CONTENTS

Can Cybersecurity Risk Be Managed?

Trying to answer this quasi-rhetorical question, let us expose a few facts. Just facts. One of the business acquisitions that impacted the world of scientific publications was that Clarivate Analytics, the Intellectual Property & Science business of the famous information agency Thomson Reuters (since 2011), was acquired almost two years ago (in 2016) by corporate investors to became an independent company, headquartered in Philadelphia, U.S.A. This science unit of Thomson Reuters provided for many years integrated information-based solutions with brands as ISI Web of Knowledge and Web of Science (among others), mostly for academia and research & development community.

This piece of news of deep interest for scholars across the world, just recently, was unintentionally associated with another fact that transcended the business and science borders, and seriously impacted the American politics: the scandal Cambridge Analytica. In mid-March this year, The Guardian and The New York Times made public details about how an intelligence company (Cambridge Analytica) harvested data of about 50 million Facebook users and wrongfully used the data – in order to influence American voters during 2016 elections period.

Almost confusing, Clarivate Analytics and Cambridge Analytica: two information/intelligence companies with pretty similar sound names, both using top technology and both intensively exploring social networks … yet with quite different objectives (probably this issue deserves more than a few lines to deeper think about). Nothing is wrong with data processing in order to better understand consumer behaviour or design better marketing strategies (as old as the second World War, basically); nothing is wrong either about using more and more computer power and newer cloud computing technologies and algorithms of data mining for this purpose. However, the red line of data security was crossed, and a strong alarm signal was triggered.

With all advantages of the increased connectivity in the cyber-environment (all types of transactions, more information, higher speed, superior convenience, and quality of life), there are coming several alarming challenges – directed to individuals, organizations, and states: increased risk of cyber-criminality, frequent privacy invasions and attacks on private data, media aggressiveness, assault of

„Torture the data, and it will confess to anything."
Ronald Coase
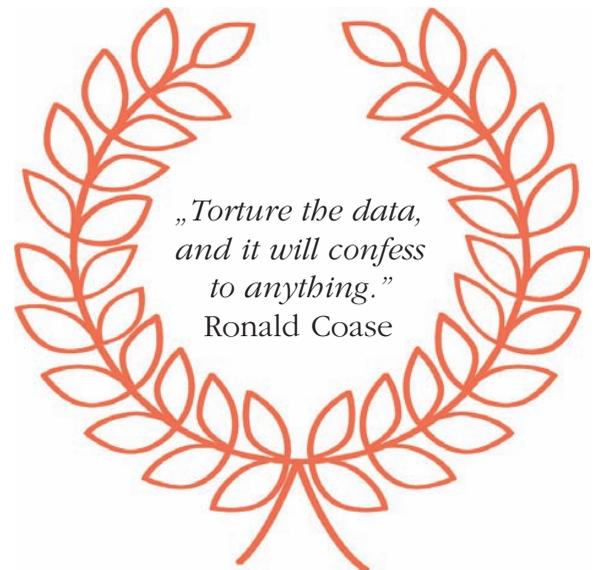
fake news, pornography and sextortion – to name just a few, letting aside the hackers' involvement in influencing political decisions by public opinion during elections. It is a complex situation that involves all actors: governments, organizations, and people. In terms of decision making, it is a question of balance between privacy versus security. In terms of size, is a battle of giants: governments of superpowers (U.S.A., European Union, China) – that want to regulate the information traffic in the cyber-space – against social media companies, which want more monopolistic freedom; both want access to the people's personal data – to be used with rather different intentions.

Romania, as any other country, is connected to the global system, and the world-wide-web makes both geographic borders and distance obstacles, obsolete. On the other hand, it is an EU Member State. According to the European Commission (2018), „the authorities of EU countries teamed up to tackle unfair terms and conditions identified on social media". As result of the dialogue held between the EU authorities and social media companies (specifically Facebook, Twitter, Google+), a number of concerns raised by Consumer Protection Cooperation Authorities were addressed. At present, the European Commission is preparing to modernize the legislation aiming to provide new advantages for consumers (i.e. users of social media): protection of the consumer's rights as well as mechanisms to enforce and properly apply the rule of law. Expanded EU internet data protection rules (effective May 25, 2018) are providing increased consumers' control over how companies collect and use their information.

Torn between privacy and security, the right governments, legislators and top decision makers should keep the right balance between the people's privacy rights versus security needs. At the organization level, we all witnessed, over the last half of century or such (as time evolves), „sure ways for better management systems" associated with sound management positions as: Chief Quality Officer (as result of quality management trend), Chief Information Officer (effect of information technology development), Chief Risk Officer (following the 2008 global financial and economic crisis), and currently Chief Information Security Officer – who has already sub-ordinated the Cybersecurity Manager.

Would the next one be Chief Cybersecurity Officer?

Cezar Scarlat
Senior editor
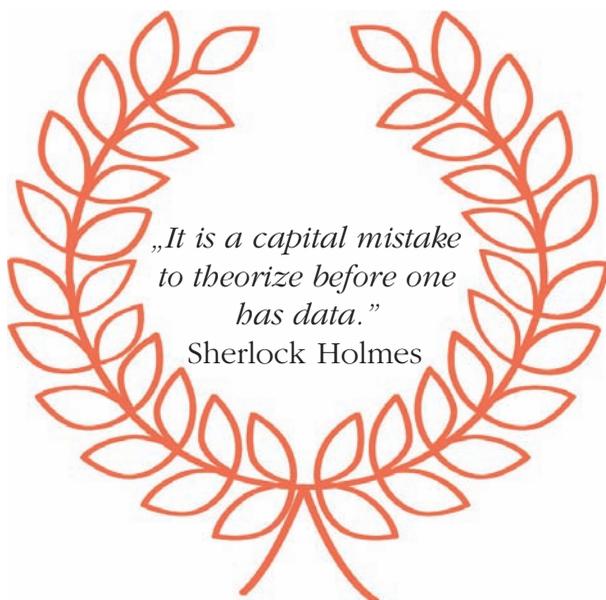
„It is a capital mistake to theorize before one has data."
Sherlock Holmes

Risk Management Based on Fuzzy Models

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Abstract

Failure mode and effects analysis (FMEA) is a useful and effective tool to identify and mitigate project risk, which utilizes the risk priority number (RPN) to determine the risk priority order of failure modes. Every production project is subject to numerous risks. Production project effectiveness is synonymous with project success in achievement of the goals. For these, it is very important to determine and evaluate the risks in all project life cycle – Initiation- Planning – Execution – Monitoring & Control – Closure in order to keep the implementation of the project under certain conditions The objectives of this research were to explore risk management practices influencing the success of production projects. In the first part of the study, a classical application of FMEA technique has been proposed to evaluate of the risks in production project. Then, a new risk assessment system based on the fuzzy set theory and fuzzy rule base theory is to be applied to assess and rank risks associated to failure modes that could appear for a production project, from automotive industry. The results show that the proposed approach can reduce duplicated RPN numbers and get a more accurate, reasonable risk assessment.

Keywords: project, production project, FMEA, Risk priority number, fuzzy logic, MATLAB software system

„We chose it because we deal with huge amounts of data."
Larry Page

Introduction

Following DIN 69901-5 a project is an „intent, characterized by uniqueness of conditions in their totality." A project is distinguished by an aim with temporal, financial, and personnel restrictions. Characteristics of a project are: Temporal limitation – there is a beginning and an end; Uniqueness –

typically it is something new; Defined objective – result could be, for example, a product, a system, or a process; Adequate complexity; Interdivisional – this is valid for big organizations; Limited resources (Alam, 2016).

Production project effectiveness is synonymous with project success in achievement of the goals. For these, it is very important to determine the all risks in order to keep the implementation of the project under certain conditions. The decision-agents need to identify, analyze and evaluate the risks in all project life cycle – Initiation Planning – Execution – Monitoring & Control – Closure – and use their organizational structure and administrative practices in order to act on the risks in favor of the project (Rodrigues-da-Silvaa, 2014). According to Rodney (2015) in the context of project management, project risk is related to the occurrence of events, from internal or external origin, which may affect the achievement of the initial target. Some examples of risks are (Ghaffari, 2014): communication and coordination, inappropriate tasks timing, quality of materials, late delivery of materials, labor productivity, failure to provide resources, lack of cooperation and coordination among team members, inappropriate tasks timing. The British Standard Institute (1991) (De Marco, 2018) defines risk as „a combination of the probability of occurrence of a defined hazard and the magnitude of the consequences of the occurrence", or as a combination of likelihood of occurrence of a certain problem with the corresponding value, i.e. impact, of the damage caused. Nowadays, companies face challenges such as fierce competition (Reis, 2018) narrow profit margins, rigorous customers and constant technological advances. For these, companies will need project management tools, especially if they develop innovative products.

Thus, many tools and methods of risk management have been developed. The aim of this paper is to presents an approach to evaluating the effectiveness of production projects, based on Failure Modes and Effects Analysis (FMEA) and fuzzy Logic FMEA methodology. The starting point is an analysis of the risks in production project, all project life cycle, with the fuzzy FMEA methodology and then to improve the techniques for assessing and preventing production project risks. Potential failure modes and their severity (S), occurrence (O) and detection (D) ratings are firstly determined. The FIS-based RPN model is constructed with data gathered from domain experts. The tool is implemented as a computer software, MATLAB environment, which can be used to compute analyze fuzzy RPN scores of failure modes, and subsequently prioritize the failure modes for appropriate remedial actions. In this paper, implementation of the model was presented via a case study, a production project from automotive industry.

Methods for Risk Management

FMEA – Failure Modes and Effects Analysis. Failure Mode and Effects Analysis (FMEA) is one of the first structured, systematic and proactive techniques used for failure analysis. It is a widely used engineering technique for defining, identifying and eliminating known and/or potential failures, problems, errors and so on from system, design, process, and/or service before they reach the customer (Stamatis, 2003). The first step in FMEA is to identify all possible failure modes of the product or system. According to FMEA, the risk priorities of failure modes are generally determined through the Risk Priority Number (RPN), which assesses three factors of risk: severity (*S*), occurrence (*O*) and detection (*D*). The RPN can be expressed as Eq. (1) (Stamatis, 2003), (Chrysler Corporation, 2008), (Belu, 2014), (Misztal, 2010):

$$RPN = S \times O \times D \qquad \textbf{(1)}$$

The occurrence factor measures the likelihood of a failure mode occurring. The severity is the expected consequence of the failure. In order to obtain the RPN of a potential failure mode, the traditional FMEA uses an integer scale from 1 to 10 for evaluating the three risk factors. The three risk factors are mostly difficult to be precisely determined. Much information in FMEA is often uncertain or vague and can be expressed by using linguistic terms such as likely, important or very high and so on (Belu, 2014), (Liu, 2012). In order to overcome the above shortcomings, many authors have continually developed this methodology. In the paper (Liu, 2012), the authors applied the VIKOR method, which was developed for the multi-criteria optimisation of complex systems, to find the compromise priority ranking of failure

modes according to the risk factors in FMEA. Approaches such as grey theory (Liu, 2012), data envelopment analysis (DEA) (Chin, 2009) decision making trial and evaluation laboratory (DEMATEL) (Chang, 2011), Taguchi method, fuzzy logic and Genetic algorithms (GA) (Maria Jaya Prakasha, 2015) have been suggested in the literature to enhance the FMEA methodology. GA can be used to search for solutions difficult to obtain by other conventional methods, in different areas. They can be run on computer or can be accelerated on parallel hardware structures (Mazare, 2011), (Ionescu, 2015). Many studies have been published in technical fields where FMEA was used together with fuzzy sets (Belu, 2014). Fuzzy FMEA provides a tool that works best with vague concepts and in the lack of sufficient information (Daniela, 2004). Using fuzzy theory is essential when dealing with some degrees of uncertainty in relationships among various criteria or when relations cannot be expressed in the form of definite numbers (Tooranloo, 2018). For example (Kumru, 2013) applied fuzzy FMEA to improve the efficiency of purchasing process in a public hospital. (Silva, 2014) presented a multidimensional approach to information security risk management using FMEA and

fuzzy theory. Chin (2008) proposed a framework of a fuzzy FMEA based evaluation approach for new product concepts. Xu (2002) implemented a fuzzy logic-based FMEA in diesel engine systems. Liu (2015) proposed a new risk assessment methodology combining fuzzy average with fuzzy decision-making trial and evaluation laboratory (fuzzy DEMATEL).

