H	H
2	H	M	H	H
3	M	H	H	M
4	H	H	M	M
5	M	M	H	M
6	M	H	M	M
7	H	M	M	M
8	M	M	M	M
9	H	L	H	M
10	H	L	M	M
11	M	L	M	M
12	L	M	M	L
13	L	L	L	L

Table 7: Fuzzy knowledge base for the evaluation of sunflower oil competitiveness. Source: own

No.	If				Then
	Quality (F_1)	*Image* (F_2)	*Service* (F_3)	*Price* (F_4)	*Sunflower oil competitive- ness level (C)*
1	H	H	H	L	H
2	H	H	H	M	H
3	H	H	M	L	H
4	H	H	M	M	H
5	H	M	H	L	H
6	H	M	M	L	H
7	H	H	H	H	M
8	H	H	M	H	M
9	H	M	H	M	M
10	H	M	M	M	M
11	M	M	M	M	M
12	M	M	M	L	M
13	M	M	L	L	M
14	M	H	H	H	M

Table 7: Fuzzy knowledge base for the evaluation of sunflower oil competitiveness. (continued)

15	H	M	H	H	M
16	M	H	M	H	M
17	M	M	M	H	L
18	M	M	L	M	L
19	M	M	L	H	L
20	M	L	M	M	L
21	M	L	L	M	L
22	M	L	M	H	L
23	M	L	L	L	L
24	L	L	L	L	L
25	L	L	L	M	L
26	L	L	L	H	L
27	L	M	M	H	L
28	L	M	L	H	L
29	L	L	M	H	L
30	L	M	M	M	L
31	L	M	M	L	L
32	L	H	H	H	L
33	L	M	L	M	L
34	L	L	M	M	L
35	L	H	M	M	L
36	L	H	M	H	L
37	L	H	H	M	L
38	L	H	M	L	L
39	L	M	L	L	L
40	L	M	H	M	L

For the proposed hierarchical knowledge base, the maximum number of rules is: 35+36+33+34=1080 (Shtovba, 2007). However, one important peculiarity of fuzzy knowledge bases has to be taken into account – the search for all possible rules deprives the system of flexibility, the ability to adapt to real conditions. Therefore, the number of rules in each knowledge base should be less than the number of all possible combinations of the values of the input variables. If the knowledge base does not have a rule that corresponds to a particular situation, the system offers the solution that is most suitable for this situation, namely, a solution for which the membership function will have the highest value. In addition, the lack of certain combinations of input variables is explained by economic content. In practice, it does not always have any combination of values of input variables. For example, in Table 4, if "Genetic purity of seeds" is high, then all other factors cannot be low (high or medium only), because genetically pure seeds are an expensive resource and can be used only by the manufacturer who provides the proper level of all other factors. The same explanation can be given in the absence of certain combinations of input variables in all other tables.

Fuzzy logical output of Mammadi is realized by the following operations:

- And method – by operation of the minimum;
- Implication – by operation of the minimum;
- Aggregation – by operation of the maximum;
- Defuzzification – by the method of the centre of gravity (centroid).

In the Fuzzy Logic Toolbox, implementation of logical operations, methods of implication, aggregation, and dephasing is programmed. They can be s set by using the following menu (Fig. 3).
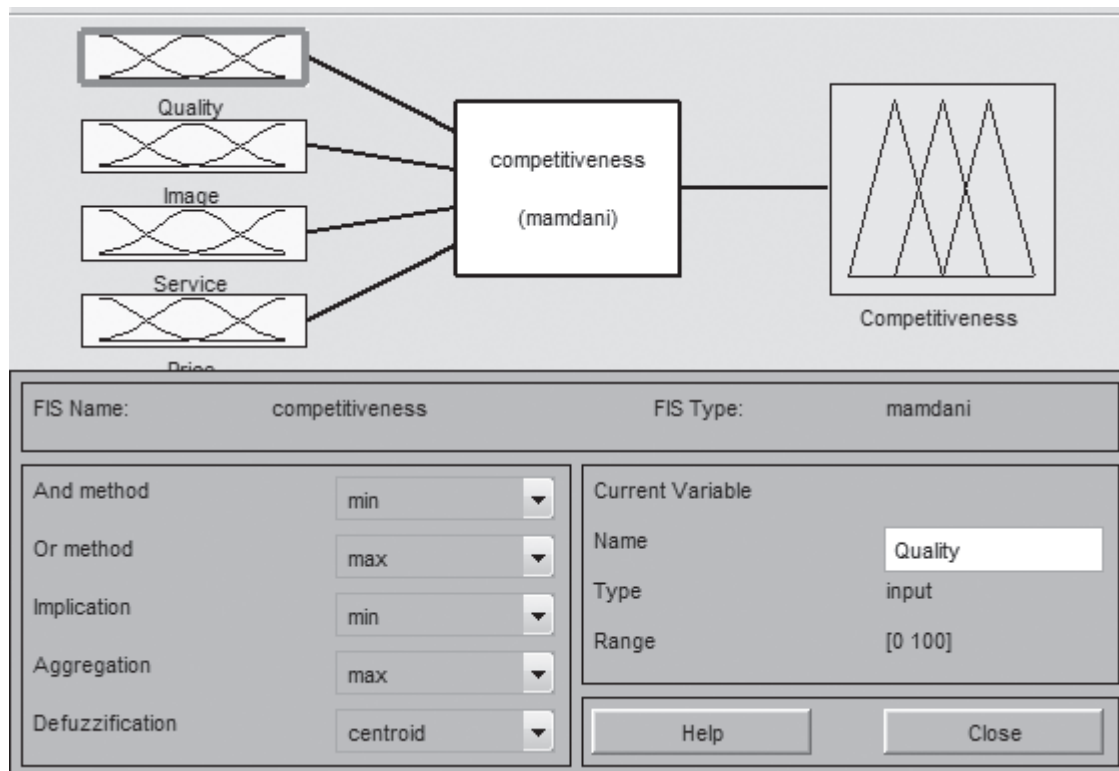
Figure 3: Operations and methods of fuzzy logical inferance of Mamdani. Source: own

4.2.3 Formation of fuzzy knowledge bases

To assess the adequacy of the model, we used a training sample containing 120 "input-output" observations, which were generated randomly. Taking into account the results obtained, the knowledge bases were adjusted (Tables 4-7 present its final version). Figure 4 shows a three-dimensional graph presenting the dependence of the level of oil competitiveness on quality and price (level of the image is 75 and level of service is 65).

The analysis on the basis of a given graph is approximate. Due to the importance of usage accurate data about the dependence of competitiveness on the level of complex factors (quality, image, service) and price, an analysis of sensitivity was carried out in the work.

4.3 Simulation of the competitiveness sensitivity of a particular oil brand

In the next step, three major oil brands were chosen to analyse their competitiveness levels. They were selected on the basis of analysis of official financial statements (SSSU, 2018) and their market share (UCAB, 2018) for the last five years. Due to obtained data, such brands as "Chumak", "Korolivskyj smak", and "Majola" are the most demanded ones (Bakertilly, 2017) and considered as main competitor at domestic market.

The research conducted allowed the researchers to evaluate and compare the level of competitiveness of major Ukrainian sunflower oil trademarks. Using the developed model, the competitiveness levels of three major sunflower oil brands were calculated (Table 8).

As judged by the data given in Table 3 and Table 8, it is possible to make some conclusions about the level of competitiveness of different brands of sunflower oil and the factors influencing it.

"Chumak" oil is characterised by high quality, and the manufacturer has a fairly strong image. The service lev-el can be referred to as high rather than average, but the price is high. Therefore, the level of competitiveness of this product is approaching the average level.

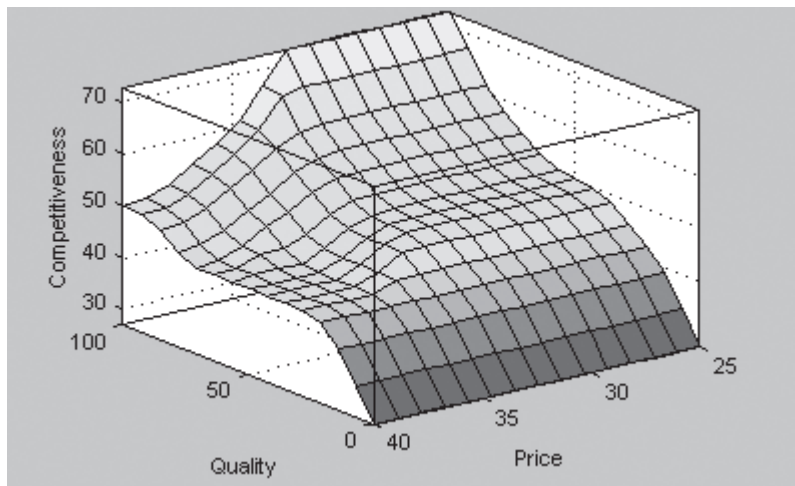In the case of "Korolivskyj smak", one can state that the

Figure 4. Three-dimensional graph presenting the dependence of the level of oil competitiveness on quality and price (obtained after setting the model on the training sample). Source: own

quality of its sunflower oil and its image is considered high rather than average. In contrast, the service level tends to be above average and the price is clearly average (the coordinate of the maximum of the membership function for the average price is equal to 32,5 UAH. Taking into account the points garnered in terms of all aggregated factors, the level of competitiveness of this sunflower oil is equal to 57,8.

Regarding sunflower oil produced by "Majola", one can declare an average level of quality, manufacturer image, and service. We can say with a greater degree of cer-tainty that the price is definitely average. Thus, as a consequence, Myola's level of sunflower oil competitiveness can be described as average.

A comparison of the estimations obtained allows us to conclude that "Korolivskyj smak" sunflower oil has a high level of competitiveness, characterised by favourable relations of price and non-price factors.

Taking into account the level of all non-price competitiveness factors, it can be noted that the price of "Mayola" oil is quite high in comparison with "Korolivskyj smak" sunflower oil. "Chumak" sunflower oil has a high level of

Table 8: Indicators for assessing the level of competitiveness of different brands of packaged sunflower oil. Source: own

Trademark Name	Quality (F_1)	Image (F_2)	Service (F_3)	Average retail price, UAH/L (F_4)	Sunflower oil competitiveness level (C)
Chumak	88	91	76	37	53.3
Korolivskyj smak	78	76	69	32	57.8
Majola	53	48	51	29	50

non-price factors, but a relatively high price reduces its competitiveness compared to "Korolivskyj smak" oil.

The developed model allows us to carry out an analysis of the sensitivity of the resultant index to the change of values of input variables.

We have analyzed the sensitivity of the level of competitiveness of the "Chumak" sunflower oil to the following factors: price reduction; increase of service level; decrease in oil quality. The level of image remains the same. It was supposed that in case of decreasing oil quality, producer with high image has either inform consumers on a given issue or remove oil from the retail chain. Consequently it could trigger the spread of negative reviews of trademark and in more remote period - reduced producers' image.

The values of the factors we changed as follows: the price was reduced in step size of UAH 0,10 to average price level since it is important for the producer to keep the price at least at the average level (32,5 UAH is the coordinate of the maximum of the membership function for the average price); service increased in step 1 to the maximum level of 100; the quality was reduced in step 1 to the average level (50 is the coordinate of the maximum of the membership function for the average quality).

The next step of our research is to analyse the sensitivity of the level of "Chumak" sunflower oil competitiveness to changes in price and service (Table 9).

According to the results, the following solutions can be proposed for "Chumak":

- decreasing the price by 4,05% (up to UAH 35,5 per 1 litre) under the condition of invariability of all other

factors will allow producers to increase the level of competitiveness of "Chumak" sunflower oil by 8,6% (C = 57.9). As the result competitiveness of "Chumak" sunflower oil will surpass the competitiveness level of "Korolivskyj smak" sunflower oil (C = 57.8);

- a 31,6% improvement of the service level (up to the maximum possible value of F3 = 100), provided that all other factors remain unchanged, will increase the level of competitiveness of "Chumak" brand oil by only 0,38% (up to the level of C = 53,5), which indicates the inexpediency of placing significant emphasis on service only;

- a 20,45% decline in oil quality (up to F1 = 70) doesn't provoke a decline in oil competitiveness, which could be explained by the high confidence of buyers in the brand (this is possible only in the short term);

- reducing the quality of oil by 21.59% (to F1 = 69) already leads to reduction in the competitiveness level by 0,75% (up to C = 52.9); further deterioration in quality causes a constant decline in the competitiveness of oil;

- it is rational to reduce the price and improve the service simultaneously. In particular, if price decreases by 3,24% (up to UAH 35,8 per 1 litre) and service level improves by 15,8% (up to F3 = 88) then the level of oil competitiveness will increase by 9% and will make C = 58,1, which will exceed the level of competitiveness of "Korolivskyj smak" sunflower oil (C = 57,8).