Fuzzy Logic Approach. Fuzzy set theory was initiated by Zadeh in the early 1960s. Fuzzy sets (FS) and fuzzy logic (FL) are one of the most fundamental concepts of science and engineering, because it can manage inaccurate information by manipulating mathematical terms. The notion of fuzzy sets is quite intuitive and transparent as it captures the essence of how things are perceived and described in everyday life (Silva, 2014). Depending on the approach used, the rational for the fuzzy logic includes three processes (Wang, 1992): **(i)** fuzzyfication, **(ii)** inference, and **(iii)** defuzzyfication. The process of fuzzy logic is given in figure 1.
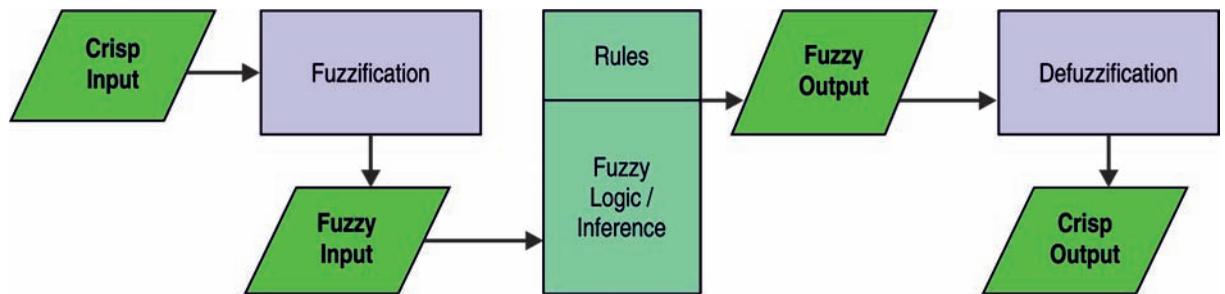
Figure 1 – *Evaluation the effectiveness of a production project*

Fuzzification comprises the process of transforming crisp values into grades of membership for linguistic terms of fuzzy sets. The membership function is used to associate a grade to each linguistic term. Defuzzification is interpreting the membership degrees of the fuzzy sets into a specific decision or real value. In our study, the three inputs (S) severity, (O) occurrence and (D) detecting are fuzzyfied and evaluated in a fuzzy inference engine built on a consistent base of IF-THEN rules. The fuzzy output is defuzzyfied to get the crisp value of the RPN that will be used for a more accurate ranking of the potential risks.

Methodology Research

Classical FMEA Application. In the first part of the study a classical application of FMEA has been realized for a production project from automotive industry. The project consists in launching of a new component, metal parts. The risks are identified for each stage of the project: initiation, planning, execution, monitoring and control and closure. In our study, we present a specific activity for each stage of the project and for each activity, the risks – failure modes – are identified, with different potential causes. Risk Priority Numbers (RPNs) of the failure modes are calculated. The evaluation of the failure modes is carried out by scoring the respective risk factors of occurrence, severity, and not detection. For this purpose, usually 10-level scales are being used. The failure modes with higher RPNs are assumed to be more important and will be given higher priorities for correction. It is presented the failure with highest RPN values (96, 90 and 240). Some of the data can be seen in Table 1. All failures modes are not given in this table.

Table 1 – *Conventional FMEA for production project*

Failure mode	Failure effect	Failure cause	S	O	D	RPN
Stage 1. Initiation – Reception Finished Part						
FM1. Nonconforming components (damaged parts)	Impossibility of mounting on the production line (dimensional) / Aspect not acceptable for the customer	C1. Inadequate packaging supplier – damaged products	8	2	6	96
FM2. Certificates of conformity unavailable	Parts manufactured with a grade „lower", requirements on security welds not respected,...)	C2. Omission of supplier (not transmitted the documents)	10	3	8	240
Stage 2. Planning – Storage						
FM3. Incorrect identification of metal sheets	Parts manufactured with a different type of material	C3. Supplier error	10	3	3	90
FM4. Damaged metal sheet	Nonconforming parts	C4. Not adapted handling means	8	3	2	48
Stage 3. Execution – Manufacturing						
FM5. Axis of the crimping are not perpendicular to the bearing face	Total loss of function	C5. Deformation of the part during crimping (bending machine)	8	1	4	32
FM6. Nonconforming torque resistance	Total loss of function	C6. Incorrectly positioned of nut (bending machine)	8	3	3	72
FM7. Marked part / peeling paint	Total loss of function	C7. Incorrect positioning of the tool (bending machine)	8	2	3	48
Stage 4. Monitoring & control – Dimensional control						
FM8. Nonconforming parts	Stop production at the customer	C8. Measurement method inadequate for the dimensional control	8	2	3	48
		C9. Control instruments damaged or out of metrological validation period	8	2	3	48
Stage 5. Closure – Expedition						
FM9. The index of the part is different from the index of the order	Stop the production at the customer	C.10 Team Leader Logistic error	8	2	6	96
FM10. The reference in the packaging box is different from that indicated on the label	Stop the production at the customer	C.11 The operator has written wrong the reference on the label	8	2	1	16

Iuliana Grecu, Nadia Belu, Nicoleta Rachieru, Emil Militaru

The Fuzzy FMEA Application. The fuzzy logic toolbox of Matlab software program has been used in calculating the values of RPN. A model was established for the FMEA technique having 3 inputs and 1 output variable, and given in figure 2. Four categories were associated to each fuzzy set: VL (Very Low), L, (Low), M (Moderate) and H (High). The output of the fuzzy system, FRPN, was scaled in the range 0...1000 in order to be compatible with the previous results. The occurrence, severity and not detection values of the failures were identified with the help of expert opinions and by using decision rules determined specifically.
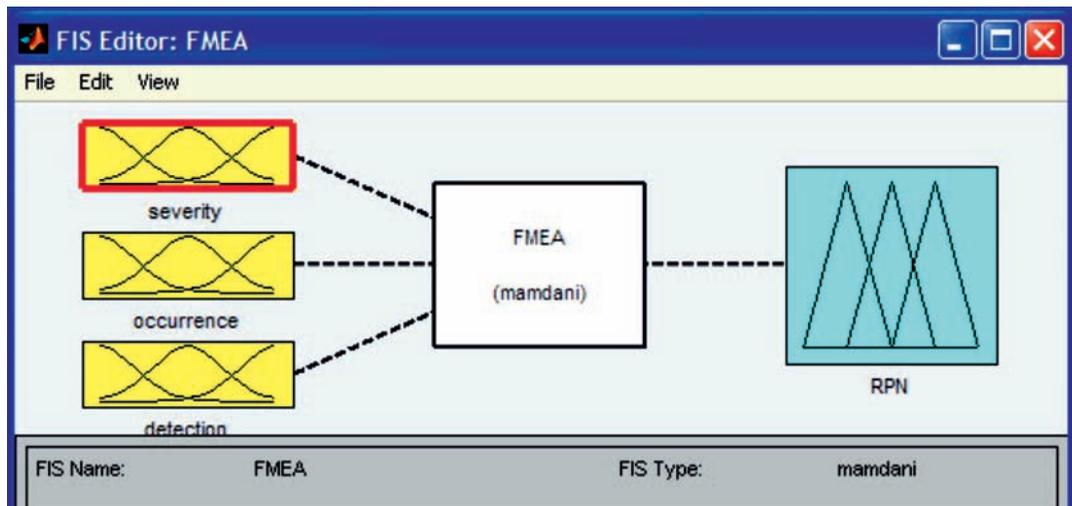
Figure 2 – *The Fuzzy FMEA model*

In this study, for risk factors like severity, occurrence and priority number (RPN), the Gaussian membership function is selected because of its two important properties (Piegat, 2001), viz., **(i)** it can lead to smooth, continuously differentiable hypersurfaces of a fuzzy model; **(ii)** it facilitates theoretical analysis of a fuzzy system because it is continuously and infinitely differentiable, i.e., it has derivatives of any grade (Eq. 2). For detection risk factor was used Cauchy membership function (generalized bell) (Eq. 3).

$$\mu_A(x) = e^{-[x-c]^2/2\sigma^2} \qquad (2)$$

$$\mu_A(x) = 1/1 + \left|\frac{x-c}{a}\right| \qquad (3)$$

where „*c*" and „σ" parameterize the center and width of the Gaussian membership function, respectively; „*c*" represents the membership function centre and „*a*" determines the membership function width, „b" a positive real parameter.

The membership function for severity and detection are depicted in figure 3 – 6.

Table 2 presents the inference rules adopted for this application. A total of 150 fuzzy rules (5 × 5 × 5) are gathered from domain experts.

These fuzzy rules are presented in an If–Then format and an example of four fuzzy rules is shown in figure 7.

Minimum function was used in order to implement AND method and implication. Maximum function was used in order to implement OR method and aggregation. An important step in fuzzy modeling and fuzzy multi-criteria decision-making is the defuzzyfication task which transforms a fuzzy number into a crisp value.

10 FAIMA Business & Management Journal
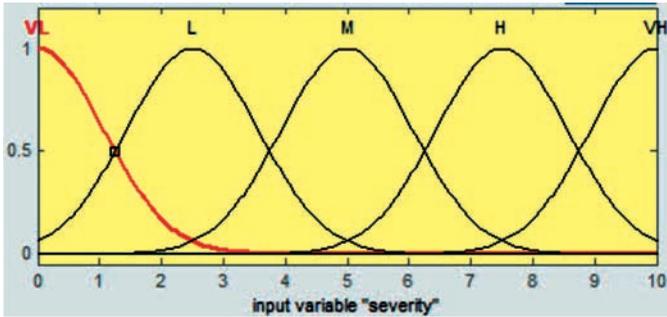
Figure 3 – *Membership functions for Severity*
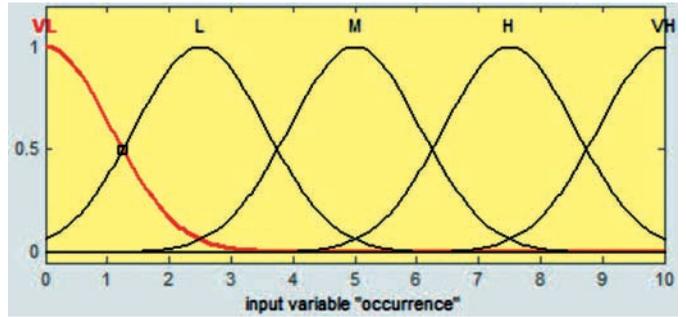
Figure 4 – *Membership functions for Occurrence*
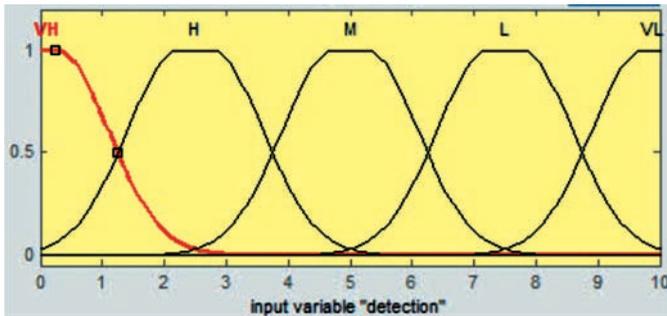
Figure 5 – *Membership functions for of Detect*
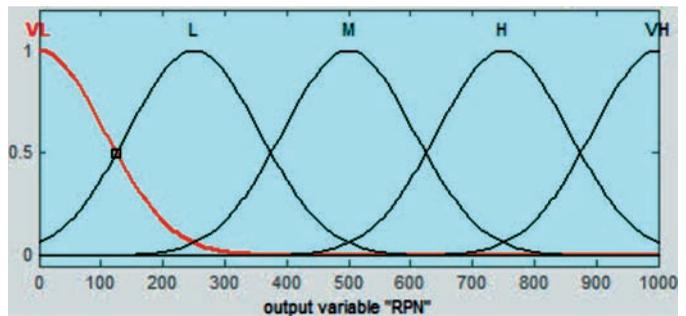
Figure 6 – *Fuzzy membership functions for the RPN scores*