Table 9: Results of the sensitivity analysis of the level of competitiveness of "Chumak" packaged sunflower oil to changes in price and service level. Source: own

Fac-tors	Options																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Dependence of competitiveness level on the price at the current level of all other factors																	
Price (F_4)	37	36.9	36.8	36.7	36.6	36.5	36.4	36.3	36.2	36.1	36,0	35.9	35.8	35.7	35.6	35.5	35.4
C	53.3	53.6	53.9	54.2	54.5	54.9	55.2	55.6	56.1	56.6	56.7	56.9	57.1	57.4	57.6	57.9	58.2
Price (F_4)	35.3	35.2	35.1	35.0	34.9	34.8	34.7	34.6	34.5	34.4	34.3	34.2	34.1	34.0	33.9	33.8	33.7
C	58.5	58.8	59.1	59.5	59.9	60.3	60.7	61.1	61.6	62.0	62.5	63.0	63.5	64.0	64.5	64.9	65.0
Price (F_4)	33.6	33.5	33.4	33.3	33.2	33.1	33.0	32.9	32.8	32.7	32.6	32.5					
C	65.2	65.3	65.5	65.6	65.7	65.7	65.8	65.8	65.9	65.9	65.9	65.9					
Dependence of competitiveness level on the service at the current level of all other factors																	
Service (F_3)	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92

Table 9: Results of the sensitivity analysis of the level of competitiveness of "Chumak" packaged sunflower oil to changes in price and service level. (continued)

C	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3
Service (F_3)	93	94	95	96	97	98	99	100									
C	53.3	53.3	53.4	53.4	53.4	53.5	53.5	53.5									
Dependence of competitiveness level on the quality at the current level of all other factors																	
Quality (F_1)	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72
C	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3	53.3
Quality (F_1)	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
C	53.3	53.3	52.9	52.5	52.1	51.7	51.4	51.1	50.8	50.6	50.4	50.2	50.0	49.9	49.7	49.6	49.6
Quality (F_1)	54	53	52	51	50												
C	49.5	49.4	49.4	49.4	49.4												
Changes in the competitiveness level in case of service improvement and price reduction at the existing level of all other factors																	
Price (F_4)	37	36.9	36.8	36.7	36.6	36.5	36.4	36.3	36.2	36.1	36,0	35.9	35.8	35.7	35.6	35.5	35.4
Service (F_3)	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
C	53.3	53.5	53.7	54.0	54.4	54.8	55.2	55.6	56.1	56.8	57.1	57.6	58.1	58.7	59.3	59.8	60.6
Price (F_4)	35.3	35.2	35.1	35.0	34.9	34.8	34.7	34.6	34.5	34.4	34.3	34.2	34.1	34.0	33.9	33.8	33.7
Service (F_3)	93	94	95	96	97	98	99	100									
C	61.3	61.8	62.6	63.5	64.2	64.9	65.6	66.3									

This business case may help managers to channel their efforts and resources in the proper particular direction to increase product competitiveness and product positioning on the market.

5 Conclusions

The paper has addressed the question of evaluating competitiveness considering determining factors. Based on this, a fuzzy model of brand competitiveness and its practical application for Ukrainian sunflower oil were proposed. The aim of this model was to outline essential qualitative and quantitative competitiveness factors (complex and partial) and to evaluate the level of competitiveness re-

garding their significance. The main idea behind using the fuzzy logic toolkit is that all factors determining the level of competitiveness (both quantitative and qualitative) were considered. The implementation of this model allows to estimate the level of complex factors of oil competitiveness, which depend on the values of partial factors, to estimate the level of sunflower oil competitiveness considering the values of complex factors. In addition, another important feature of the model is the possibility for researchers to analyse the sensitivity of oil competitiveness to changes in the values of factors.

Our study contributes to the knowledge base in several ways. Firstly, although this research adopts a single-country approach, it gives us the possibility of comparing the results with other sectors of the economy. Secondly, this

detailed analysis may become a substantial advantage allowing us to formulate hypotheses to be verified in the context of other industries and countries.

One should also add that the model for the evaluation of the level of competitiveness of sunflower oil developed in this paper has several practical applications. First of all, it allows researchers to forecast the level of oil competitiveness taking into account the values of complex factors and price. In addition, it also allows for the assessment of the level of complex factors, while simultaneously taking into account the values of particular factors. As a result it allows researchers to conduct an analysis of the sensitivity of product competitiveness to the impact of significant factors (partial and complex). The results of such analysis could provide a starting point for decision-making in order to improve product competitiveness. In addition, the model can be used for case studies to predict the competitiveness of other food products produced from agricultural raw materials by adjusting its parameters (linguistic variables and their corresponding term sets, functions of membership of fuzzy terms, and fuzzy knowledge bases).

Our study has several limitations, the first (and most important) of which was the analysis of only one product produced by one country. Despite this limitation, we believe that the results achieved allowed us to obtain a true picture of the situation of the product analysed, thus contributing to academic debates of the comprehensive evaluation of product competitiveness.

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Ocena konkurenčnosti izdelkov: analiza primera

Ozadje in namen: Obstoječi okviri zagotavljajo le površinski pristop k vrednotenju konkurenčnosti izdelkov, ki upošteva povezavo med stopnjo konkurenčnosti izdelkov in kvantitativnimi ter kvalitativnimi dejavniki, ki imajo največji vpliv na to. Ker je namen tega članka izdelati model za ocenjevanje konkurenčnosti pakiranega sončničnega olja, ob upoštevanju tako kvantitativnih kot kvalitativnih dejavnikov, ki vplivajo na konkurenčnost. Razviti model smo uporabili tudi za preučevanje najbolj zahtevnih ukrajinskih blagovnih znamk sončničnega olja, da bi ugotovili možnosti za povečanje konkurenčnosti.

Zasnova / metodologija / pristop: Metodologija raziskave vključuje elemente teoretičnih, empiričnih, kvalitativnih in kvantitativnih analiz. Namen teoretične analize je osvetliti različno razumevanje »vrednotenja konkurenčnosti« ter pristopov in orodij za njegovo analizo. Empirična analiza se osredotoča na opazovanje uradnih statističnih podatkov o izvozu sončničnega olja in prihodnjih trendov. Kvalitativna analiza je sestavljena iz identifikacije, sistematizacije in opisa dejavnikov, ki vplivajo na konkurenčnost pakiranega sončničnega olja. Kvantitativna analiza pa temelji na uporabi orodja mehke logike za oceno vpliva kompleksnih in delnih dejavnikov na raven konkurenčnosti izdelkov.

Rezultati: V prispevku je predstavljen poslovni primer ocenjevanja konkurenčnosti posamezne blagovne znamke sončničnega olja. Na podlagi uporabe orodja mehke logike smo analizirali vpliv kompleksnih in delnih dejavnikov na raven konkurenčnosti. Kot rezultat je bila predstavljena simulacija konkurenčne občutljivosti posamezne oljne blagovne znamke na relevantne kompleksne dejavnike, ki določajo njeno konkurenčnost. Ta poslovni primer lahko pomaga upravljavcem usmeriti svoja prizadevanja in sredstva v pravo smer, da bi povečali konkurenčnost izdelkov in pozicioniranje izdelkov na trgu.

Zaključek: Rezultati teh raziskav bi bili koristni za strokovnjake pri ocenjevanju konkurenčnosti izdelkov, modeliranju prihodnjih ravni in razumevanju skritih možnosti za povečanje konkurenčnosti izdelkov. Ponujeni okvir bi se lahko uporabljal tudi za druge vrste izdelkov.

Ključne besede: *konkurenčnost izdelkov, splošni in delni dejavniki, mehka logika*

Reinventing Organizations: Model of Self-Organized Process Organization (SOPO)

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Background and Purpose: Self-organization in teams and Business Process Orientation have been subjects of many separate researches, yet there is lack of research actually joining it within a common research. The purpose of our research is to define a research model for new type of service organization - called SOPO (Self-Organised Process Organization). This model sets research base to determine SOPO's maturity level and a self-assessment tool, helping new emergence or transitions of existing organization toward SOPO.

Methodology: We conducted a case researches in three ICT service companies, which were undergoing a transition process towards SOPO. We conducted several in-depth, un-structured and structured part of interviews with employees holding three different positions in each organization. Hereby we present the researched organisation with most explicit case.

Results: We defined the key elements of the model and tested it in a case research. Key elements are Self-Organised Work Teams (SOWT) and Business Process Orientation (BPO). Both SOWT and BPO are positively affecting level of SOPO. Level of SOPO is positively related to both, enthusiasm of personnel to work in self-organised environment and perceived Quality of Service (QS).

Conclusion: SOPO model can be used: (1) in existing companies as a blueprint for SOPO implementation, (2) to assess the maturity level of companies reinventing their organizational structure, and (3) helping SOPO organizations to structure changes toward higher service quality. SOPO model is a viable starting point in further research. Further verification of the SOPO model by a quantitative research is needed.

Keywords: self-organization, business process orientation, service quality, SOPO, reinventing organizations

1 Introduction

Nowadays, an increasing number of organizations are trying to organise their hierarchical management structure towards more horizontal one, as an answer to employees' requests for a more flexible and cooperative working environment, allowing for work to be done more effectively and with better care. In the last decades, the most commonly used practice has been that of teams or work groups (Yang & Guy, 2010). Even the most recent work teams innovations are "team-buildings" and self-management.

In the age of globalisation, organizations are facing a competitive market and an increasingly more demanding customer base. The need for shorter response and production times, coupled with the demands of their own employees, push towards new approaches and tools. E-business is often forcing out classical "business as usual" practices, making prices and availability more transparent – as a result, customers are getting less loyal to brands. Usual consumer behaviours, popular in the last decades, are van-

ishing rapidly. Organizations tend reply to the challenges of changed consumer behaviour, by being faster, more adaptable, more cooperative, custom-oriented and they manage time and processes (McCormack, 2001). "Teams will become the primary unit of performance in high-performance organizations and indeed, working in teams has become more frequent in a variety of sectors and settings" (Ruch et. all, 2018, p. 3).

The purpose of our research was to thoroughly and extensively study the areas of self-organization, the integration of the individuals into teams and the methods of managing groups, teams and organizations and the field of process organizations and IT process management. We were searching for cultural and other socio-technological characteristics of ICT companies to define organizational model that could more fully meet the today's needs of key stakeholders, among which a special emphasis is placed on employees. In our research, we were looking for answers to the following research questions:

(1) Is it possible to create effective, prosperous and sustainable business organizations using new self-organization approaches?

(2) Is organization based on self-organized teams more effective business model for all stakeholders?

(3) Are there any interests to co-create new and more creative working environments,

(4) How to apply process models and how to combine it with self-organization and intuition?

(5) What sociological and cultural factors should be taken into account?

(6) What obstacles and reservations can we expect in the emergence of new forms of organization?

Our research does not aim toward replication and was not designed to do so. We used qualitative method case study research to gain a deeper understanding of the emergence of a new type of organization and its underlying causality. We designed theoretical model and verified its use in our case research. We gained insights in several phenomena, that can help us understand the underlying forces driving organizations toward new forms of organization, which make the satisfaction of the true needs of their key stakeholders.

2　Theoretical framework

Self-organization in work environment (toward self-organised work teams - SOWT)

Yang & Guy (2010) are defining self-managed work teams (SMWT) as relatively independent work teams whose members share responsibilities and leadership activities to perform independent tasks. The basic characteristics of SMWT can be described as: (1) independent tasks (Kirkman and Shapiro, 1997), (2) independent decision making (Wellins, 1992; Magpili & Pazos, 2017), (3) shar-

ing common responsibilities (Wall et al., 1986), and (4) shared leadership (Hackman 2002; Nahavandi and Malekzadeh 1999).

In theory, there are two main reasons that make SMWT so successful (Ziek and Smulowitz, 2014): (1) self-management allows a higher levels of autonomy within the decision making process, organising, control, employees involvement and monitoring, and (2) team work: team spirit accelerates cooperation and at the same time, sense for shared responsibility allows efficiency to be measured at a team level, rather than on a personal one; leaders are thereby seen more as a moderators or facilitators, rather than classical supervisors. Various team members may emerge as leaders in self-organized, as well as virtual teams.

Various researches experimented with different models to best define organizational effectiveness, but we can essentially divide them into three areas: (1) stakeholder's satisfaction, with focus on employees, (2) goal attainment, in relation to the organization's processes, and (3) system resources (adopted from Yang and Guy, 2010).