Table 2 – *Inference rules*

Severity: VL						
FUZZY RPN		|	Occurrence			
		VL	L	M	H	VH
Detection	VL	VL	VL	VL	VL	L
	L	VL	VL	VL	L	L
	M	VL	VL	L	L	M
	H	VL	L	L	M	M
	VH	L	L	M	M	H

Severity: L						
FUZZY RPN			Occurrence			
		VL	L	M	H	VH
Detection	VL	VL	VL	VL	L	L
	L	VL	VL	L	L	M
	M	VL	L	L	M	M
	H	L	L	M	M	H
	VH	L	M	M	H	H

Severity: M						
FUZZY RPN			Occurrence			
		VL	L	M	H	VH
Detection	VL	VL	VL	L	L	M
	L	VL	L	L	M	M
	M	L	L	M	M	H
	H	L	M	M	H	H
	VH	M	M	H	H	VH

Severity: H						
FUZZY RPN			Occurrence			
		VL	L	M	H	VH
Detection	VL	VL	L	L	M	M
	L	L	L	M	M	H
	M	L	M	M	H	H
	H	M	M	H	H	VH
	VH	M	H	H	VH	VH

Severity: VH						
FUZZY RPN			Occurrence			
		VL	L	M	H	VH
Detection	VL	L	L	M	M	H
	L	L	M	M	H	H
	M	M	M	H	H	VH
	H	M	H	H	VH	VH
	VH	H	H	VH	VH	VH

Rule 1: If *Severity* is **Very Low**, *Occurrence* is **High** and *Detection* is **Moderate** then RPN is **Moderate**
Rule 2: If *Severity* is **Low**, *Occurrence* is **High** and *Detection* is **Moderate** then RPN is **High**
Rule 3: If *Severity* is **Moderate**, *Occurrence* is **High** and *Detection* is **Moderate** then RPN is **High**
Rule 4: If *Severity* is **High**, *Occurrence* is **Moderate** and *Detection* is **Moderate** then RPN is **High**

Figure 7 – *An example of four fuzzy rules*

Various techniques for this transformation are available, including the Mean of Maxima (MOM), Center of Area (COA), Center of Gravity (COG) or α-cut. Different defuzzyfication methods extract different levels of information. Defuzzyfication is performed according to the membership function of the output variable.

For our study the center of area was chosen for defuzzyfication. It finds the point where a vertical line would slice the aggre-gate set into two equal masses. The fuzzy logic system was simulated using MATLAB-SIMULINK.

Figure 8 shows the rule box with 11 rules and degree of support that set up the relationship between the input and output variables. As to the types of failure, the fuzzy RPN values provided in the model are shown in Table 3 in comparison with the RPN values of classical FMEA.

Figure 8 – *Rule box and rules*
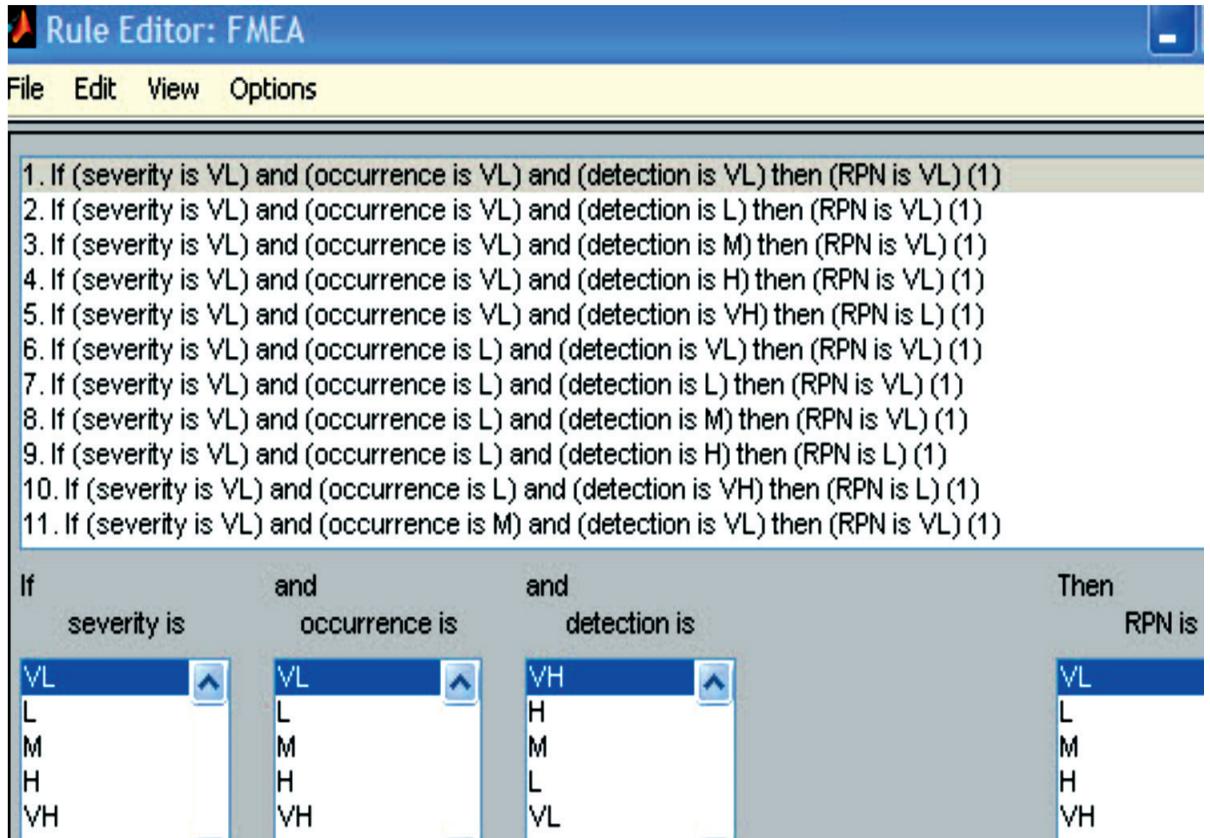
Figure 9 presents the surface plot a three-dimensional curve that represents the mapping from occurrence and severity.
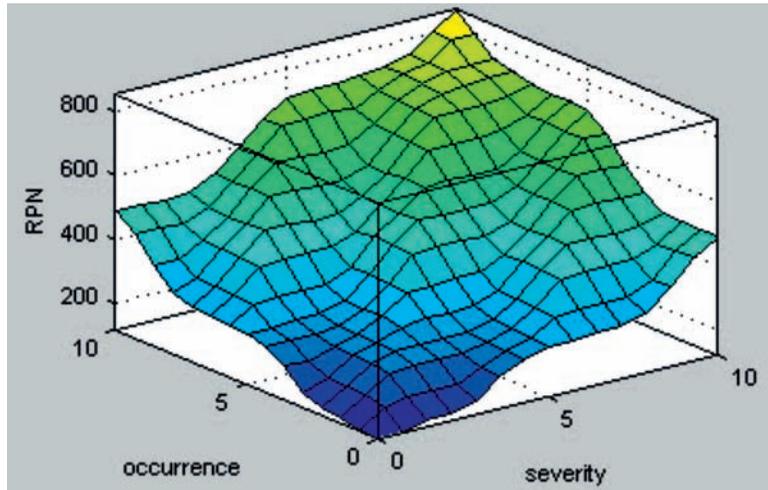
Figure 9 – *Surface plot for FRPN*

Figure 10 shows the evaluation of the fuzzy RPN in one of the checkpoints where the inputs are set up ($S = 8$, $O = 2$, $D = 3$). It leads to the result FRPN = 513.
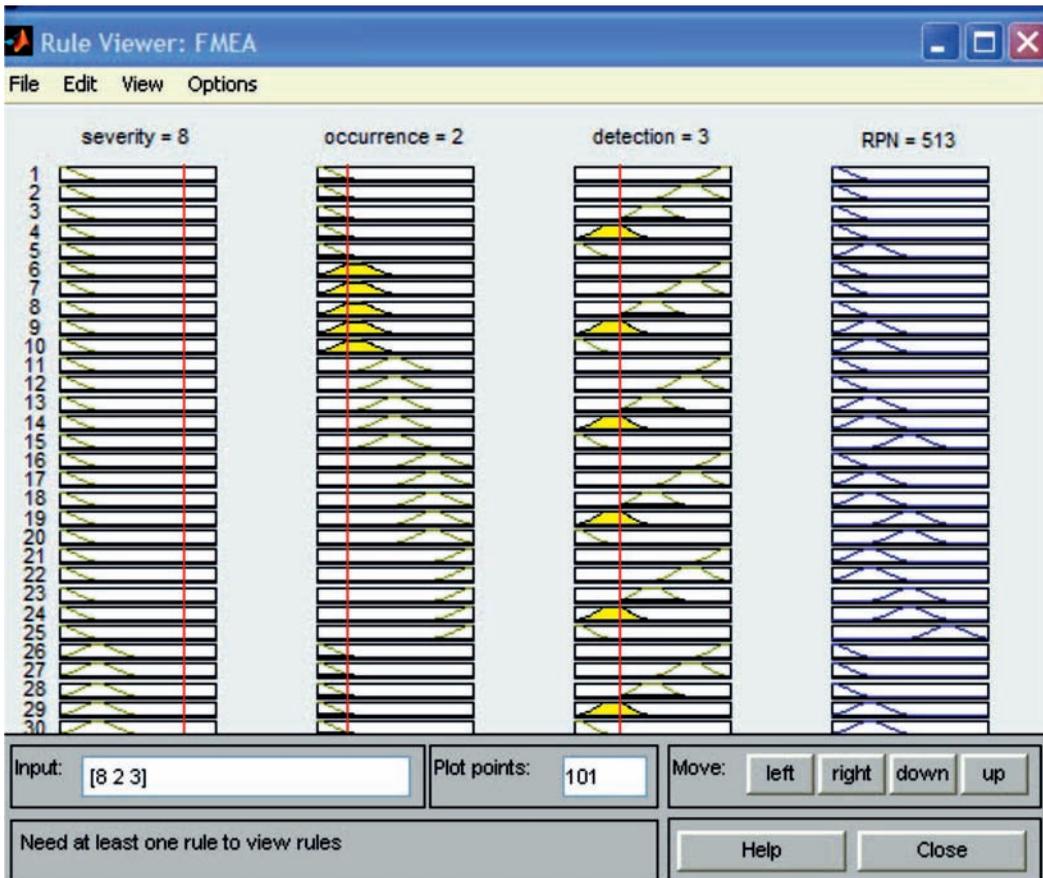
Figure 10 – *Validation of the fuzzy model*

Table 3 – *Prioritization of failure modes*

Failure mode	Failure cause	RPN	Rank 1	Fuzzy RPN	Rank 2
Stage 1. Initiation – Reception Finished Part					
FM1. Nonconforming components (damaged parts)	C1. Inadequate packaging supplier – damaged products	96	2	417	9
FM2. Certificates of conformity unavailable	C2. Omission of supplier (not transmitted the documents)	240	1	465	8
Stage 2. Planning – Storage					
FM3. Incorrect identification of metal sheets	C3. Supplier error	90	4	701	1
FM4. Damaged metal sheet	C4. Not adapted handling means	48	6	546	3
Stage 3. Execution – Manufacturing					
FM5. Axis of the crimping are not perpendicular to the bearing face	C5. Deformation of the part during crimping (bending machine)	32	10	409	11
FM6. Nonconforming torque resistance	C6. Incorrectly positioned of nut (bending machine)	72	5	544	4
FM7. Marked part / peeling paint	C7. Incorrect positioning of the tool (bending machine)	48	7	513	5
Stage 4. Monitoring & control – Dimensional control					
FM8. Nonconforming parts	C8. Measurement method inadequate for the dimensional control	48	8	513	6
	C9. Control instruments damaged or out of metrological validation period	48	9	513	7
Stage 5. Closure – Expedition					
FM9. The index of the part is different from the index of the order	C.10 Team Leader Logistic error	96	3	417	10
FM10. The reference in the packaging box is different from that indicated on the label	C.11 The operator has written wrong the reference on the label	16	11	650	2

Conclusions

FMEA is one of the most important safety and reliability analysis techniques and has been extensively used in a wide range of areas and industries. In view of the criticisms for the conventional RPN method in the literature, In this paper, a new risk assessment methodology for the FMEA based on fuzzy theory was proposed to deal with the risk factors and identify the most serious failure modes for corrective actions, in order to evaluate the production project effectiveness.