Stakeholder satisfaction

With this approach we try to define the extent to which the organizations are able to satisfy their stakeholder needs. We can see the organization as a contact point of many similar or different interests of various individuals - stakeholders. Among them, the key roles are taken by the employees. The similarity of purpose and interest between an individual and organization is what makes an organization to move towards a shared set of goals more smoothly, compared with the ones dealing with many opposing needs. When the stakeholders needs are similar to the organizational ones, the organization can meet them much more efficiently and in the circular way contributes to diminish the number of conflicts, increasing job satisfaction at the same time (Cohen et al., 1997; Yang and Guy, 2010). The key element of every organization are the individuals who carry different needs, desires, feelings and who implement different strategies, to reach goals and satisfy their needs. If the organizations' purpose, goals and strategies are aligned with the individual ones (on the level of true needs and not artificially created ones), synergies can emerge on a different level of consciousness (Laloux, 2014).

Goal attainment

Another way to define team performance is its ability to achieve defined set of goals. Several empiric researches have confirmed the following correlation: the level of SMWT usage positively relates to the organization's efficiency (Yang and Guy, 2010. Cohen et al., 1997). We can define team performance as "acceptability of output to customers within or outside the organization who receive team products, services, information, decisions, or performance events (such as presentations or competitions)." (Yang and Guy, 2010). In terms of goal attainment, empirical findings usually show a positive effect for self-managed work teams. There are researches showing, that level of goal achievement is mainly accomplished through

self-management, which provides a highly efficient employment of human resources and, therefore, it positively affects job satisfaction as well (Cohen et al., 1997).

System resources

This approach predicts that the scarcity of resources in the environment and their balance, can affect the organization's ability to gather or utilise such resources toward achievement of a greater bargaining position. In the business environment, a good bargaining position can be translated into a competitive advantage, therefore the efficiency and systemic approach toward gathering appropriate resources, may results in greater organizational effectiveness (Yuchtman in Seashore 1967).

In their research Yang in Guy (2010) test all three approaches mentioned above on the following assumptions: (1) a greater level of (a) self-management and (b) teamwork, is positively associated with perceived employee job satisfaction, (2) estimated higher level of (a) self-management and (b) teamwork, will is positively associated to SMWT performance, (3) the level of self-management is positively associated to the perceived team performance, and (4) SMWT members' perceived resource attainment is positively associated with their perceived job satisfaction. They created a questionnaire with three sections and administered it to 56 public institutions in the US. They discovered a significant and positive correlation between the level of teamwork and job satisfaction, but correlation between self-management and job satisfaction was not significant. Nonetheless, they explained it as an indirect correlation between self-management and job satisfaction over resource attainment. In relation of teamwork toward SMWT performance, they also proved a strong positive correlation. However, comparing self-management and SMWT performance they found no significant relation. It could be explained through socio-technical systems theory, as it postulates that autonomy can improve efficiency if some preliminary criteria are met. In addition, a positive relation was discovered between self-management and team performance as well as resource attainment is positively correlated with perceived job satisfaction. They conclude that the quality of teamwork or team's spirit, also known as "esprit de corps", within the US public service sector is a much more influential factor in team effectiveness than self-management itself. Hand in hand, teamwork and self-management may be working as a well-oiled machine towards a more effective organization.

Additional research influencing our SOPO model was done by Spreitzer et al. (1999). In their research they view SMWT from two different perspectives: (1) relation of different dimensions of SMWT performance and (2) key SMWT success factors in service sector. Authors define

SMWT as "teams of interdependent individuals that can self-regulate their behaviour on relatively whole tasks". Organizations use SMWT to replace whole hierarchical organizational structures by employing SMWT, to respond to the current market situation. Self-leadership is the approach that is improving team performance and innovativeness. (Eseryel, 2014). More than 52% of organizations within the Fortune 1000 service sector list in year 1993, already used SMWT. They imply that SMWT usage improves customer satisfaction by increasing service quality and rates of customer loyalty. From the perspective of employees, SMWT positively affects job satisfaction, employees' loyalty and raises incomes. Key success factors of SMWT are defined as: (1) team design, (2) team characteristics, (3) team leadership, and (4) supportive work environment for individuals. The research followed those assumptions was conducted in two service organizations with extensive SMWT usage. They have conducted two researches, involving 14 SMWT with 94 individuals in first research and 50 individuals in second research. Although the samples were not very big, they were not able to confirm any strong relation between the categories, except for customer satisfaction and productivity, which were found to be marginally related. One of the possible reasons for such findings could be that "although employee quality of work life, customer satisfaction, and team productivity did not work against each other, the dimensions didn't necessarily reinforce or support one another" (Spreitzer et al., 1999).

There seems to be several differences between a Self-Managed, Self-Directed and Self-Organised Teams. We define it as: (1) a Self-Managed Team is "a group of people working together in their own ways, toward a common goal, which is defined outside the team", (2) a Self-Directed Team as "a group of people working together in their own ways, toward a common goal, which the team defines", (3) a Self-Organised Team is "a group of motivated individuals, who decided to work together and have the ability and authority to make decisions toward a common goal, which the team defines".

*Business process orientations - **BPO*** (toward key chaos fixing SOPO ingredient)

BPO was first introduced by Michael Porter (1990) nearly three decades ago, with the use of chain value and interoperability as key challenges toward creating organizational added values. W. Edwards Deming (McCormack, 2001) continued with the idea of process management and designed, by now, well known flow diagram, directing business flow from supplier's side directly to customers, and defined them as process that can be measured and managed. Later on, researchers investigated different ap-

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1 Some companies have an 'employee first' policy, with a basic premise that contented or happy employees perform better. South West Airlines is a well-known example. In such companies, serious demands are made on employees and strict selection procedures are in place, and teams are responsible for performance. It is far from a free-floating culture.

proaches to business process. One of them was Michael Hammer (1990, 1996) who set one of the milestones in organizational reengineering in business process organizations. Process orientation or the process method of management can be defined as assigning each manager in-charge of a whole set of activities that produce a valuable product or service for current or future customers. It is also considered as the horizontal method of management based on end-to-end processes, and contrasts with the traditional hierarchical approach (Hammer, 1996; Khosravi, 2016). Hammer (1990) defined process as cross-functional and out of organization aimed operation. To establish process way of thinking within organization, he defined four views: (1) business processes, (2) work places and structure, (3) management and measurement systems, and (4) values and believes. Despite all these base references for business process orientations (BPO), and wide usage in practice, it was not easy to clearly define BPO. Jasper (2014), sees BPO as a firm decision to use Business Process Management (BPM) in the structure. According to Palmer (2010) the definition of BPM, two different movements are identified: (1) focusing on the management and improvement of single processes is "A structured systematic approach to analyse and continually improve the process" (Palmberg, 2010, p. 95) and (2) more holistic view on BPM with the view on whole organization can be defined as "A more holistic manner to manage all aspects of the business and as a valuable perspective to adopt in determining organizational effectiveness" (Palmberg, 2010, p.95). Strong base of BPM related researches and excessive use of BPM in practice, were a good starting point for McCormack (2001), to define various variables and connect them into meaningful groups. He completed the BPM model by allowing organizations to measure BPO level. BPO model is divided into three groups (McCormack, 2001): (1) process management and measurements: including measurements as output quality, production time, process cost and variability, etc, (2) process workplaces: for example, role of process owner replacing role of development manager, (3) process view: complete and clear documentation to be understood from bottom to up and from beginning to end. As a tool McCormack (2001) designed a set of questions, to use with factor analysis. His final questionnaire is consisted by 11 questions, which fall under the three above mentioned categories. The model verification and questionnaire was administered in over 100 international companies. In the research BPO was also compared against four different indicators: (1) overall business performance, (2) inter-functional conflict, (3) inter-functional connectedness and (4) team spirit or "esprit de corps". The basic proposition was that BPO improves overall business performance, helps reducing inter-functional conflict and improves inter-functional connectedness and "esprit de corps" (McCormack, 2001). Research results confirmed a strong and positive correlation between BPO and the overall business performance (Bronzo et al., 2013, McCormack, 2001), "esprit

de corps", better inter-functional connectedness and lower inter-functional conflict levels. BPO also showed strong relations to organizational variables. On the other hand, process view did not show significant correlation to other variables. The facts were explained, as most likely to be the result of improper, or lack of proper documentations. The Effects of Process Orientation on Customer Satisfaction research in an empirical study done by Kohlbacher (2009), BPO positively relates to customer satisfaction, product quality, delivery speed, and time-to-market speed. The results of a research among 127 Croatian companies (Glavan and Vukšič, 2017), suggests, that BPO practice is positively related to nonfinancial performance and that there is an impact of non-financial performance on financial performance. This effect on financial performance is indirectly caused by non-financial factors, suggesting that companies should view performance in both, financial and non-financial ways. Cleven et al. (2016), in their research suggests, that process orientation significantly contributes to organization's overall productivity and improvement of its service quality.

Self-Organization

We could define self-organization as "a spontaneous process where some form of global order or coordination, arises out of the local interactions between the components of an initially disordered or not naturally organised system" (Serugendo et al., 2005:168). Normally the process it is not directed or controlled by anyone from inside or outside of the system, but the start of the process may be controlled or initiated. The resulting organization is wholly decentralised or distributed over all the elements of the system. As such it is typically very robust and able to survive and self-repair substantial damage or infections. Self-organization occurs in a variety of physical, chemical, biological, social and cognitive systems. Self-organization is also relevant in chemistry, where it has often been taken as being synonymous with self-assembly (Camazine et. al., 2003).

Since the dawn of civilization, humans have always employed self-organization: our cities, villages and most of counties begun as self-organized structures. Yet, somewhere along the way, we lost the sense of our true needs and have gained the ability to control and direct Mother nature. And if we don't correct those mistakes in the very near future it may well cost us our existence on this planet (Laloux, 2014).

3 Research model

We based our research on the assumption that some organizations are reinventing their work structure, based on values stemming from two approaches: (1) self-organization principles: to unleash unlimited creative and innovative possibilities in each individual merging with true global and meaningful purpose of organization, and (2) business process orientation approach: to enable structured

and dynamic flow among members, supporting higher service quality and service value.

Although there are many researches that fall within those categories, there seems to be a lack of scientific research covering both aspects. In an attempt to present a more holistic approach, the present research builds on some of the aforementioned researches and other relevant theoretical material to create a model that could define and measure the organizational levels of what we called Self-Organised Process Organizations - SOPO.

At this stage, the scope of the research was limited to service sector organizations. We defined four main categories from our research questions: (1) maturity level of SOWT - Self-Organised Work Teams (xSOWT), (2) maturity level of BPO - Business Process Orientation (xBPO), joined into (3) maturity level Self-Organised Process Organizations (xSOPO) - SOPO, affecting (4) SQ - Service Quality and being in mutual relation (xWA&JS) with (5) levels of employee Affection to work in SOPO & perceived job satisfaction. We identified the following categories based on several existing models: (1) Yang and Guy, (2010), (2) McCormack, (2001) and (3) Cohen et.al., (1997). In our model the levels of all categories are affecting the next level (S1-3 affecting the level of SOWT, P1-4 affecting the level of BPO, and C1-2 affecting SQ). The categories and key indicators are shown in Figure 1.

SOWT - Self-Organised Work Teams at various maturity levels use different teamwork and self-organization or self-management elements. Different approaches and intensity of SOWT implementation can be used in organizations business models. We have identified 3 key categories defining SOWT: (1) Self- Organization, (2) Workgroup team spirit or „esprit de corps ", and (3) Team leadership style.