With the traditional RPN model, the same RPN score is obtained with different combinations of S, O, D, i.e., 8, 3, 2 and 8, 2, 3, respectively. Even though the RPN scores are the same, feedback and opinions from experts suggest the risks associated with both processes are different.

The proposed methodology fuzzy FMEA can not only resolve some critical problems of the conventional RPN method but also provide more accurate and reasonable risk assessment. The results obtained by fuzzy inference provide a hierarchy of potential risks that differs from the ranking established by classical FMEA. The fuzzy inference does not allow identical values of RPNs to appear for different sets of risk factors. According to the analysis of the results produced by the traditional FMEA and the fuzzy FMEA methods, this research shows that a more accurate, reasonable ranking can be achieved by the application of FMEA based on fuzzy theory. More risk factors can be included if necessary.

The proposed methodology can be applied to any case to provide effective information for making risk management decision in industrial and service organizations. For further research, the proposed model may be implemented for identified of the risks in logistics project in order to evaluate the logistics project effectiveness.

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Ronald Reagan
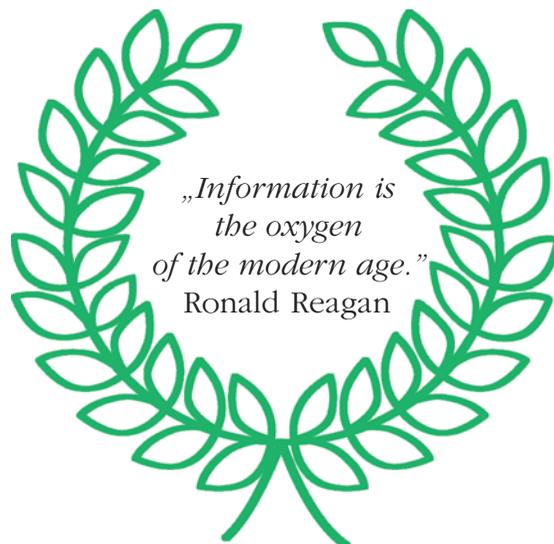
The Hidden Effects of New Fiscal Frames

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Abstract

It is known the fact that, in Romania, fiscal rules change for about ten times a year and there is obviously a direct perceived and quantifiable effect over business incentive. This article aims finding if there is a reasonable and quantifiable hidden effect of the fiscal frame changes over the entrepreneurial incentive. The business choice is based on the economic results. For this purpose, the forgotten effects model shall be utilized. This present paper iterates the importance of projecting an investment for a small enterprise in a changing tax frame. It also points to assessing economic profit given the fiscal frequent changes and such, investor's incentive. The author pilot tested a tool in order to be applied to other regions for finding relevant data in what regards the role of the fiscal changes on the way a business is conducted.

Keywords: taxes, fees, SME, fiscal rules, business incentive

Introduction

Law no. 227 from 8th September 2015, published in the Official Gazette on the 10th September 2015 represents the fiscal frame for Romania. It has been changed for 25 times up until now. The former law, 571/22.12.2003 suffered 105 changes during the validation period, starting from the 4th November 2015. The average figures reveal the fact that tax payer's, in Romania, have to deal with 9.12 law's changes each year. That is about 0.76 fiscal changes each month.

Europe's quest for fiscal discipline and national budgetary adjustments represent the main arguments of the legislator for

„Information technology and business are becoming inextricably interwoven."
Bill Gates
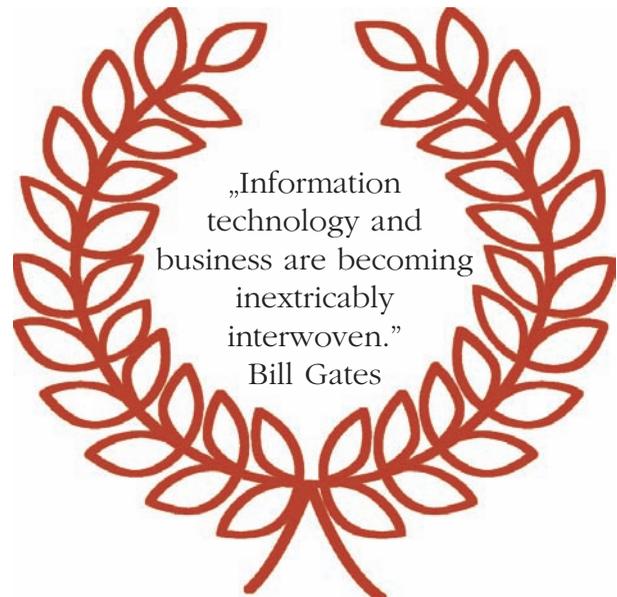
this volatile context. On such uncertain regulatory environment the empirical evidence shows that the behavior of the firms is difficult to describe (Casault, 2017). Taking into consideration that some policies have an insignificant influence on economic figures (Pieroni, 2017), there are still hard empirical evidences that reveal the effect of fiscal policy on economic growth especially in transition and emerging countries (Fetai, 2017). On this macroeconomic scale the results depend on the instrument that has been used. In some cases, there has been revealed that a cut in personal income tax had no effect on the relative prices, the activity levels or the unemployment rate (Campoy-Munoz, 2017).

There are empirical evidences that proves the introduction of an extremely small tax does not affect the aggregate output in the economy, and increases the supply of labor and reduces wages, further increasing the tax rate leading to a growing negative impact on the total supply of the product (Achkasov, 2017). Other authors developed a calculation mechanism for differentiation of personal income tax revenues that would create additional incentives for development of the economy and encourage the implementation of justice concept in tax assessment (Yashina, 2017). Scientific literature provides various methods for identifying the impacts of different taxes and expenditures on economic

growth. Zimcik found that an increase in social contributions, property, production and personal income tax quotas has an adverse effect on economic growth (Zimcik, 2016).

Knowing that corporate income tax is one of the most important taxes in acquiring government revenue and fiscal regulation of economic activity there were identified existing problems and ways to improve the taxation of corporate income in the context of balancing the interests of taxpayers and the government (Paientko, 2016). There are also empirical evidences about the dependence of the effective taxation on the corporate income tax rate, given the variability around the world due to different view of governments and countries on corporate taxation (Kosturikova, 2016). Analyzing the discrepancies in the taxation of corporate income tax between different Eurozone countries locates the idea of the fiscal pressure on the companies results (Llopis, 2016) and, taking this idea further, discrepancies in the competitive advantages and possibilities to establish new policies to improve competitive development (Sotalin, 2016). There are also evidences of the corporate income tax rates on shadow economy activity as the efforts to reduce budget deficits with corporate tax rate increases may be offset by an increase in shadow economy activity (Duncan, 2014).

On the other hand, the Small and Medium Enterprises (SME) have to deal with a fuzzy business frame. The results of studying the application of tax methods of regulation and support for small business and their impact were that the more consistent and understandable tax system is, the larger number of small enterprises can be founded, resulting in steady economic development of the state (Gogol, 2017).

Other evidences state that taxes and contributions represent an obstacle in the growth of companies with significant share in total costs (Marques, 2016). There are many other consequences, including the taxpayer's wellbeing. There are results that reveal some stakeholders bear the tax incidence and others do not (Donohoe, 2015).

There are also temporary differences that appear because of different temporal imputation of incomes and expenses to the tax base and accounting result and there are literature evidences that support the statement that companies that practice more discretion apply less positive an more negative adjustments in order to postpone or defer the taxation (Fernandez-Rodriguez, 2015). Other studies reveal that companies take reactions before the new enterprise income tax law is adopted and the market has a positive reaction to the companies that avoid tax successfully through earning management (Wang, 2014). Other countries experience such as Estonia (Masso, 2013) or Latvia (Pule, 2014) are consistent with an increase in holdings of liquid assets and lower use of debt financing after fiscal reform. A positive relationship of post-reform's investment and productivity has also been found with an emphasis on small and medium firms (Masso, 2013).

Methodology

We state the hypothesis that, at least in Romania, business incentive is based more on previous experiences of economic results related to various tax rate factors that influenced the costs than of rational understanding and anticipation of fiscal policy goals.

The study presents a method of acknowledging the forgotten effects of fiscal changes on small business incentive in a fuzzy environment. It is based on the quantified relationship among various factors that influence the decision of further investing. The survey results were biased by the expert's opinion in this field.

The pilot test was applied to 78 business partners from 70 small firms as defined by the Romanian law (OMFP 1802/2014). The methodology used in interpreting data is a fuzzy logic approach (Gil-Lafuente, 2010). The forgotten effects method operates in accord with diffuse values. These values were calculated in this present paper as the means of the results of an opinion survey conducted on 78 business people in Bucharest. The respondents were coming from different fields of economic activity, all of them having more than ten years of professional and business experience. The results were biased by experts' opinion.

The meaning of each value that express the evaluation of the relationship causes to causes, causes to effects and effects to effects: 0 – no impact; 0.1 – virtually no effect; 0.2 – almost no effect; 0.3 – very low effect; 0.4 – low effect; 0.5 – medium effect; 0.6 – significant effect; 0.7 – very significant effect; 0.8 – strong effect; 0.9 – very strong effect; 1 – the highest effect.

We further present the **causes** of the proposed model of analysis.

1. The change in the subject of taxation for worker's social security contribution is probably the most important change in the law 227/2015. Before its implementation through Emergency Ordinance No. 79/08.11.2017 published in Official Gazette No. 885/10.11.2017, that changed Paragraph (2), Article 2, Chapter I with Point 1, Article I, contributions were collected from the employee through the employer. This change refers to the type of contributions, fewer now, the subject of the contribution to the state budget and the quantum of contribution. Collecting and paying the contribution remains on the firm. What changed, was given the fact that personal contributions are subject to criminal law if not paid on time, the perception on the urgency of this payments. Up to that modification, there existed some possibility of delaying the payment of the debt up to a year or to postpone any debt less than 10.000 lei through fiscal credit (paying only the penalties and interests to the state budget). This was a short liquidity instrument cheaper than a commercial credit. On the other side, we find a managerial extra burden, that of renegotiating the individual contracts and of making all the additional changes in various registers as „REVISAL", „D112", etc. All this facts create justifiable influences over the expected economic and accounting results, over the incentive to maintain the legal form, to avoid taxation or to leave the market.

2. The change of the income tax contribution, considered to be of ease for the fiscal burden of employees, at least perceived as such is, in fact, a very small ease in his total fiscal burden as he is the main fiscal subject starting the 1st of the January.

The employer has to retain this obligation and make the changes in legal documents and registers.

3. The change of various taxes for the Authorized Physical Persons represents an incentive to change the current form of legal enterprise to other form of conducting a business, if results are relevant. There was an important change regarding the fixed taxation under a certain amount of total earnings in the fiscal year (that is 22.800 lei of any source of income). A small entity, according to the commercial field it operates (that is the NCAE codes) and according to the results (that is in particular valid when we consider small results), may change if considered proper, the legal form, from Limited Liability Company to Authorized Physical Entity according to Romanian law. The vice-versa is also valid. This decision is also based on expected economic and accounting results and to avoid taxation and further may leave to the incentive to leave the market in order to become an employee.

4. The change of the Value Added Tax (VAT) from 21% to 19% from the 1st of January 2017 represents an ease on business taxation, especially for the small ones registered as VAT contributors. This is the

second reduction of the main VAT quota in the last five years, declining from 24%. It is considered that the perceived effects are: a growth in economic and accounting results, the incentive to maintain the legal form, a decrease in the incentive to avoid taxation and to leave the market.

5. The frequency of changes in taxations has a psychological effect on the business people that naturally complain over. There are perceived uncertainties of the results, the possibility to remain in business and a growth in the incentive to avoid taxation.

The results of the survey conducted in Bucharest, in February 2018, on 78 entities, with a rate of responses of 89.7%, are presented in Table 1.

Table 1 – *Causes to causes matrix*

The change in the subject of taxation	The change of the income tax contribution	The change of various taxes for the APF	The change of the VAT	The frequency of changes in taxations
The change in the subject of taxation				
1.0	0.3	0.4	0.1	0.2
The change of the income tax contribution				
0.4	1.0	0.6	0.2	0.1
The change of various taxes for the Authorized Physical Persons				
0.1	0.8	1.0	0.2	0.0
The change of the VAT				
0.0	0.3	0.6	1.0	0.2
The frequency of changes in taxations				
0.0	0.3	0.1	0.4	1.0

(Source: Own work based on the survey's results)

Except factor on factor level 1 scoring, given by default, the most important influences are considered to be the change of various taxes for the Authorized Physical Person over the change on the income tax contribution. The change of the income tax contribution over the change of various taxes for Authorized Physical Person has the same influence as the change of the VAT over the same cause. There is virtually no influence in what regards the change of the VAT and the frequency of changes in taxations over the changes in the subject of taxation.

The **effects** form the decision to further invest in a small firm and may be summarize as such:

1. Expected economic result represents the anticipation of the economic profit. This is the anticipation of the net income biased by the inflation, the risk and the opportunity cost of the decision of having a business instead of working as an employee, for example.

2. Expected accounting results are the gross and net figures from the financial situations at the end of the fiscal year, that represent the base for the remuneration of the owners of the economic enterprise.

3. Incentive to maintain the legal form is having the same juridical form or changing to a different one, more proper according to the new fiscal rules. That implies additional costs of legal forms, management, etc.

4. Incentive to avoid taxation is possibly one of the most important effects derived from the fiscal volatility.

5. Incentive to leave the market implies the most negative effect over the business decision but is subdued to the rationality of maintaining the results over the costs.

The effects to effects matrix subjective evaluation is presented in Table 2.

Table 2 – *Effects to effects matrix*

Expected economic result	Expected accounting results	Incentive to maintain the legal form	Incentive to avoid taxation	Incentive to leave the market
Expected economic result				
1.0	0.6	0.9	0.9	0.5
Expected accounting results				
0.8	1.0	0.5	0.9	0.6
Incentive to maintain the legal form				
0.6	0.7	1.0	0.2	0.0
Incentive to avoid taxation				
0.2	0.8	0.8	1.0	0.5
Incentive to leave the market				
0.5	0.9	0.2	0.3	1.0

(Source: Own work based on the survey's results)

Expected economic results have the most influence of 0.9, over the incentive to maintain the legal form and over the incentive to avoid taxation. The same is evaluated the expected accounting results over the incentive to avoid taxation and a slightly lower influence over the expected economic results. The incentive to avoid taxation has a strong influence over the expected accounting results and over the incentive to maintain the legal form. The incentive to leave the market has the peak influence over the expected accounting results. There is no influence what so ever in what regards the incentive to maintain the legal form over the incentive to leave the market. That is considered an odd case and the author will further test this matter. The incentive to leave the market has also a very small influence (almost no effect) over the incentive to maintain the legal form.

Further we present the average **results of causes to effects** evaluations evident relationship, in Table 3.

Table 3 – *Causes to effects matrix evident relationship*

Expected economic result	Expected accounting results	Incentive to maintain the legal form	Incentive to avoid taxation	Incentive to leave the market
The change in the subject of taxation				
0.4	0.8	0.3	0.4	0.1
The change of the income tax contribution				
0.8	0.9	0.7	0.4	0.5
The change of various taxes for the Authorized Physical Persons				
0.1	0.1	0.4	0.3	0.2
The change of the VAT				
0.9	0.9	0.3	0.6	0.6
The frequency of changes in taxations				
0.7	0.8	0.3	0.4	0.9

(Source: Own work based on the survey's results)

The change of the income tax contribution and the change of the VAT have a very strong effect over the expected accounting results while the VAT has the same effect over the expected economic result. The frequency of changes in taxation has a very strong effect over the incentive to leave the market. On the other hand, the change of various taxes for the Authorized Physical Persons has virtually no effect over the expected economic results and the expected accounting results the same as the change in the subject of taxation has over the incentive to leave the market.

We'll further introduce an instrument of work in order to find out which is the non-evident relationship between causes and effects. Table 4 represents a transitory function that will further be used in order to reveal the forgotten effects relationships. It was calculated as composition using the maximum of minimum function of causes to causes and causes to effects matrices.

Applying the method of maximum of minimum function by composing the causes to causes matrix with the causes to effects and then with the effects to effects matrix, we obtain, in Table 5, the accumulated causes to effects matrix. It reveals the **non-evident relationship** that further represents the support for calculating the forgotten effects matrix.

Table 4 – *The max-min matrix*

Expected economic result	Expected accounting results	Incentive to maintain the legal form	Incentive to avoid taxation	Incentive to leave the market
The change in the subject of taxation				
0.4	0.8	0.4	0.4	0.3
The change of the income tax contribution				
0.8	0.9	0.7	0.4	0.5
The change of various taxes for the Authorized Physical Persons				
0.8	0.8	0.7	0.4	0.5
The change of the VAT				
0.9	0.9	0.4	0.6	0.6
The frequency of changes in taxations				
0.7	0.8	0.3	0.4	0.9

(Source: Author's own work)

Table 5 – *The non evident relationship causes to effects matrix*

Expected economic result	Expected accounting results	Incentive to maintain the legal form	Incentive to avoid taxation	Incentive to leave the market
The change in the subject of taxation				
0.8	0.8	0.5	0.8	0.6
The change of the income tax contribution				
0.8	0.9	0.8	0.9	0.6
The change of various taxes for the Authorized Physical Persons				
0.8	0.8	0.8	0.8	0.6
The change of the VAT				
0.9	0.9	0.9	0.9	0.6
The frequency of changes in taxations				
0.8	0.9	0.7	0.8	0.9

(Source: Author's own work)

There is now revealed a strong effect in what regards the change in the subject of taxation over the expected economic results and over the incentive to avoid taxation. There is a very strong effect in the change of the income tax contribution over the incentive to avoid taxation. The change of various taxes for the Authorized Physical Persons has important hidden effects over the expected economic result and the expected accounting results, as the non-evident relationship reveals a strong effect. The same is valid for the change of the VAT over the incentive to maintain the legal form. The frequency of changes in taxations has a very significant effect over the incentive to maintain the legal form and a strong effect over the incentive to avoid taxation. The differences between the evident relationship and the non-evident one are presented in Table 6.

Table 6 – *The forgotten effects matrix*

Expected economic result	Expected accounting results	Incentive to maintain the legal form	Incentive to avoid taxation	Incentive to leave the market
The change in the subject of taxation				
0.4	0.0	0.2	0.4	0.5
The change of the income tax contribution				
0.0	0.0	0.1	0.5	0.1
The change of various taxes for the Authorized Physical Persons				
0.7	0.7	0.4	0.5	0.4
The change of the VAT				
0.0	0.0	0.6	0.3	0.0
The frequency of changes in taxations				
0.1	0.1	0.4	0.4	0.0

(Source: Author's own work)

We determined the most relevant hidden aspects on the change in the subject of taxation over the incentive to lave the market, the change of the income tax contribution and the change of various taxes for the Authorized Physical Persons over the incentive to avoid taxation. There are also non-evident relations between the change for various taxes for the Authorized Physical Persons and expected economic result and expected accounting results.

Conclusions

By using the fuzzy logic and the forgotten effects model, it could be proven that fiscal changes represent a very important aspect that influences the business incentive. The forgotten effects model is a very useful tool in order to find out if there is a more efficient way to support the business incentive stated in the hypothesis. For example, the direct effect of the change of the subject of taxation on the incentive to leave the market is only 0.1 but, as the non-evident relationship causes-effects matrix shows, there is an effect of 0.6 which means that the chain that induced this forgotten effects of 0.5 has to be revealed.

We'll take into consideration any hidden effect that is more or equal to 0.5 and study the causes to causes, causes to effects and effects to effects matrices in order to find out a better fine-tuned chain of the propagation of causes to the effects. This allows the quantification of the extent to which a cause is influencing a lever that will induce another lever or an effect.

Analyzing the hidden effects for various causes over the incentive to leave the market, we determined there is a direct effect of 0.1 and a non-evident relationship of 0.6 that leads to searching the lever for the forgotten effect of 0.5. Following the evident relationships in the causes and causes to effects and effects to effects matrices we determine a non direct influence through the expected accounting results (0.8) that leads to a 0.6 incentive to leave the market. The change of the income tax contribution has a 0.6 influence over the change for various taxes for the Authorized Physical Persons and a 0.8 influence over the expected accounting result but has an insignificant effect on the incentive to leave the market. The change of various taxes for the Authorized Physical Persons has a 0.8 influence through the change of the income tax contribution that leads to a 0.5 influence over the incentive to leave the market. The change of the VAT leads to a 0.9 change in the subject of taxation that has a 0.8 influence over the expected accounting results.

The change in the VAT also leads to a 0.9 change of the income tax contribution that influences by 0.8 expected economic result,

by 0.9 the expected accounting result and by 0.7 the incentive to maintain the legal form of activity. It also has a 0.5 influence over the incentive to leave the market. This change also directly influences by 0.9 the expected economic and accounting results, by 0.6 the incentive to avoid taxation and by 0.6 the incentive to leave the market. The VAT change has an important influence over the frequency of changes in taxation, by 0.6 that leads to a 0.7 influence over the expected economic result, 0.8 over the expected accounting results and a 0.9 influence over the incentive to leave the market.

The change of the income tax contribution has a direct and a hidden important effect over the incentive to avoid taxation. Evidence reveal the same is valid for the change of various taxes for the Authorized Physical Persons over the expected economic result, the change for various taxes for the Authorized Physical Persons over the expected accounting result, the change for various taxes for the Authorized Physical Persons over the inventive to avoid taxation and, the most important part of the fiscal deal, the change of the VAT over the incentive to maintain the legal form.