Self-Organization variable defines the level of self-organization. Workgroup team spirit or „esprit de corps" can also be described as level of teamwork. It describes connection between individual needs entering team work and
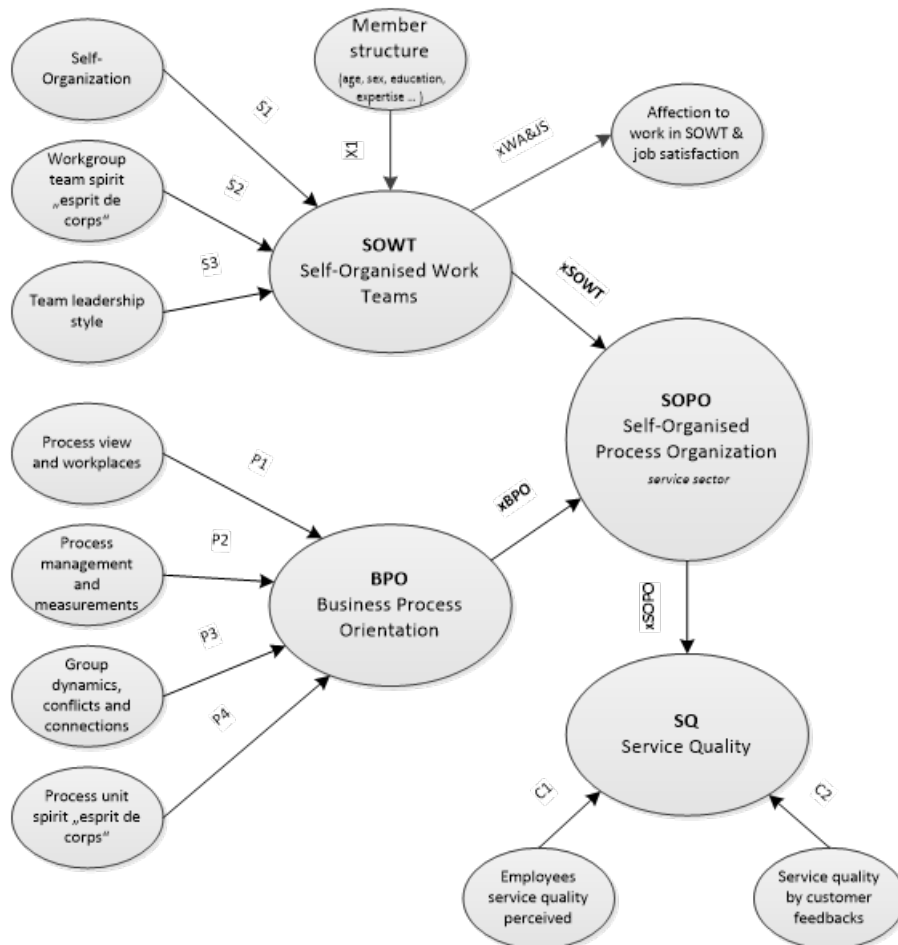

Figure 1: SOPO model of organization

how team can manage to satisfy individual needs in the path of efficiently following team's strategies, goals and tasks (Yang in Guy 2010, Campion et al., 1993; Kirkman in Shapiro, 2001). Team leadership style was added to the model as there can be many different leadership styles connected to different maturity levels of the SOWT. So far, the most advanced and appropriate leadership style for SOWT would be shared leadership (Cahill, 2011; Cashman, 2008; Cox et.al., 2003; Kantabutra in Suriyankietkaew, 2012). Team leadership alone is also a subject of many researches. Multifactor Leadership Questionnaire - MLQ - is one of the most commonly used methods of determining a leadership style, yet it was found to be too detailed to be put to use. A slightly more appropriate approach was offered by the Team Multifactor Leadership Questionnaire - TMLQ (Avolio et al., 2003. Avolio in Bass, 2004). Based on TMLQ model, we predicted that higher level of shared leadership will have positive effect on SOWT performance. Anyway, we concluded, that our main goal is to determine maturity level only, so such an extensive questioner may be overwhelming. The decision also based in (Cox et al., 2003. Pearce and Conger, 2003), stating, that the use of qualitative research methodology, may be more appropriate. By their opinion, classical quantitative questionnaires tend to present a more polarized, black and white results without being able to reveal the "grey" areas of group dynamics and leadership styles and fail to reveal the complexities of team processes. A separate categorization of leadership styles has also been forgone and incorporated under the SOWT level category. Member Structure is well-researched team category and due to its vastness, we believed the model would not be complete without it. At the same time, it is over extensive to be fully covered as just one part of the research, so we decided, to keep it in the model, yet not to touch it more in depth than necessary to cower the requested holism.

BPO - Business Process Orientation maturity levels are defined by the use of 4 key categories: (1) Process view and workplaces, (2) Process management and measurements, (3) Group dynamics, conflicts and connections, and (4) Process unit spirit „esprit de corps".

Process view and workplaces is an employee mostly indicator. We could have called the indicator employee process view, as it joins two different yet so similar categories into a new, more holistic one. Process management and measurements is an indicator entirely based on McCormack's (2001) survey questions. Group dynamics, conflicts and connections defines joint several originally separate categories. We found important to keep all statements and let us decide which one will describe it more accurately when we complete our research. Some statements are more or less just negative aspects of quite similar positive ones, so it is nevertheless a bit more difficult to combine them anyway. Ending up with so many statements under one indicator was a bit uncomfortable, although we believe, they belong in the same category. Anyway, we let

this option open, to find out if some of them may show less relevant, or even to disjoin the merged indicators if necessary after the research completed. Process unit spirit „esprit de corps" is similar indicator as in teams category, with a bit modified statements, as research subject here is process unit.

Affection to work in SOWT & job satisfaction is hereby joined by two sub categories, that on the first site might not belong together, although we believe they do. Anyway, to be on the safe side, we designed research separately for each sub-category still left it open checking it after the research.

SQ - Service Quality measurements are multilayer research activity. Most of today's service organization are more or less persistent trying to determine user perception of their service quality. Most commonly used are user surveys, but users are quite reluctant in giving real and valuable feedbacks with surveys.. Combined of employees perceived service quality and feedbacks from customers can be quite reliable and uses less resources to get results. So we combined both sub-categories, (A) Employees service quality perceived and (B) Employees service quality perceived into one set of statements based on SERVQUAL model (Parasuraman et al.,1988; Spreitzer et al., 1999). In detail, categories, questions and references of the whole SOPO model are presented in Table1.

4 Research approach

We used the SOPO model as a base in our case study research in an IT service oriented small enterprise organization. We conducted: (1) in-depth unstructured interviews and (2) structured interviews, based on a specific set of questions compiled by the aforementioned authors. Based on the employee's competencies, we selected a key competent person from one of the following categories: (1) key top management person, (2) key person experienced in leadership (leading a group, team or project), and (3) process group/working team/ project group key member. Interviews were conducted in May 2015. The basic structure was developed out of the SOPO model indicators and categories.

The base for interviews was designed very openly in an attempt to dive deeper and get to the core of the phenomenon

Table 1 : SOPO model categories, questions and references

Category / Question	Reference
SOWT - Self-Organised Work Teams	
SOWT: Self- Organization	
My team works independently	(Yang and Gay, 2004; Campion et al., 1993; Kirkman and Shapiro, 1997)
My team makes autonomous decisions	
My performance evaluation is related to my team's performance	
Top management in my organization trust my team	
SOWT: Workgroup team spirit or „esprit de corps	
My team members share responsibility	(Yang in Guy 2010, Campion et al., 1993; Kirkman in Shapiro, 2001)
Leadership in my team is shared among the members	
My teammates are helpful to me	
I am unhappy when my teammates perform poorly	
My team relies on consensus to get the work done	
SOWT: Team leadership style	
Self-criticism	(Manz and Sims 1997; Spreitzer et al., 1999)
Testing before implementing	
Rewards and encouragement	
High expectations	
Self-assessment	
Encouragement of intellectual activities	(Avolio et al., 2003. Avolio in Bass, 2004)
Passiveness/leadership avoidance.	
Inspirational leadership	
Conditional rewarding	
Individual approach	
BPO - Business Process Orientation	
BPO: Process view and workplaces	
View the business as series of linked processes	(McCormack, 2001)
Use of process terms in work conversation	
Processes defined to a level employees know how they work	
Multidimensional work and not just simple tasks	
Included problem solving	
Continuous learning process presence	
BPO: Process management and measurements	
Measuring process performance	(McCormack, 2001)
Defined process measurement	
Allocation of resources by process needs	
Process targets are defined	
Process outcomes are measured	
BPO: Group dynamics, conflicts and connections	

Table 1 : SOPO model categories, questions and references (continued)

Cooperation among departments	(McCormack, 2001)
Rising tension in presence of different department members	
General dislike to those from other departments	
Goals in different departments not aligned	
Protective inter-department behaviour	
Marketing objectives not being aligned with production (or services)	
Little or no inter-departmental conflict in business unit	
easy communication regardless of rank	
Presence of informal communication	
Comfortable calling different department member on an issue	
Formal communication channels thru ranks and positions exists	
Employees being accessible to those in other departments	
Routing communication between departments into proper channels, and	
Easy scheduling meeting in similar middle management ranks.	
BPO: <u>Process unit spirit „esprit de corps"</u>	
Genuine concern about the needs and problems of others	(McCormack, 2001)
Team spirit across all ranks,	
Fells like being in a family,	
People feel emotionally attached to each other,	
People feel like they are in it together,	
Process unit doesn't act connected,	
People view themselves as individualist's only tolerating other employees, because they have to	
Affection to work in SOWT & job satisfaction	
Affection to work in SOWT	
Readiness to accept responsibility and task merits	(Cohen et al., 1997; Yang and Guy, 2004)
Relation of personal performance to team performance	
Self-directed behaviour and equivalent communication	
Authority to act independently; we added additional shared leadership element)	(Cashman, 2008, Cohen et al., 1997)
Shared leadership vs. classical team management; and from knowledge management one addition	(Kim, 2000; Alberts, 2007):
Ability to assure or gather needed knowledge to successfully accomplish taken tasks	
Job satisfaction	
Valued work	Yang and Guy, (2010):
Interesting job	
Job gives sense of accomplishment	
Fair payment	
Good chance for promotion	
Meaningful job	
Challenging work	
Satisfying job	
SQ - Service Quality	

Table 1 : SOPO model categories, questions and references (continued)

Modern and up-to date equipment,	(Parasuraman et al.,1988; Spreitzer et al., 1999):
Visually attractive business place	
Appropriately dressed personnel	
Appropriate business space	
Keep deadline promises	
In case of problems employees are come and understanding	
Are reliable	
They deliver service as promised	
Transparent business books	
They believe customer does not need to know exact time of service delivery	
Not real to deliver service by customer request	
Not possible to deliver service right now	
Being busy they can reply to customer at their convenience	
Customers can trust employees of this organization	
Customers feel save to do business with this organization	
Employees are polite	
Relevant support to employees delivering service on high quality to customer	
Inability of whole organization to pay attention to each customer individually	
Inability of each employee to pay attention to each customer individually	
Not real for employees to know the needs of all customers,	
Not real that organization can always act in customer best interest	
Not possible to adjust working hours in such a manner to please all customers	

researched. Unstructured interviews (where interviewees might not be familiar with the theoretical background of the conducted research) is essential to delve deep into the underlying causes as well as the circumstances of the phenomena. The basic interview thread was divided into two main streams, investigating two different levels: (A) on a team and individual level and (B) on the organizational level. We researched the following areas: (1) operation and changes, (2) form and style of management, (3) organization and processes, (4) methods and forms of communication, (4) design methodologies and knowledge transfer, (5) satisfaction and preference for different forms of work, (6) integration and conflict between members of the team and between teams within the organization, and (7) related questions and sub-questions. We occasionally allowed ourselves to go beyond research area to provide better understanding and assure required holism.

4.1 Case research data in ICT service company

Top manager

The interviewee is a CEO (therefore, one of two key leaders, responsible for issues concerning organization, finances, management and operations). The company positioned itself as a strategically driven, into future and customer-oriented company, having clear objectives. Its main range of services is sufficiently narrowed and specialized, although many customers in a wide field of ICT service areas may find it useful. They have a numerically smaller set of clients - typically larger companies. The company that has no fixed organizational structure and is somehow divided into two sections based on two types of ICT technologies they use. Mostly, they organise their work aligned with projects and they always work with key focus to fulfilling the customer needs. The "official project manager" is usually one of two top leaders of the company, but the "real" project management work is usually delegated to the technical project leader, chosen among a pool of employees (almost all employees are in the pool). The size of the team is entirely dependent on the individual case, and may include

external partners. Employees are very familiar with the "informal" organizational processes. This knowledge of internal processes, work amazingly and shows great result in completed projects or process for clients. Within the organization there are only few formal processes set out, and the smallness of the company represents an advantage in dealing with all the informal processes. However, this does not mean that they are not process oriented.

Dynamic functions of the jobs require a lot of adjustments, as required by the dynamic work and tasks. Within a team the communication flows very openly: people like to contribute with new ideas which are welcomed and accepted. Errors, although not encouraged, are resolved in the (informal) processes of monitoring and correcting. Such approach is greatly accelerating time to correct errors and provide valuable knowledge by "lessons learned", shared within team and whole organization. Errors are regarded as learning opportunities and at the same time there are much less chances to be replicated. They have somehow specific, personal, strait forward and very correct attitude towards their clients, who can thereby always know what to expect from them. Quite often even the mistakes (errors) are communicated with the customer, spreading the »lessons learned" knowledge beyond borders of organization. Without their unique working methods (based on a type of self-organization), they would certainly not be able to reach the volume of successfully completed ICT services they currently accomplish, let alone the quality they offer. As a provider of highly specialized services, primarily targeting limited number of larger companies, they create a special "organic" relationship with customers, based on trust and cooperation. "Our internal self-organization and flexibility are gratefully accepted by our customers. Those aspects give them (the customers) an insight into our work and they can influence the process of service creation step by step ", pointed out the CEO. The company has five owners, of which four are employed by the company. Possible barriers in agency relationship were already settled by clear communication and clearly separating ownership roles, rights and privileges, from the roles of employees.