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„Information rules the world."
Winston Churchill
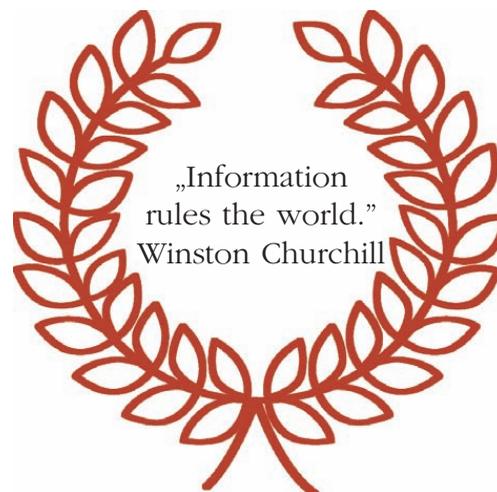
Benefits of Social Technologies

Cezar Scarlat (1), Alexandra Ioanid (1), Jeretta Horn Nord (2)

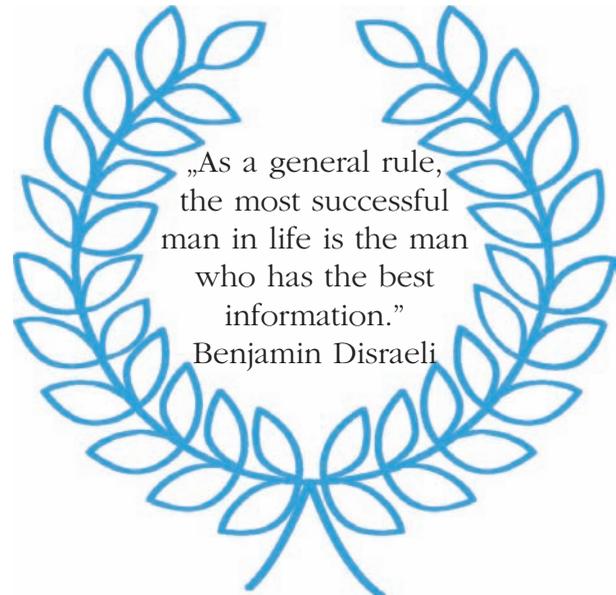(1) University POLITEHNICA of Bucharest, Romania, (2) Oklahoma State University, USA

Abstract

Based on the theory of uses and gratifications (U&G) to understand the people's needs to use social technology, the main objective of this paper is to analyze what kind of technology devices Romanians have access to and what social technologies they prefer. A structured questionnaire was used as a main survey tool in this pilot study. The study aims at answering the following questions: (i) what social technologies are used by Romanians and (ii) for what purpose; (iii) what benefits were obtained for that stated purpose (if any). The results of the survey should make the managers of organizations think about ways to sell their products by social networks, which is great opportunity Romanian companies can use to increase their revenue and profits. In the final part, several alarming trends are discussed – as increased cyber-criminality, assault of fake news, and hackers' attempts to influence political decisions. It is a complex situation that involves all actors: governments, organizations, and people. In terms of decision theory, it's a question of balance between privacy vs. security.

Keywords: social technologies, access to (social) technology, use of social technology, theory of uses and gratifications

Introduction

Social technologies are about connecting people and building networks, for both personal developments of individuals and business growth. They help individuals in both personal and professional issues because not only that people communicate easier having access to these technologies, but they also can promote their business/companies interest on social networks.

„As a general rule, the most successful man in life is the man who has the best information." Benjamin Disraeli

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Agreed that „*Social media* is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (Kaplan and Haenlein, 2010, p. 61). *Social technology* is defined as the practise of technology for social purposes. The term generally indicates any technologies which are used for social determinations, for instance, Facebook, Twitter, YouTube, LinkedIn (Bernoff, 2008; Oly *et al*., 2015; Wiid *et al*., 2014; Vannoy and Prashant*,* 2010). However, social science views about social technology drive broad areas such as social pedagogy, technology, technocracy, political science engineering, efficiency engineering, social economic planning, and planned society (Etzemüller, 2015; Knobloch, 2006).

Kaplan and Haenlein (2010, p. 62) reveal a large variety of social media, the classification criteria being **(i)** self-presentation/disclosure, and **(ii)** social presence/media richness. As examples, Facebook is a type of social media defined by high self-presentation/disclosure and medium social presence/media richness (this group of social media is known as *social networking sites*), while YouTube is that type of social media characterized by low self-presentation/disclosure and medium social presence/media richness (in general, *content communities*).

Generally, sociological knowledge solves the social problems by theories, expertise and methods. On the other hand, sociological knowledge is used for specific purposes, actions and decisions. The social technology uses theories and methods for scientific purposes which can be used for decision making. Many authors (Kim *et al*., 2015; Burson-Marsteller, 2012; Go and You, 2015) show that individuals and professionals are using social technologies – as Facebook, YouTube, and Twitter – for their gratifications. Previous studies emphasized on uses and gratifications of Twitter, Facebook, social recommendation systems, social technology uses in South African and Arabic context considering samples of teenagers, students or other young people (Chen, 2011; Cheung *et al*., 2011; Lane and Coleman*,* 2012; Oly *et al*., 2015; Wiid *et al*., 2014). There is still lacking to understand how and why people use social technology overall and what benefits they get.

As the literature on the use of social technologies in Romania is relative scarce, the article further investigates the concept of uses and gratifications in Romanian context. This paper is based on authors' previous work (Horn Nord *et al*., 2015; Ioanid, 2015; Ioanid and Scarlat, 2017; Scarlat *et al*., 2015), amended and updated.

Elements of the Theory of Uses and Gratifications

Uses and gratifications (U&G) were first familiarized in the imperfect media effect which is shifted away from the outlook of passive to active audiences. The U&G doctrine assumed that audiences will be active and goal oriented to the uses of media technology because they are concerned about their needs and they try to fill that.
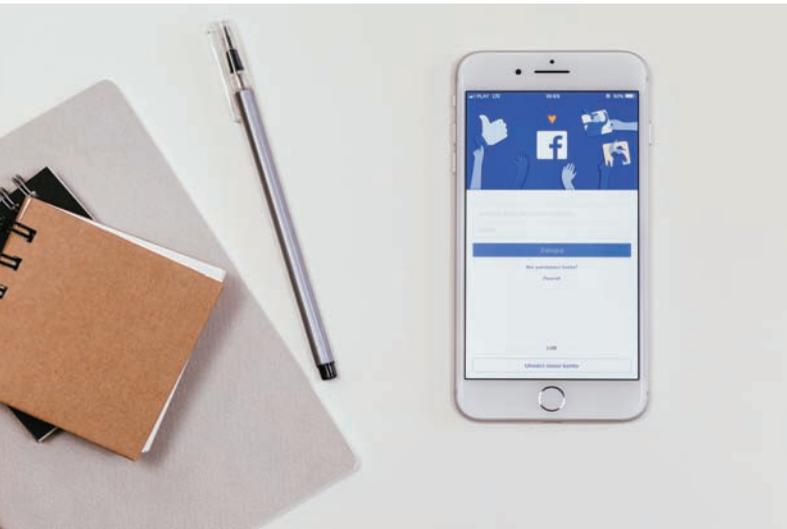
Scholars tried to understand the psychological needs to understand the uses of social media technologies because people use the same media technology for different purposes (Severin and Tankard, 1997; Rubin, 1994). Due to the advantage of the internet with related social technologies, U&G theory has sustained to thrive as a salient study area (Ruggerio, 2000).

Many scholars have applied U&G theory to explore social technology values (Charney and Greenberg, 2002; Cheung et al., 2011; Kim, 2014). Gradually, U&G theory has been a popular paradigm to understand the motives of using communication technologies such as Facebook, Twitter, and YouTube for information sharing, social interaction, vacation trip planning, social network games, news sharing, product selling and revenue growth (Kim, 2014; Lee and Ma, 2012; Lee et al., 2012). Florenthal (2015) found that students use social technologies such as Facebook, Bebo and MySpace for online identity, information and interpersonal communication.

To have a fair idea about the tremendous dynamics of social technologies use, let's mention just that Facebook registered just little more than 175 million as of January 2009 (Kaplan and Haenlein, 2010, p. 59), the number of active Facebook users surpassed 1 billion in the third quarter of 2012, and, according to Statista (https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/), Facebook had 2.2 billion monthly active users as the fourth quarter of 2017. However, the intention of uses varies for men and women; for example, there is no significant effect on enjoyment for men. It shows that gender differences yield different effects (Lane and Coleman, 2012; Lin et al., 2011).

Based on the theory of uses and gratifications (U&G) to understand the people's needs to use social technology, the authors conducted a pilot study to find out what kind of technology devices Romanians have access to, and what social technologies they prefer. Therefore, the remaining of this article is divided into three parts: methodology, data and results; conclusions, recommendations, limitations and further research; current trends in the use of social technologies.

Methodology, Data and Results

The main objective of this study was to analyze to what kind of technology devices Romanians have access to and what social technologies they prefer. Explicitly, the study aims at answering the following questions: **(i)** what social technologies are used by Romanians and **(ii)** for what purpose; **(iii)** what benefits were obtained for that stated purpose (if any). A pilot study was planned accordingly, and a structured questionnaire was used as a main survey tool. The data was collected in May 2015, randomly targeting owners and employees, in Bucharest, Romania. For this study, the authors have chosen only respondents that work for a company, in executive or managerial positions.

A number of 270 filled questionnaires were selected as valid, including 197 females and 73 males (Figure 1b) from 37 organizations. By educational background, 133 have graduated from university, 80 from high school, and 57 have master studies (Figure 1a). The interviewees are mostly single (171); 50 are married, 10 divorced, and 37 are having children. These results suggest that it is a general trend within the actual Romanian society to remain single up to more than 35, as most of the interviewees are in the age group 20-35. The type of organization that the interviewees work with is: corporations (41%), partnership (28%), sole proprietorship (20%), non-profit (6%), direct selling or network marketing (2%), franchise (1%), cooperative (1%), and other (1%).
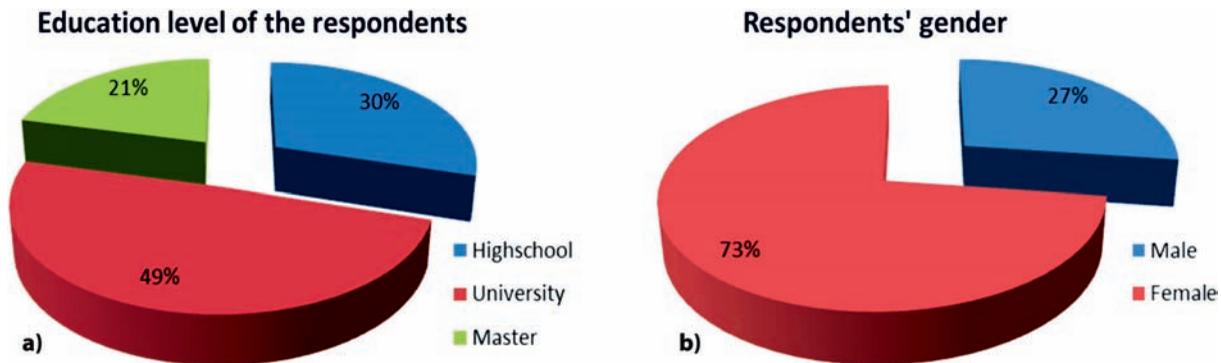
Figure 1 – *The level of education* **(a)** *and the gender of the interviewees* **(b)**

Most of the respondents (99%) have access to technology, the percentage being a little bit higher for laptops than for desktops. About 70% of the respondents connect through Wi-Fi, while less than half of the respondents have access to iPads or Tablets. The respondents have been using computers/technology for more than 5 years (94%). The respondents who only start using technology for 1-3 years or less than one year (total 2%) are usually from rural areas and are less educated. The rest of 4% use technology for 3-5 years. The Figure 2 indicates the type of technology the subjects have access to.
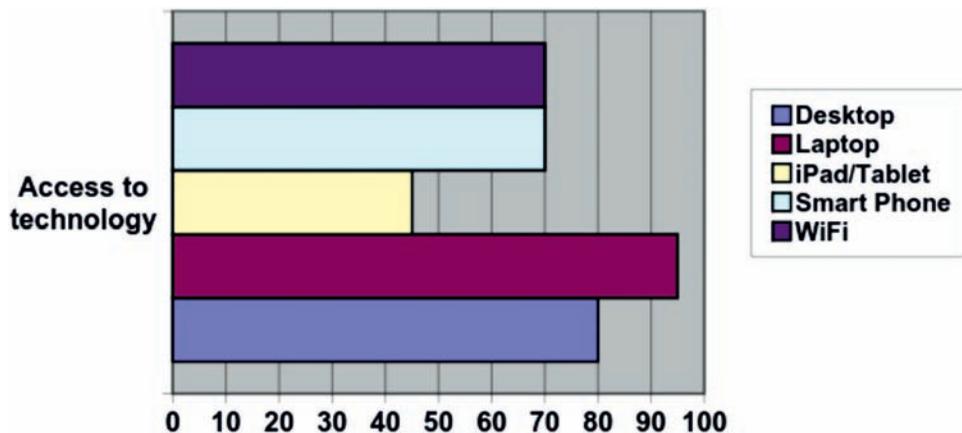
Figure 2 – *Access to technology*