Project/process manager

As most of the employees in the company are holding a leadership role, it was not simple to choose the most competent ones. We discovered that most of the development work in the company is project-based, and most of the operational tasks are process-oriented. Assigning the project members and deciding on their particular roles in the project is not difficult. There is a limited number of employees in each of two technical areas that are incompatible and work load is also quite transparent. Most of the decisions are based on the person's availability and their load capacity. The formal "leader" is almost always one of two top managers, and the role of the actual "technical lead" resembles that of a project coordinator or project manager. The person selected has usually performed similar task in the past, but less experienced may »step-in" for less

complex projects. In this manner, a leadership experience can be obtained by a wider range of employees keen on taking leadership roles. Their formal roles notwithstanding, all the team members have their own specific tasks to perform and report to any stakeholder concerned. The technical "lead" is usually the person responsible for the technical development of the products or services. Mistakes and successes in accomplishing the established tasks are transparently communicated and the team follows the 'spirit' of professionalism with informal conversations, although communication in times of crisis remains subdued and correct. Inter-departmental conflicts are kept to a minimum. Awareness of personal responsibility is very high and contributes to lowering error rates. Proper communication with the customers was identified as a weak point in the past, therefore additional training has been provided. "I believe the unique team spirit we create in each of our projects and design is somehow "infecting" our customers and it invites them to contribute to the co-creation of final solution. I strongly believe that our way of doing things contributes to the quality of our services. In addition, our specific service is really designed and delivered in accordance to the customer's real needs, rather than by their initial request."

Employees are encouraged to acquire additional knowledge at their own discretion, mostly on-line, but formal courses are also available, although less popular. Knowledge sharing within the company is excellent. The method of work and (self-)organization influence the quality of the service provided, and the company is constantly striving to maintain a high quality level. The employees have a lot of ideas and promote innovation, but often the lack of time prevents their implementation and development.

Technical expert

Selecting a "technical person" without any leadership experience who could provide the required insight and knowledge was almost impossible, so we selected a key person having few leadership tasks to perform. He explained that creating "ad-hoc" teams and team management in this company is a dynamic task. The company sets up and modifies the project organically and in communication with the client), where and when it is need. They can change or modify the project's team structure even within an ongoing project by changing its members or even changing the leader without disrupting the project which usually remains on track or can even get improved. "It really relaxes me to work in such flexible teams. And I always know I can trust anyone, even when the deadlines are tight or when something goes wrong", stated one of the interviewees. Teams are therefore dynamic structures as well as their functions and processes. Working in teams is relaxed, but usually less professional and more fun. By the opinion of this person, the team's results were attributable to the knowledge and experience of its member, rather than to the form of (self-)organization. Major projects are

usually quite challenging, but smaller ones are more routine and less attractive. Due to the somehow changeable role of the leaders, performing the tasks can sometimes get unclear, which do not necessarily contribute to a quick problem resolution. The interviewed person sees solutions toward greater clarity of tasks in more formalized process for task management. Communication (within the teams as well as external) is accurate and professional, he believes. Knowledge upgrade and further education is encouraged and desirable, but mostly their own responsibility. The work is extremely targeted. Internal processes are mainly informal, but there are some results which are measured. According to the interviewee, the processes which take place within companies, don't have significant impact on the quality of service, or at least not as much as expertise, experience, commitment and dedication to the goal does. He sees that the main purpose of organization lies within larger, more technically demanding projects, where employees can really prove their value as experts.

4.2 Case study research results in ICT service company

Results from unstructured part of interview

ICT service company from the case study research is a small business enterprise with 14 employees and approx. EUR 0.7 million in annual turnover. The company was established 10 years ago. By watching them in work process, one can easily spot a lot of power and speed in handling difficult tasks. It is a company where the ownership is largely in the hands of five individuals, four of which are also employed by the company.

The owners are clearly aware and show clear interest in growth, development and the existence of the company. Owners are also aware, that in the long run company existence and success is considerable depending on innovation ability and empowering employees. It seems, they are aware of the Agency theory trap: conflict of interest between greater personal benefits as employees (increasing company's labour costs), and increase of profits from the owners perspective. Despite this duality, we didn't observe any conflicts related.

The highest level of management is divided between two of the owners, one responsible for the sales and marketing department, while the other handles the technical, operational and financial side of the operations. Although we refer to them as top managers, this is purely because of the absence of a more appropriate term. One imagining classical top manager stereotype, a person sitting in a glass corner office, not connected to everyday work, might get a wrong idea in this case. Watching the "managers" in our case study, shows that they are just a person, among equals, performing their tasks and process roles.

Most of the work is arranged into projects and carried out by team members that are usually different persons. The

company has very smartly introduced the role of "technical project lead", who actually overlook and manage all of the tasks from technical perspective. This approach usually works great on majority of the projects. Coordination with customers and other significant communication activities are mostly done by the formal project manager. The project lead (technical), the formal project manager and the team members are very flexible and can easily take or switch between different roles or tasks. The distribution of the tasks and the delegation of responsibilities are, to some extent, already quite divided between team members. The exceptions are the technical tasks, which require certain specific skills. Otherwise, we could easily argue, that the team creation process is very creative and collaborative. By our estimation, the largest part of the work in teams is self-organized. Despite the minimal formal structure of the organization, a large organizational "chaos" between people can be felt on every step. At the same time closer look shows, that there are so many underlying organic processes going on, not being formalised in any documentation. Employees of the company are familiar with the business processes, as a large part of their activity consists of providing their customers business-oriented ICT solutions and services, largely based on processes management. Many of the provided services or solutions include automation of business and/or administrative processes. Being in touch with their own processes, they can also deliver highest quality of customer service. During the IEEE certification process, the company got very good reviews on management effectiveness, project implementation of projects and business processes ("Project and Process Efficiency" - PPE). The company does not have many internal formal processes, although they show high levels of process orientation. Informal processes are subject to continuous and organic changes. Processes in observed organization are quite different from the ones in ITIL recommendations (Pereira and De Silva, 2011). We could summarise that there is a certain set of informal processes and they work very well. The CEO explained that »PPE, as the Business Process Orientation framework serve us better than ITIL would, and we tried ITIL first. Being structurally flat and dynamic we would not achieve such performance, as we can be holding to BPO. At the same time, not being so self-organised and co-operating in a relaxed way with customers, our services would not reach the current quality and could not match the customers' expectations."

From the interview data we extracted the following key success factors: (1) the choice of selecting the members of the team, (2) identifying and executing tasks, as well as (3) the entire implementation process, from the first idea to the final realization. All processes are designed in a "natural" way, to satisfy the customer, even if the entire project team changes during its implementation.

Most of the employees of the company favour self-organization, with the exception of one person that came across as slightly more sceptical than the others. It is only log-

ical to assume that a person who prefers to perform routine work and clearly defined tasks would have such an attitude. While the majority of the employees wants more creative work and accept the responsibility that this form of work brings. However, there will always be some individuals who prefer to work in more structured working environments. Normally, the various processes also feature tasks that require less innovation and accountability and these individuals are invaluable for such tasks. Self-organized forms of work seem like the norm in this company, although no one is specifically tasked with designing it. We have easily concluded, that affection toward Self-organized forms of work is perceived very positively. Less encouraging is the atmosphere, which is very professional, yet little less relaxed.

The company, which is the subject of our case study research, is committed to providing a high quality service, a goal reached not only in theory, but also in practice. Covering a relatively technically demanding niche and a small set of clients does not allow much space for a large number of errors and the consequent poor quality service. However, customers still expect innovative solutions. "To be able to fill the gap in the knowledge of a person necessary for the successful delivery on forthcoming projects or development, there is always either exchange of knowledge within a company, or if needed in any kind of formal or informal courses available," says the CEO. Designing and delivering their ICT services requires knowledge on processes and process orientation. The company is therefore engaged to verification of reliability, process readiness and achieved of high results. We can easily say that the business process orientation contribute to the quality of service. What about self-organization? When we compare the operational performance and the effectiveness, of the case-study company, with other similar-sized enterprises, we can see them performing significantly better. Also, the estimated degree of self-organization is noticeably higher. Nonetheless, it is difficult to claim if the relation behind it is related to a more diversified ownership. In any case, the spirit of co-creation is deeply rooted in culture of this company, as in any other we have seen in other researches. The degree of self-organization, by our judgement, is in general quite high, regardless of the doubt expressed by the technical person. The company has at least some partial form of shared leadership and medium to high level of self-organization. There are clear signs, that self-organization is positively influencing quality of services in this case study research. As the "technical lead" person says: "the way we self-organise and design the informal processes accordingly, give us great flexibility. Maintaining a good and relaxed working environment is enabling us to keep high quality in the optimal way. We put a lot of trust in our common commitment and shared responsibility, so sometimes we can take time to grab a coffee or tell some jokes, even when we are trying to catch some punishing deadlines or fix some deeply rooted errors. Sharing manage-

ment and tasks, without a formal leader, is usually helping us accomplish things, that might have looked impossible at first."

Results from structured part of interview

In the structured part of interviews, indicators of self-organization, on average all, with the exception of two, are estimated very high. Much lower estimations were identified in: (1) working independently of the control, and (2) use of consensus decision-making in the team. Our interpretation is, that the level of SOWT in this company is quite high, but some elements of self-organization of the company are not used, or used only to a very limited extent, which reduces the total results.

An average grade level of process orientation was lover by low assessment, provided by one individual, which could be explained by the fact, that he might not know the company and its processes that well. High probability, that estimated values by two other individuals are more accurate, could be underpinned by the fact, that both gave quite similar arguments and similar individual answers. Communication and diversity indicator is also quite dominated here; even allocation of resources and good cooperation between divisions were also estimated as high valued. Measurement of processes and processing language are given a lower grade. We would state, that the company is fairly well process oriented, although the results are not so high, mainly due to lower assessment given by one of the employees.

The company's preference to work in a self-regulated environment is very strong. Highest rated statements are related to the possibility of honest communication, as well as a desire for greater accountability, and lower grades were given to work where the tasks are less precisely defined. Despite a very high overall assessment we can conclude that, within this company, the preference to work on SOWT principles is very high. The service quality assessment in the researched company is also quite high. Two individuals assessed the quality as very high, but one of the respondents decided to assign it a much lower value. As this person also assessed other areas with slightly lower scores, the overall perception of quality (and all other areas) was also lowered. The lowest rates were estimated for the category Time and due dates of service delivery; all the others were rated quite high. Generally, we can highlight: (1) the willingness of employees to pay attention to each individual customer, (2) the value of costumers' trust, (3) appropriate equipment and suitable premises. It was quite obvious from the results that the company has had a long-term orientation and builds special, organic relationship with each client. This is a very effective approach, because the company operates in a fairly specific niche market, where the number of potential customers in relatively geographically limited. Fair overall assessment would be, that the company provides a fairly high quality of ICT services.

5 Discussion

SOWT

Self-organized working teams are an essential element in new forms of organizations, both, within emergence of newly established organizations, as well as within those, who undergo a process of transitioning. The concept of self-organization of teams is not new, since SOWT had many different names and has been used quite extensively within the organizations in the past decades, even though self-organization has mainly been utilised on a team level. The forms and the frequency of use are increasing and in the same time, SOWT has been given new dimensions, going beyond the boundaries of self-organised teams into a truly self-organised organization with the organic growth.

BPO

Not to fall in the traps of self-organization becoming disorganization and chaos, organizations can balance it with somehow structured self-driven processes, to enable dynamic environment and rapid changes to occur. It is also important not to lose focus which could lead to a systemic collapse. Suddenly, we realised that business orientation approach becomes very useful even in self-organized teams and organizations. Comparing some of the processes toward good practices like ITIL lead to a conclusion that most of the processes in our researched case were significantly different. Overall we identified smaller amount of formal processes and many more informal ones. We didn't do a thorough analysis, but it was evident, that most of the "classical" controlling and budgeting processes were entirely absent. What remained was pure and so natural, that we called them 'organic processes' as they rise and fall based on the organizational needs and mostly not as a result of mindful awareness, but based on intuition and trust. Surprisingly, well-functioning processes enable great performance and high quality services, yet no one even calls them processes. They just follow their instinct to do things organically. One of the key findings of our research was the existence of not typical business processes. Such "natural" or "organic« processes are enabling creation of environment, that foster personal growth and allow people to communicate their needs freely. It is based on win-win strategy and is eliminated potential for many conflicts. We also identified one other key processes and this is true empowerment. It means every individual is enabled by having the power to decide on every subject coming his way. Process was still under development and under some limits, but already made enormous positive effect on employees.