The purpose of using computers/technology is mainly for social media access and e-mail communication (Figure 3).
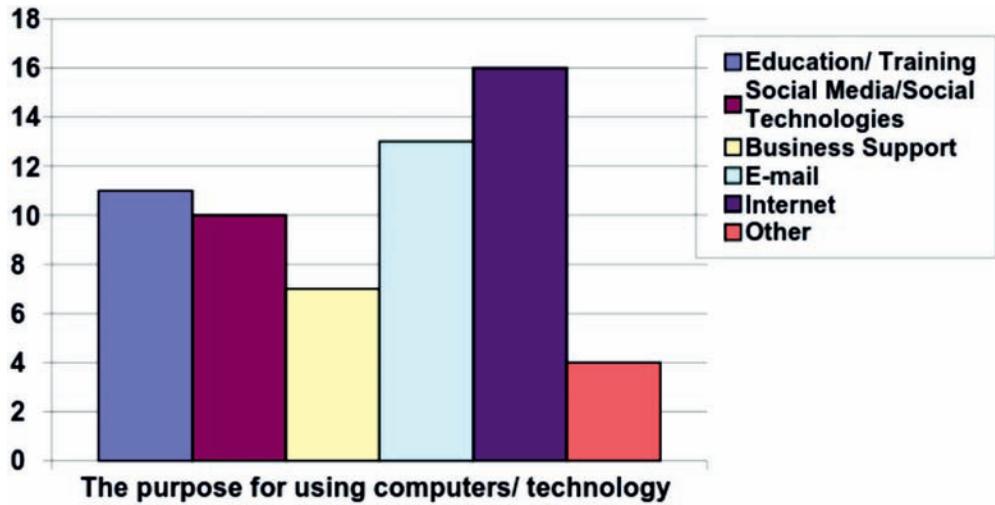

Figure 3 – *The purpose of using computers/ technology*

Figure 4 shows that most respondents are aware of the benefits technology brings to their lives, using it in general to obtain information (80%), followed by educating themselves online, communicating online cheaper than through other means and by reading the news (about 70% each). Surprisingly, only about 60% of the respondents are aware of the benefits social media could bring to their business.
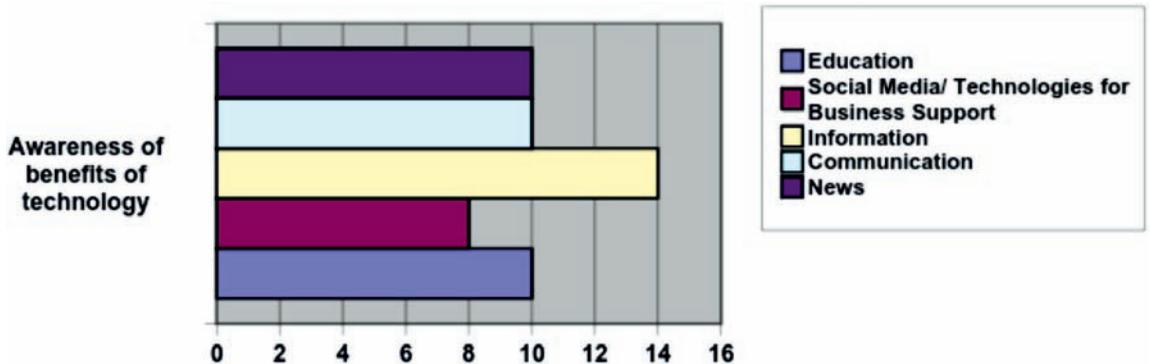

Figure 4 – *Awareness of benefits of technology*

Figure 5 displays the percentage of respondents indicating the use of each social technology platform. The platform most used in Romania is by far Facebook, for both personal and professional interest. Facebook is followed by LinkedIn and YouTube with equal percents, mentioning here that LinkedIn is used more by professionals with the purpose of developing their career and finding better jobs and YouTube is used by everyone interested in music and videos.
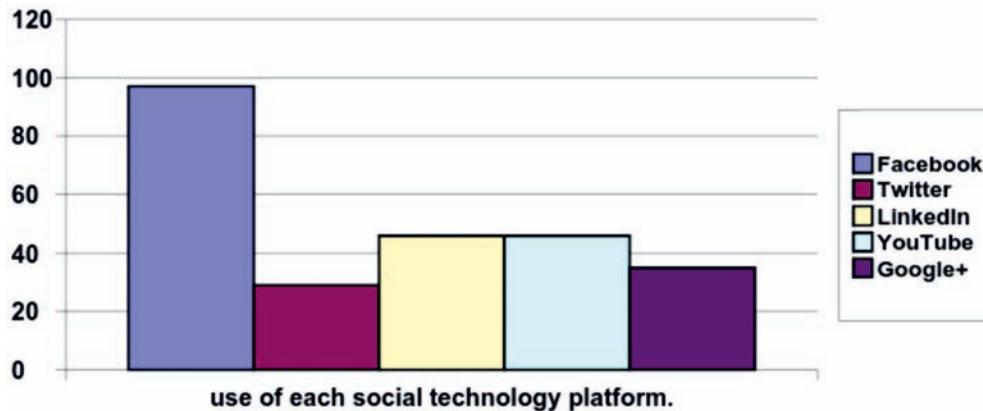
Figure 5 – *The use of each social platform*

The authors also analyzed the purpose for which respondents use each of the five social technologies. Subjects had to state the purpose for which they had chosen to use certain technology and if the organization they work for realized a benefit by using it. Facebook is the most used social technology in Romania and the main purposes for using it are networking, communication/collaboration and gaining exposure/creating awareness. LinkedIn is mostly used by professionals with the stated purposes of recruiting, networking and increasing revenue. YouTube is as used as LinkedIn but for more purposes, among which: marketing, customer service, gaining exposure or gaining new customers. Twitter is not so used, but the respondents that are active on this network are there for marketing and gaining exposure. The least used network in Romania is Google+ and the purpose why some of the respondents of this study are there is for networking.

Asked if education and technology would make them more successful, 98% of the subjects gave positive answers. When asked about the benefits social technologies bring to their life, most respondents answered that: can communicate easier and cheaper, can find information, educate them, find better jobs. In case of managers – they observed the decreased cost for marketing, and increased number of customers. They also obtained valuable feedback from customers in order to improve their services or products.

Current Trends in the Use of Social Technologies

Romania – as any other country – is part increasingly connected to the global system; the world-wide-web is making obsolete both geographic borders and distance obstacles. With all advantages of more connectivity by social media provided by newer and newer technologies (all types of transactions, more information, higher speed, superior convenience, and quality of life), there are coming several alarming challenges – directed to individuals, organizations, and states: increased cyber-criminality and cyber-terrorism, frequent privacy invasions and attacks on private data, overwhelming assault of fake news – to name just a few, letting aside the hackers' involvement in influencing political decisions by public opinion and elections. It is a complex situation that involves all actors: governments, organizations, and people. In terms of decision making, it is a question of *balance between privacy versus security.*

In the United States, the rise of global technology giants (Amazon, Apple, Facebook and Google) has created „new challenges for competition watchdogs" – so they have joined Microsoft Corp. in 2017 „to become the five most valuable companies in the U.S., a ranking that included only the software company 10 years ago" (McLaughlin, 2018, p. 22). To note that two of them are social technology companies, which dominate globally: Google has 78% of the U.S. and 92% of European internet-search ad spending; Google and Facebook combined also have 56% of the U.S. mobile-ad spending (McLaughlin, 2018, p. 22). Because the decline of successful technology start-ups is attributed to the supremacy of such technology giants, not only the U.S. regulatory bodies but other inter/national regulators are highly concerned by this phenomenon; Japanese and South Korean watchdogs as well as European Union (European Commission, 2018) are looking at the exclusive control Facebook and Google have over massive amounts of users' data.

The similar Chinese social technology giants (Alibaba, Baidu and Tencent) have large market shares as well. McLaughlin (2018) observes that „China not only hasn't pursued antitrust actions against them, but also protects them from competition by restricting foreign companies". Just to discern that China's position is totally opposed to the U.S. approach, and – even it is regulated as the EU is – the fair competition principles considered are ways different. In a 2016 study conducted by the civil liberties group *Freedom House*, cited by Ramli (2018, p. 43), China leads the global ranking of *World Worst for Online Freedom* (score 88) topping Syria (87) and Cuba (79) [100 = least free; 0 = most free]. Since 2000, employing „at least 50,000 people to enforce censorship, barring websites it disapproves of and forcing search engines to filter out content considered harmful", the *Golden Shield Project* has aimed to create the *Great Firewall*, „a database-driven surveillance system capable of accessing every citizen's record and connecting China's security organizations" (Ramli, 2018, p. 43). The same source also mentions „an army of social media influencers who… post 500 million pro-government comments a year". To note that critics, among others, fear that Russia, Turkey and others might follow this „model" to insulate, restrict and influence their own citizens as well as imposing restrictions on global online companies. China also seems to have a leading role in spotting the cyberthreats – at least this is the conclusion of analyzing the Equifax Inc. hack that, back in March 2017, „allowed hackers to make off with sensitive information of 145 million Americans" (Dune, 2017, p. 24).

This analysis revealed that the U.S. lags China in spotting the cyberthreats as well as the need for U.S. security watchdogs to receive more funding in order to catch up. The U.S. presidential election cycle in 2016 (when 400,000 bots tweeted political

messages), the French (2017) and German federal elections in the same year (16,000 bots combined that „tweeted extremist right-wing materials that also posted similarly themed sentiments" – according to Wang, 2017) brought into light a critical security issue, at the highest political level. Since September 2017, „Facebook and Google have acknowledged selling political ad space to Kremlin-affiliated groups that spread false stories about the 2016 U.S. presidential elections… There are signs of Russian activity on almost every American social network of any consequence, including Twitter, Reddit, Tumblr, Pinterest, LinkedIn, and even the smartphone video game Pokémon Go. … Snapchat, however, has found no evidence of political ad buys by anyone in Russia." (Chafkin, 2017, p. 56) The investigation is still in progress.

The evolution of Facebook (and associated changes in its CEO Zuckerberg as well as company strategy and policy), under the combined pressure various stress factors associated to the above-mentioned trends, is a good case to watch. Losse (2012) nicely describes the Facebook early days, when Facebook decided to open up to developers in 2007, when the „boss was very excited" and „This excitement was expressed more often than concerns about privacy. This isn't to say that he didn't think about privacy, but conversations about the platform were focused on its business about technical potential." Gradually, Facebook „simply allowed an advertising based system to get out of control. You could use the word greed if you wanted to be uncharitable. They clearly prioritized growing profits over cautionary controls." (Kirkpatrick, 2010) According to Kuchler (2018), „Facebook was built on the idea that 'sharing' was natural to a new generation. Mr. Zuckerberg said in 2010 that 'social norms' around

privacy were changing. When the social network began to try to generate revenue, it realized that user data were its treasure." In March 2018, right after the data scandal involving Facebook and *Cambridge Analytica* [an analytics company that worked for the Trump 2016 election campaign, and used data from about 50 million users leaked from Facebook], when Facebook market value dropped with more than $60 billion, „privacy may become more of a concern for Mark Zuckerberg" (Kuchler, 2018). Cited by the same source, „Steve Bannon, former chief-strategist for Trump and one-time vice-president at Cambridge Analytica, blamed Facebook for collecting the data later used by the company. 'That is Facebook's business – he told the *FT Future of News* conference on Thursday [i.e. March 22, 2018] – They take your stuff for free and sell it and monetize it for huge margins … then they write algorithms and run your life'." Currently (March 2018), Zuckerberg is touring U.S. to apologize.