SOPO

One of the key findings of the research was, that top management and ownership structure were supporting transformation into SOPO. In our research this was one of the key prepositions allowing SOPO to emerge. The second key factor was the support and dedication of the top man-agement to the company and its employees. One additional key elements of SOPO is the presence of a true and meaningful global purpose based on true needs and not artificially created ones. True purpose pushes and organization to become a "learning organization" that can anticipate and embrace changes at any time (Senge, 2014). A true meaningful, purpose should be based on the following elements: (1) true purpose; within the meaning of "because of our doing, world is a better place", (2) no artificially (marketing) created needs, but connected and satisfying to a real human needs, (3) being sustainable, takes into account organic growth and is based solely on the use of renewable energy resources, (4) is not an end in itself, because it meets the needs of individuals and groups (stakeholders) outside the boundaries of the organization, (5) understands his organic conception (launch, operation and end) and do not claim to self-preserve at any cost, (6) is well balanced, and (7) respects the natural diversity and the diversity of the individual in the environment.

When we first designed the research, there were no scientific evidence of the existence of SOPO. In the last few years, some reliable information is emerging about the SOPO's or similar approaches, organisation tend to use (Laloux, 2014). We guess, that most of the SOPO's are not being researched, as they do not market their SOPO orientation. Hopefully this will change in time and set ground for many new researches.

We based our research on preposition, that "SOPO way of organizing" may be good for some social enterprises, narrow market niches, or in some new social order supporting many new values. What we unexpectedly found out was, that SOPO's can be very successful even in the current business environment of today.

6 Conclusion

SOPO's are thereby one of the attempts, to reinvent organizational behaviour following the path of natural processes.

The usefulness of the SOPO model, as we see it, lies in: (1) guidelines toward SOPO for start-ups, (2) reinventing/transition companies to determine the maturity level and increase usage of SOPO principles in reinventing organizational structures, and (3) helping established SOPO organizations in structuring changes toward higher service quality. The SOPO model can be a viable starting point for further research.

The applicative use however, might require more clarity on specific factors and their interactions. This model can serve as a base start for further research, but could also be applied in practice, bearing in mind that all content should be open for further improvements. We suggest that additionally, more specific guidelines should be developed in the near future. We are looking forward to improving the model gathering further information from existing SOPOs

with even higher maturity levels. The analysis of the qualitative results can shed the light on research questions and in the same time verification of the SPO model a quantitative research is needed to reach wider applicability.

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Prenova organizacij: model samo-organizirane procesne organizacije (SOPO)

Ozadje in namen: Samo-organizacija timov in poslovno procesna usmeritev sta predmet številnih ločenih raziskav, hkrati pa primanjkuje raziskav, ki bi oba pristopa združevala v okviru skupne raziskave. Namen naše raziskave je opredeliti raziskovalni model za novo vrsto storitvene organizacije - SOPO (samo organizirana procesna organizacija). Ta model, kot orodje za samoocenjevanje, postavlja nove temelje za določanje razvojne stopnje SOPO in lahko novim organizacijam ob nastajanju ali obstoječim organizacijam pri prenovi, pomaga organsko slediti SOPO razvojno smer.

Metodologija: V treh IKT-storitvenih podjetjih v procesu prehoda v SOPO, smo izvedli raziskavo primera. Izvedli smo več poglobljenih, nestrukturiranih in strukturiranih intervjujev z zaposlenimi na treh različnih položajih v vsaki organizaciji. V teh okvirih podrobneje predstavljamo raziskano organizacijo z najbolj eksplicitnim primerom.

Rezultati: Določili smo ključne elemente modela in ga v raziskavi primera preverjali. Ključni elementi so: samoorganizirane delovne skupine (SOWT) in poslovno procesna usmeritev (BPO). Tako SOWT kot BPO pozitivno vplivata na raven SOPO. Raven SOPO je pozitivno povezana tako z navdušenjem osebja za delo v samo-organiziranem okolju, kot tudi do zaznane kakovosti storitve (QS).

Zaključek: SOPO model je lahko uporaben: (1) v obstoječih podjetjih kot načrt za implementacijo SOPO, (2) za ocenjevanje stopnje zrelosti podjetij, ki spreminjajo svojo organizacijsko strukturo, in (3) v podporo organizacijam SOPO pri strukturiranju sprememb v smeri zagotavljanja višje kakovosti storitev. Model SOPO je lahko smiselno izhodišče za nadaljnje raziskave. Potrebno je tudi nadaljnje preverjanje modela SOPO z uporabo kvantitativnih raziskav.

Ključne besede: *samoorganizacija, poslovno procesna usmeritev, kakovost storitev, SOPO, prenova organizacij*

Information Technology Reliability in Shaping Organizational Innovativeness of SMEs

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Background and Purpose: This article refers to the relation between information technology (IT) reliability and types of innovations. The main objective of the article is to identify the role of reliability of IT (mainly information reliability) in shaping organization ability to develop different types of innovations, according to Oslo Manual.
Design/Methodology/Approach: Theoretical concept of IT reliability is proposed as a one of innovation determinants. Authors proposed four hypotheses and developed a questionnaire to measure the relation between four types of innovation (product, process, organizational and marketing) and IT reliability. The hypotheses were verified using data collected in 2017 from 400 SMEs operating in Poland.
Results: Information reliability as the whole notion is statistically significantly correlated with all four types of innovation in organization. Searchability, accuracy and relevance of information have significant relation with product, process, organizational and marketing innovation.
Conclusion: The performed empirical research should be treated as the first step of the analysis of innovation determinants, however allowing to draw a set of conclusions useful for the development of next steps of the study.

Keywords: management, information technology, IT reliability, types of innovation

1 Introduction

Nowadays organizations operate in dynamic, turbulent, uncertain and competitive environment. That is the reason why organizations are trying to achieve competitive advantage in order to obtain stable market position. There is widespread agreement among authors, researchers, consultants and thinkers in the field of management that innovation is the central capability for all organisations interested in maximizing the opportunities for success in the 21st century (Pereira & Fernandes, 2018). As Dobni (2010) noticed, innovation is a crucial aspect of survival, growth and profitability of the organization, support-

ing the achievement and maintenance of competitive advantage. In order to increase the level of innovative ideas implementation, it is necessary to understand innovation process. Moreover, there are different types of innovation. Therefore, there are different ways in which organizations can be innovative. Practitioners and theoreticians concentrate on the problems of managing innovations, seeking its determinants, which can emerge by minimising barriers to the creation and implementation of different types of innovations. Therefore, it is crucial to identify innovation determinants, considering the typology of innovation. One of the known determinants of organizational innovation is information technology (IT) (Tworek et al. 2018, Corso & Paolucci 2001; Dewett & Jones 2001; Xu et al. 2005). In

case of innovation, the importance of IT for current business practices has drawn the attention of practitioners and academicians for a long time. As Liao (2003) noticed, the rapid access to information is an important aspect of IT influence on innovation level and a critical factor of success for many organizations enabling innovations. Significance of IT is caused by their ability to support acquisition, locating, transfer and codification of knowledge. However, there are some limitation of IT use in organization. First of all, IT is oriented to the management of well-structured, numerical data, intended for many recipients (Davenport & Prusak, 1998, Zaliwski, 2000). It does not always allow to show a context and all the links between information. The IT supports the process of knowledge combination, knowledge sharing and enables many users to participate in such activities (Nonaka et al., 2001). In most cases, IT does not offer the possibility to create knowledge, which is developed in the minds of individuals and as a result of interaction between them (Davenport & Prusak, 1998; Zaliwski, 2000; Nonaka et al., 2001). However, the role of IT in shaping innovative process is also related to communication support. Nonaka with the team (2001) indicate that the importance of using IT should be acknowledged while supporting the constant creation of knowledge, but it must be more deliberately directed towards hidden knowledge. It is necessary to integrate the human and technological subsystem to achieve such an objective. "It is important to perceive technology as potentially supporting human effort, not replacing it" (Sage & Rouse, 1999, p. 210).

Authors of this article focus on reliability of IT in organization (based on the model developed by Tworek (2019), as a new approach to the analysis of IT in organization, which can be helpful in explaining how IT influences the level of innovation, considering its different types). One of the elements building IT reliability – the reliability of processed information – seems to be especially important determinant of innovation level. Therefore, the main aim of this article is to analyse the relation between the IT reliability (mainly information reliability) and innovation level of the organization.

2 IT reliability

Many authors underline that it has become necessary for the organizations to integrate IT into all organizational functions in order to build its potential to influence organizational performance and competitiveness (Tsubira & Mulira, 2004; Bieńkowska et al., 2017). However, since the relevance and the need for IT use in organization finally seems to be undisputable, there is a need for the analysis and evaluation of its use in organization. The concept of 3 R (reliability, resilience and robustness) (Little, 2003) underlines that the key factor influencing the ability to profit from using IT is its appropriate functioning in organization. Hence, the main element of this concept is IT reliabil-

ity. When almost every organization operates using some kind of information system (IS), its reliability seems to be one of the key factors influencing organization's competitive advantage from using it and its ability to benefit from IT during the entire innovation process (Tworek, 2019).

The reliability of IT in organization is understood as measurable property of IT, useful for its control and management, identifying its quality level and pointing out potential problems (Zahedi, 1987) and it is directly linked to the efficiency of IT components, especially those critical to its proper operations (Tworek, 2019). Therefore, it can be said that IT reliability in organization is a notion build by factors connected to three different IT theories. First one is DeLone and McLean success model (DeLone & McLean, 2003), second one is Lyytinen (1987) four types of IT failure and third one is TAM model (Davis, 1985). Model of IT reliability in organization has been developed by Tworek (2019) and it is presented on Figure 1. The reliability of IT in organization consists of four factors: reliability of information included in IT in organization, reliability of support services offered for IS in the organization and reliability of system itself, which also includes the usability of this system. Each factor is built by series of items, listed on Figure 1 (dark shade indicates the most significant item for the component, than lighter tones indicate lesser importance).

2.1 Information reliability

Information reliability – one of four components included in the IT reliability model – is the main topic of this article. That is because it is a well-known fact that information management is conducive for developing innovations (Trantopoulos et al., 2017) and it may by assumed that reliability of those information has an especially important role in this relation. The Conceptual Framework of information reliability was proposed by Financial Accounting Standards Board (FASB) in 1978 and its basic assumptions are still true. The report proposes two characteristics of information reliability. First one is connected to representational faithfulness understood as "the correspondence or agreement between a measure or description and the phenomenon it purports to represent" (FASB 1980, 1163) and it is the most important aspect considering the notion of IT information reliability. Second one is connected to verifiability, understood as "the ability through consensus among measurers to ensure that information represents what it purports to represent or that the chosen method of measurement has been used without error or bias" (FASB 1980, 1163), which is however less important in the context of reliability of information included in IT operating in organization. Moreover, FASB underlined that information reliability is not a binary concept (information is or is not reliable) but rather it should be treated as linear concept with a level of information reliability as a characteristic (FASB 1980, 1159). It is consistent with the findings of
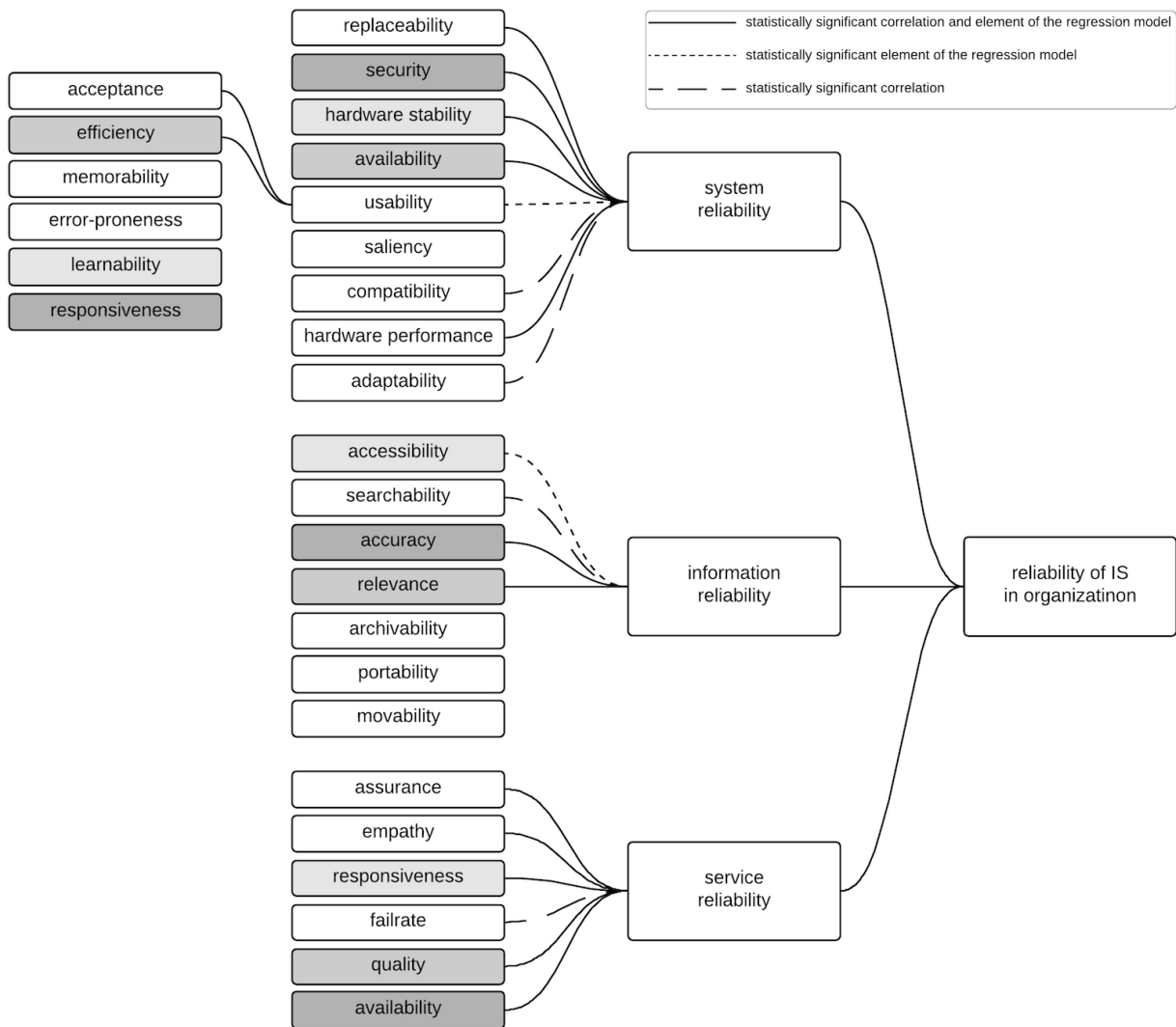
Fig. 1: Model of reliability of IT in organization Source: (Tworek, 2018)

Tworek (2019) formulated as one of the steps of IT reliability model development.

Many authors also recognize that information reliability is closely connected with information quality and credibility – all features that are especially important during processing any information within the organization (Hilligoss & Rieh, 2008; Kim, 2010; Tomaél, 2000). Moreover, Hilligoss & Rieh (2008) and Mai (2013) are underlining that information reliability is highly dependable on user evaluation and the information can be considered as reliable or nonreliable only in the context.

All above mentioned arguments can be a basis for the conclusion, that information reliability should be measured with a series of items connected to all aspects of the notion. Hence, based on the literature review and several sets

of items (Niu et al, 2013; Palmius, 2007; Finne, 2005; Irani, 2002), Tworek (2019) identified seven items building the notion of information reliability in IT used in organization. Those items are:

- Accessibility, understood as the ability of access information included in IT,
- Searchability, understood as the ability and efficiency of searching through the information included in IT,
- Accuracy, understood as the quality and credibility of information included in IT,
- Relevance, understood as the ability to avoid irrelevant and overlapping information included in IT,
- Archivability, understood as the ease of archive the information included in IT,
- Portability, understood as the ability to move infor-

mation included in IT between different system environments,

- Movability, understood as the ability to move information included in IT between disk spaces.

3 Innovation level

Depending on the discipline, in which term innovation originated (in organisation theory, economics, sociology, technology), the various approaches to it are underlined. Most authors emphasise the organisation's search for new solutions in response to changes in the environment (both changes in customer needs and changes in organisational environment elements such as e.g. technology) (Tidd & Bessant, 2018). Commonly, innovation is interpreted as the introduction of a new product and is associated with the production process, especially manufacturing technology. As Davila and the team noticed, more rarely is it related to organisational, administrative and cultural changes (Davila et. al. 2006). However, innovation novelty should be understood objectively (the macroeconomic view: innovation is something absolutely new, pioneering work) and subjectively (the microeconomic view: innovation is something new to the organisation, developed and implemented regardless of whether such a solution exists in other organisations). Innovation implies success as a result of implementation of a novelty (it is not just theoretical assumptions or a new idea). Innovative activity should be reflected in improving the use of resources or generating socio-economic benefits like economic profit, personal development of employees, higher job satisfaction, better communication within the organization, the increase of resources knowledge and experience (Walecka-Jankowska 2015).

Schumpeter (1985) described the following types of innovation: new product, method of production, source of supply, method of business organization and the exploitation of new markets. Drucker (2014) distinguished different types of innovation and defined innovation as the process of equipping in new, improved capabilities or increased utility. Nowadays the distinction described in the Oslo methodology is often used (Oslo Manual 2005). This document is the primary international basis of guidelines for defining four types of innovation: process, product, marketing and organizational. In this paper, those four types of innovation are considered in relation with IT reliability – product, process, organizational, marketing. Innovation is connected to new ideas and new knowledge. Development of new knowledge requires information from extrapolation and experimentation, although as Zgrzywa-Ziemak (2015) noticed – the essence of exploration is experimentation with new alternative proposals and the results are uncertain, postponed, often negative and not so unambiguously related to a specific activity. The relation between IT and innovation can be especially seen,

while concentrating on different stages of innovation process, because it enables communication between employees and influences the information flow within the organization. Moreover it is one of the key factors supporting information security (Tworek, 2019; Safa et al., 2016). IT enhances sharing of data, information and knowledge by lowering temporal and spatial barriers between employees (Tworek, 2018). At the same time, IT improves access to information and to shared knowledge, which is essential to make new solutions. It can be assumed that on every level of organizational hierarchy, it is necessary to develop knowledge, locate an existing one, diffuse knowledge to all employees, and access up-to-date information that allows decision making. Tasks connected with information reliability, secures the ability of IT to support all those tasks (Tworek et. al 2018, Tworek, 2019; Safa et al., 2016).

3.1 Product innovation

Product innovation is understood as the implementation/ commercialization of product or service with improved performance characteristics that delivers objectively new or improved services to the user (Oslo Manual, 2005). Product and/or service innovation entails activities such as design, research and development, acquisition of patents, technology licenses, trademarks, and industrial engineering. From the 1970s, authors emphasized that technology plays an important role in the stimulation of product/ service innovation (Utterback and Abernathy, 1975; Tushman and Anderson, 1986). IT can support especially receiving signals from environment about the possibilities of change and it is crucial for making decision e.g. concerning the domain in which organization is going to compete. Therefore, a broad and extensive mechanism is needed to identify, process and select information from the dynamic environment. Reliability of information included in IT is a prerequisite for supporting those mechanisms. Availability of secure, relevant and up-to-date information is a deal-breaker in case of product innovation (Rehm et al., 2016). Moreover, more advanced innovations might draw from scientific knowledge, generated in universities and research organizations. Such knowledge is often exchanged in personal interactions at a local or regional level (Tödtling et al., 2009; Soto-Acosta et al., 2018). It is important to enable free and secure communication in many different directions. Reliable IT, securing those information flows, influences the ability to generate innovations. Based on that analysis, the following hypothesis can be formulated: *H1: The more reliable the IT information in organization, the greater the level of product innovation.*

3.2 Process innovation

Process innovation is understood as the implementation of new solution or significant improvement in production or delivery methods (Oslo Manual, 2005). It may involve investment in new technology process, new technology embodied in devices, machinery, tools and equipment, new software for supply-chain management, new business software for designing products and training of staff to offer new services. Organizations, especially manufacturing ones, often improve product quality in product innovation, and in the same time implement cost reduction based on process innovation (Trantopoulos et al., 2017). It can be achieved by decrease of the cost of production and delivery (also by the reduction of time) or by increase of quality. As in the product/service innovation case - IT plays an important role in the stimulation of process innovation. First of all, it can be useful in process of acquisition of knowledge during the phase of seeking new solutions. Second of all, it is crucial for the proper process changes implementation, considering that nowadays IT supports most processes in organization (Janampa et al., 2018). Moreover, IT is essential in process of transfer of new knowledge, especially on the first stage of this process, when organization is choosing from numerous technological and market opportunities (Tidd & Bessant, 2018). Hence, the following hypothesis can be formulated: *H2: The more reliable the IT information in organization, the greater the level of process innovation.*

3.3 Organizational innovation

An organizational innovation is understood as the implementation of a new solution and significantly improved method in the business practices, management methods, workplace organization or external relations (Oslo Manual, 2005). Organizational innovation is increasing organizational outcomes by gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies (Oslo Manual, 2005).

One of the examples of organizational innovation may be the introduction of practices for codifying knowledge by establishing databases of best practices, lessons learnt and other knowledge, so that it can be easily accessible to organization members (Gunday et al., 2011). Organizations need to raise their absorptive capacities to acquire, assimilate, transform, and exploit knowledge which can lead to the organizational innovations (Daghfous, 2004). As Gunday et al. (2011) claim – organizational innovations are strongly related to all the administrative efforts of renewing the organizational routines, procedures, mechanisms, systems, etc. to promote teamwork, information sharing, coordination, collaboration, learning and innovativeness. Therefore, it is necessary to develop knowledge at

every level of organization, locate an existing one, diffuse knowledge to all employees, and access up-to-date information that allows decision making (Trantopoulos et al., 2017). All those tasks, needed to obtain organizational innovation, are nowadays impossible to be efficiently implemented without reliable IT. Moreover, absorptive capacity appears to be one of the most important determinants of the organization's ability to acquire, assimilate, and profitably utilize new knowledge to increase its innovation performance (Chen et.al 2009). Features such as accessibility and searchability are needed in order to efficiently process needed information and allow organization members to efficiently use all the information already gathered as the organizational know-how. True value for organizational innovations is generated by the increase in the level of knowledge and the possibility of learning from one's own mistakes, which is impossible without efficient access to information and proper communication flows. Moreover, insufficient transfer of knowledge causes the organization members to reinvent the wheel and is counterproductive in generating organizational innovation (Tidd & Bessant, 2018). Based on that, the following hypothesis arise: *H3: The more reliable the IT information in organization, the greater the level of organizational innovation.*

3.4 Marketing innovation

A marketing innovation is understood as the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion, pricing or customer segmentation (Oslo Manual, 2005). Marketing innovations concern addressing customer needs better, opening up new markets, or positioning a product on the market with the intention of increasing organization's sales (Gunday et al., 2011). As Kotler and Keller (2012) assumed in P theory – marketing innovations are strongly related to pricing strategies, product package design properties, product placement and promotion activities. Similarly to the process, product or organizational innovation, the process of gathering information is crucial for marketing innovation to occur. From the vast amount of information concerning customers, it is especially important to identify and obtain those connected to the changing needs of clients and transfer them to the R & D department (Tidd & Bessant, 2018; Nguyen et al., 2015). Those tasks are supported by IT, and its reliability also plays a role in this case. Archivability of information seems to be important in building and analysing past marketing strategies. Also, securing relevance of information seems to be a prerequisite for analysing customers information. Moreover, accuracy of information causes marketing innovation to be better tailored to the environment. The research shows that the early inclusion of customers in

the process of creating innovation (not possible nowadays without IT support) leads to better adoption by the market, better quality of innovation, allows more effective simulation of behaviours, and thus more effective adaptation of the organization's activities (Tidd & Bessant, 2018). Therefore, the following hypothesis can be formulated: *H4: The more reliable the IT information in organization, the greater the level of marketing innovation.*

4 Empirical research methodology

The survey based on developed questionnaire was conducted in order to identify the relation between the level of IT reliability in organization and innovativeness. The pilot survey was conducted in 2017 among the group of 100 organizations, indicating the issues concerning ambiguity of several questions. Some questions were rewritten based on the obtained feedback. The main survey was conducted later in 2017, among small and medium enterprises (SMEs) located in Poland (organizations employing less than 50 people), using online survey service: SurveyMonkey. The

Table 2: Items building types of innovations

	Please mark X for actions that have been implemented by your organization last year	
process	1. New technological processes, crucial for the company's business	
	2. New machines / devices / equipment/ tools, crucial from the business point of view (excluding standard personal computers)	
	3. new business-critical software used in the enterprise (only key software)	
	4. new business-critical way of services creation	
product	5. new business-critical product or service implemented on market	
marketing	6. new business-critical change of implemented product appearance	
	7. new business-critical change in the positioning of products or services	
	8. new business-critical change in price policy	
	9. new business-critical change in customer segmentation	
organizational	10. new business-critical methods of personal development of employees (career planning, system of professional qualifications, etc.)	
	11. new business-critical methods of business organization i.e. quality management system	
	12. new business-critical methods of delegation of responsibilities and decision-making by employees	
	13. new business-critical systemic knowledge management solutions	
	14. new business-critical ways of selling goods or services (including new distribution channels)	
	15. new organization of external relations – i.e. outsourcing	

research was anonymous. Efforts had been made to make sure that the questionnaire was filled in by employees who have a broad view of the entire organization (higher level managers or CEO). A total of 400 valid responses were collected. Since the responses were collected using properly prepared form, the online system counted only those fully and correctly filled in.

Respondents were asked to evaluate innovation level based on 16 questions, which are presented in Table 2. Four types of innovations were evaluated, according to the Oslo Manual (2005).

Respondents were asked to evaluate the IT in the organization based on the list of factors using the five point Likert scale (from very poor to very good with the middle point: fair) – see Table 3. They were asked for the general opinion concerning reliability of system, usage, information and service, and then they were asked to evaluate each factor constructing those 4 variables (see Table 3).

Table 3: Items building reliability of IT

Variable: *system reliability*	Variable: *usage reliability*	Variable: *information reliability*	Variable: *service reliability*
• usability • security • hardware stability • availability • replicability • saliency • compatibility • hardware performance • adaptability	• learnability • memorability • efficiency • errorproness • acceptance • responsiveness	• accessibility • searchability • accuracy • relevance • achievability • portability • movability	• assurance • empathy • responsiveness • failrate • quality • availability

Using a Likert scale to measure IT reliability seems to be an appropriate choice. First of all, reliability of IT in organization is a subjective notion. Employees own perspective and opinion concerning aspects of IT reliability is the best source of knowledge, since their perception matters the most, that is because IT influences the organization mainly through its potential to influence every-day work of the employees. Quantitative methods are commonly used to assess the software and hardware features linked to the reliability. However, they do not give the information concerning the actual perception of IT reliability within the organization.

Table 4. Descriptive statistics. Source: own work

	Average	Median	Minimum	Maximum	Std. deviation
Information reliability	3,65	4	1,00	5,00	1,08
accesibility	3,67	4	1,00	5,00	1,26
searchability	3,63	4	1,00	5,00	1,23
accuracy	3,82	4	1,00	5,00	0,97
relevance	3,85	4	1,00	5,00	1,26
archivability	3,67	4	1,00	5,00	1,15
portability	3,71	4	1,00	5,00	1,23
movability	3,67	4	1,00	5,00	1,41
Product innovation level	0,74	0,85	0,00	1,00	0,27
Process innovation level	0,77	0,75	0,00	1,00	0,29
Organizational innovation level	0,68	0,69	0,00	1,00	0,32
Marketing innovation level	0,68	0,78	0,00	1,00	0,25

5 Research results

There were two main variables: information reliability and innovation level calculated for each types of innovations. It is worth noting that Cronbach's α was above 0,890 in case of IT information reliability and even higher for each type of innovation level (every variable), which indicates a high internal reliability of the scales and measurements. Values describing innovation level are calculated based on average values of responses (positive response was as-

signed as 1 and negative response as 0) to statements in Table 2. Descriptive statistics were calculated for all measured variables (Table 4). Average value of responses given by respondents is followed by median of those responses, its minimal and maximum value and standard deviation.

The r-Pearson correlation coefficients between the information reliability together with all items building this notion and innovation level for each type of innovation have been calculated (Table 5). The results show that IT information reliability is significantly correlated with all types of innovations. However, the correlation is smallest

Table 5. Correlation analysis between IT information reliability and different types of innovation level. Source: own work

	Product innovation	**Process innovation**	**Organizational innovation**	**Marketing innovation**
IT information reliability	0,432**	0,298**	0,562**	0,523**
accesibility	0,066	0,092	0,131**	0,098
searchability	0,388**	0,295**	0,516**	0,464**
accuracy	0,421**	0,324**	0,638**	0,541**
relevance	0,465**	0,368**	0,460**	0,496**
archivability	-0,001	0,001	0,027	0,007
portability	0,054	0,045	0,086	0,073
movability	0,008	0,022	0,041	0,017
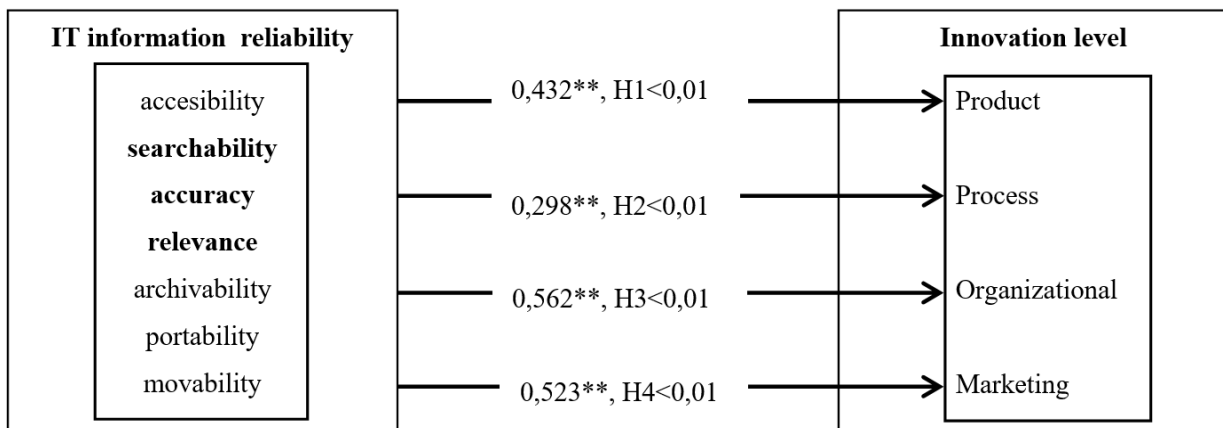
Figure 2: Research hypotheses verification. Source: own work

in case of process innovation and biggest in case of organizational innovation. Moreover, not all individual items are correlated with innovation level in case of every innovation type. Only three of them: searchability, accuracy and relevance proved to be statistically significantly correlated with all types of innovations and the correlation is moderate in all cases. The fourth item – accessibility - is

also correlated with organizational innovation, however the correlation coefficient is very low (r = 0,131, p < 0,05). The highest correlations appear in case of organizational innovation (r = 0,562, p <0,001 for IT information reliability as a whole and r = 0,638, p < 0,001 for accuracy – the most correlated item) and marketing innovation (however, a little bit lower values). What is surprising, the lowest cor-

relation appears in case of process innovation (r = 0,298, p <0,001).

As the empirical analysis clearly showed – there is a relation between information reliability and innovation level in case of all four types of innovation. Obtained results are presented in Figure 2.

First of all, based on the r-Pearson correlation analysis it can be concluded that IT information reliability is related to the level of process, product, organizational and marketing innovations in organization. Thus, information reliability as the whole notion is statistically significantly correlated with all types of innovation in organization, which was the basis for accepting hypotheses H1, H2, H3 and H4. Hence, it positively verifies the views, which arose from the literature review (Trantopoulos et al., 2017), that reliable information included in IT in organization is an important factor building the ability to generate product, process, organizational and marketing innovation. That influence is the biggest in case of organizational and marketing innovation. Hence the information processing needs are definitely the biggest in those two cases, it is not surprising that those correlation were proven to be the highest.

6 Discussion

As authors noticed in introduction it is crucial to identify determinants of innovation, considering the typology of innovation. Article concentrates on IT as one of those determinants. The contribution to the existing knowledge in this fields consist of introducing IT reliability as a new method for the evaluation of IT in organization, allowing to focus the considerations on information reliability role in fostering innovation. Therefore the main aim of the article was to empirically verify the relation between information reliability (and its constructs) and the level of innovation in case of four types of innovation. The results show the strongest relation occurring between information reliability and organizational and marketing innovations, then product. The least strong relation occurs between information reliability and process innovation. Moreover, the performed empirical research allowed to conclude that three elements of information reliability are especially important for fostering innovation processes: searchability, accuracy and relevance of information. The analysis revealed that only those 3 out of all items building information reliability are significantly correlated with all types of innovation. It seems to be consistent with the assumptions made based on the literature (Niu et. al., 2013). Searchability of information, understood as the ability and efficiency of searching through the information included in IT, is especially important due to employees' ability to quickly gain access to information which are already available in the organization. That definitely shortens the time of idea creations and influences positively the possibility to gen-erate innovations. Accuracy of information, understood as the quality and credibility of information included in IT, is especially important and can be considered as prerequisite for generating innovations. Basing innovation process on non-accurate information seems to be a potential source of problems for efficient innovation processes. Moreover, relevance of information, understood as the ability to avoid irrelevant and overlapping information included in IT, seems to be important due to the fact that employees gain rapid access to that information, which are crucial and helpful for them in the process of innovation generating. Therefore, it further verifies the views from the literature, that IT gives employees' possibility to communicate, to search for information, to share the knowledge and information reliability is particularly important to make quick decisions based on accurate and up-to-date information (Soto-Acosta, 2018). All of innovations' types need information as a starting point of innovation process, it is a trigger to think of new solutions. IT makes it possible to acquire information from around the world, continuously updating, both through access to knowledge and through the support of free, multidirectional information flow between employees (Trantopoulos et al., 2017).

7 Conclusions and future research

The main aim of this article was to analyse the relation between the IT reliability (mainly information reliability) and innovation level of the organization. The obtained results allowed for the conclusion that indeed, there is a significant relation between those notions, which suggests that information reliability is conducive to innovativeness. Moreover, determining the relation between IT, in particular information reliability, and four types innovation, requires the analysis of numerous other factors that are considered to be key to innovation (generally accepted are e.g. corporate culture, knowledge workers, motivation system). Therefore, the performed empirical research should be treated as the first step of the analysis of the broader notion, however allowing to draw a set of conclusions useful for the development of next steps of the study. However, the presented research has some other limitations – the hypotheses verification is based on the sample of 400 organizations operating in Poland and further verification in different business contexts is required. Nevertheless, the research presented here can be a solid first step in the process of framework verification. It is a well-known fact that nowadays information is crucial for obtaining ability to generate innovations. Considering the obtained results, it seems logical to assume that it is especially true for process innovations. The performed research caused some new scientific questions to arise: are process innovations even possible without the availability of reliable information? Or will they be misdirected without them? It seems that it is a new direction of research emerging from the

conclusions obtained in this paper, especially considering the surprisingly lowest correlation obtained for this type of innovation.

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Vpliv zanesljivosti informacijske tehnologije na oblikovanje organizacijske inovativnosti MSP

Ozadje in namen: Članek analizira odnos med zanesljivostjo informacijske tehnologije (IT) in vrstami inovacij. Glavni cilj članka je ugotoviti vlogo zanesljivosti informacijske tehnologije (predvsem informacijske zanesljivosti) pri oblikovanju sposobnosti organizacije za razvoj različnih vrst inovacij, po priročniku Oslo Manual.
Zasnova / Metodologija / Pristop: Predlagan je teoretični koncept zanesljivosti informacijske tehnologije kot eden od determinant inovativnosti. Avtorji so predlagali štiri hipoteze in razvili vprašalnik za merjenje razmerja med štirimi vrstami inovacij (produkt, proces, organizacija in marketing) in zanesljivost IT. Hipoteze so bile preverjene z uporabo podatkov, zbranih v letu 2017 od 400 MSP, ki delujejo na Poljskem.
Rezultati: Zanesljivost informacij kot celoten pojem je statistično značilno povezana z vsemi štirimi tipi inovacij v organizaciji. Iskanje, natančnost in ustreznost informacij imajo pomembno povezavo s produktnimi, procesnimi, organizacijskimi in trženjskimi inovacijami.
Zaključek: Izvedene empirične raziskave je treba obravnavati kot prvi korak v analizi determinant inovacij, vendar omogočajo pripravo sklopa zaključkov, koristnih za razvoj naslednjih korakov študije.

Ključne besede: management, informacijska tehnologija, IT zanesljivost, vrste inovacij

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