Romania, as *European Union* (EU) Member State, is subject of national as well as EU law. According to the European Commission (2018), „the authorities of EU countries teamed up to tackle unfair terms and conditions identified on social media". As

result of the dialogue held between the EU authorities and social media companies (specifically Facebook, Twitter, Google+), a number of concerns raised by Consumer Protection Cooperation Authorities were addressed – as:

□ Jurisdiction and applicable law (social media operators cannot stop EU consumers from bringing proceedings against them in their Member State of residence and EU consumer law must apply).

□ Waiver of mandatory consumer rights (social media operators cannot deny consumers their rights under EU consumer law).

□ Failure to identify commercial communications (the commercial nature of communications and sponsored content cannot be hidden from consumers but should be identifiable as such).

□ Consumer's obligation to indemnify the provider and the waiver by the provider of all liability (social media operators cannot limit or totally waive responsibility in relation to their services while holding consumers fully responsible for their actions).

□ Removal of user generated content (social media operators cannot remove posts or other user generated content, such as pictures, without providing a clear justification and without giving consumers the possibility to appeal).

□ Power to unilaterally change terms and conditions (social media operators cannot unilaterally change the terms and conditions, without clearly informing the consumer of the justification and without giving, under reasonable notice to the consumer, the possibility to cancel the contract).

□ Power to unilaterally determine the scope and application of the terms and conditions (social media operators cannot

unilaterally decide to apply separate or new standard terms to some of their services, without informing consumers and without asking for their consent).

□ Power to unilaterally terminate the contract, for any reason (social media operators should always provide clear grounds for closing down an account and should notify consumers accordingly).

Coming as the result of a joint action by national enforcers of the Consumer Protection Cooperation (CPC) Network led by the French authorities and facilitated by the European Commission, which started at the end of 2016, on February 15, 2018, the European Commission together with EU consumer authorities published the changes Facebook, Twitter and Google+ have made to their terms of services, to align them with the EU consumer protection rules and to ensure the rapid removal of illegal commercial content upon notification. These changes will benefit more than a quarter billion of EU consumers who use social

media (http://ec.europa.eu/newsroom/just/item-detail. cfm?item _id = 614254). The effective dates are: January 31, 2018 (Facebook); estimated March 2018 (Twitter), and March 1, 2018 (Google+). To note that also in the U.S., „Twitter is responding to congressional investigators and says it has expanded its good-government efforts, but it lags far behind Facebook" (Wang, 2017, p. 24).

At present, the European Commission is preparing to modernize the legislation aiming to provide „new advantages for consumers" (users of social media): protection of the consumer's rights as well as mechanisms to enforce and properly apply the rule of law. Expanded EU internet data protection rules will take effect May 25, increasing consumer control over how companies collect and use their information.

As beneficiaries of technology development – 5G mobile technology is already experimentally functioning (Dagenhart and King, 2018) – and progressively exposed

to aggressive media, fake news and pornography, the people are deeply concerned to protect their own life and privacy: one survey, cited by Strohm (2014), found that a quarter of Americans changed the way they use their phones, the web, email and text messages after learning about the government surveillance activities.

Not like Twitter – which „isn't taking fake news seriously" and „has done little to even diagnose the bots on its service" (Wang, 2017, p. 22), Snap Inc. is considered a good case of free-of-fake-news company. Considered a source of inspiration for Facebook, but having only 173 million daily users, back in 2013 Snapchat's CEO Spiegel rejected Facebook's Zuckerberg's $3 billion buyout offer. Snapchat business model mirrors basically a media company free of fake news, working with credible media companies, information channels (as CNN and NBC) and journals (as *Wall Street Journal* and the *Economist*), and having a significant team of professional producers, creators, and journalists (Chafkin, 2017, p. 56). However, while „investigators complain that the [Snapchat's] app's privacy makes creeps tough to track", „predators know that they can contact kids on Snapchat [… and] they think they're not going to be tracked" exactly because „photo and video evidence often disappears from Snapchat before police can find it" (Smythe and Frier, 2017, p. 21). Snapchat is singled-out as a potential problem, while Facebook and Instagram remain the likeliest venues for cases of sextorsion (Smythe and Frier, 2017).

Summarizing, today, the people are torn between privacy and security. Tomorrow, more than today, the right governments, legislators and top decision makers should keep the right balance between the people's privacy rights *versus* security needs. As seen, this is not an easy task.

Conclusions, Recommendations, Limitations

This study investigates the uses and usefulness of social technology in the Romanian context. Also, the study is applying uses and gratification (U&G) theory to understand the needs of people to use social technology (Kim, 2014). Besides the theorization contribution of social technology, the findings of this study contributes to practitioners to design online communication platforms, which will fit their users' needs and values with more friendly and safer.

The major conclusion of this paper is that in Romania the access to computers/ social technologies is very good, considering that about 90% of the respondents to this exploratory research own a desktop, laptop or smartphone, have access to Wi-Fi connections and are aware of the benefits social technologies can bring to their lives. Most of the respondents however use the social technologies for a personal purpose: communicating easier and cheaper, getting informed faster about any topic of interest and being informed about better job opportunities. The respondents who are working in managerial positions mention also the marketing benefits of social networks, together with gaining exposure or recruiting employees.

In the light of the survey results, it is highly recommended that the managers of organizations should think about ways to sell their products by social networks, as abroad most companies start to do it; this is a great opportunity Romanian companies can use to increase their revenue and profits. This pilot study was completed on a restricted target market (Bucharest area); then to extend the study across Romania is an obvious continuation. As the sample was not designed considering the industry structure, a further research avenue is definitely a finer survey observing this issue. Conducting comparative studies Romania against other countries/regions is another important research avenue to pursue.

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"Give me just enough information so that I can lie convincingly." Stephen King
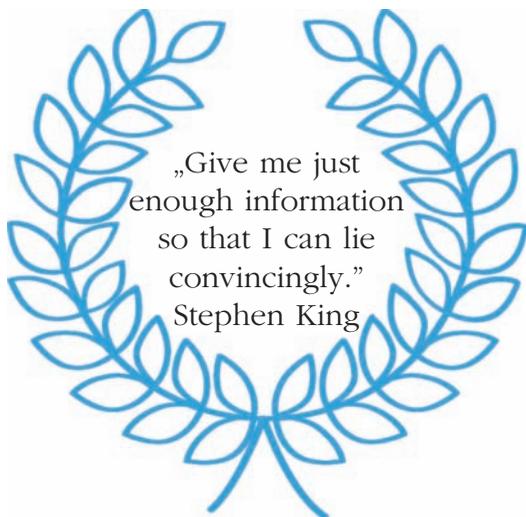
Thematic Content Analysis for Software Applications

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The literature about technology adoption/acceptance has produced large amounts of evidence about the importance of user perceptions when comes to technology use and usefulness. That is why, increasingly, the argument can be and is made that information technology development and improvement should make significant use of user feedback. This paper is focused on how such user feedback can contribute to developing more user-friendly software applications. Specifically, we explore the role of thematic content analysis (TCA) as a tool in analyzing user feedback. The paper is aiming to clarify the process of using thematic content analysis in software development: sources of data, themes identification, recoding or consolidating data, data analysis, etc. The main focus is on how qualitative data could be transformed into actionable findings for developers and business decision makers. Providing insights with regards to clients' perceptions, attitudes and behavior could contribute to designing software applications that better respond to clients' needs.

Keywords: thematic content analysis, technology adoption, user-friendly software application, software usability, human-computer interaction

„Information can bring you choices and choices bring power; educate yourself about your options and choices."
Joy Page

Introduction

Usability, an important reference for software applications, is defined by ISO 9241-11, International Standards Organization, as „[…] the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context

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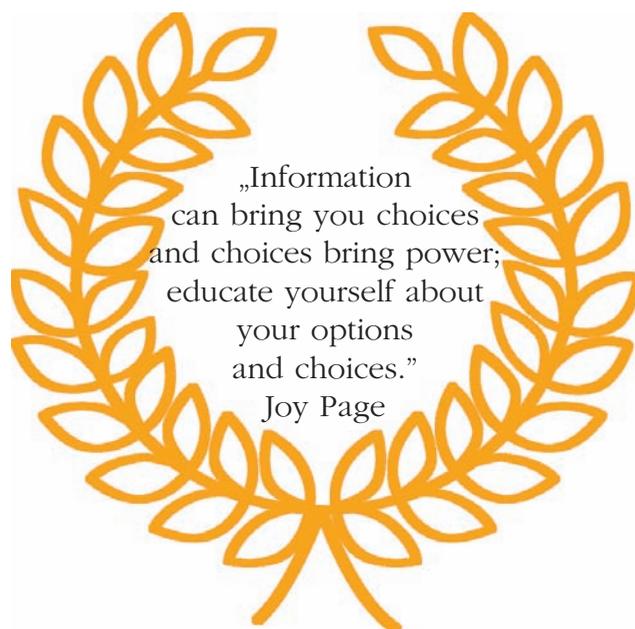
of use" (ISO 1998). Another key concern for a software application is user experience defined as „a person's perceptions and responses that result from the use or anticipated use of a product, system or service" (ISO 2010). The increased number of tools to measure and manage usability and user experience are matched by an increased volume of software generated data provides software's teams with various types of analytics for their technical and business decision. Among the sources of data taken into consideration for this analytics are included: source code, bug reports, code reviews, execution data, user feedback, and telemetry information.

This paper is focused on how to make software application user-friendlier through the means of user experience methods and data, particularly this paper will analyze synergies between thematic content analysis (TCA). The most commonly used list of user experience research methods entails:

○ Qualitative methods: Usability lab studies, Ethnographic field studies, Participatory methods. Focus groups, Interviews (direct, phone), Diary studies, Message board mining, Customer feedback via email, forum, customer support chat, etc., Task analysis, Contextual design, Prototyping;

○ Quantitative methods: data mining/analysis, surveys, A/B Testing, Web analytics, First click testing, Eye tracking.

Falling under the user feedback analysis, (TCA) could be used to contribute to increasing the user-friendly qualities of a software application. The data used by TCA for this purpose can be any qualitative data produced by the interaction with the clients or users. It can consist of: interviews; focus-groups; open questions within questionnaires; exchange of messages between customer support and users; forum conversations etc.

Thematic Content Analysis

Content analysis has been used throughout time in different domains and for different purposes from interpreting texts, establishing the authenticity of documents, etc. The thematic content analysis was mostly used in social research with a focus on media studies, political sciences, market research, etc.

A key component of the qualitative research spectrum, the thematic content analysis provides interesting ways to present analyze, interpret written or oral textual data. TCA provides insights into the experiences, perceptions, feelings, etc. of the analyzed public.

TCA could be used both within inductive or deductive approaches: starting from the data to identify relevant themes, on one hand, or starting from a set of relevant themes and analyzing to what extent and how the analyzed data refers to those respective themes, on the other hand. The two approaches could be mixed within the same methodologies, depending on the objective of the project and available data.

The thematic content analysis implies a process with a succession of stages. A comparative literature review presents similar stages described by different authors in dif-

ferent contexts referring to thematic content analysis identify a similar process as per the data presented in table 1. Components of data analysis are Data collection, Data display, Data reduction, Conclusion drawing/verifying (Miles, Huberman, 1994).

Resuming the different approaches described above, the process of TCA starts with becoming familiar with the data, structuring the data and reading through it. The next step is to establish a list of key themes/categories (that are addressed by the data) and/or establish to what extent the data addresses themes of interest for the study. Then it follows grouping the data by themes/

categories, recoding data or data reduction within each theme/category and, finally, analysis (Figure 1).

Working with themes allows the researcher to regroup the data referring to the same idea/ideas and so to respond to the research questions. TCA finds correspondence between users' perceptions, attitudes and behaviour, on one hand, and abstract concepts, on the other hand. Defining or identifying themes can be performed before, during or after data collection and before or during data analysis (Figure 2) (Ryan and Bernard, 2003, pp. 85-109).
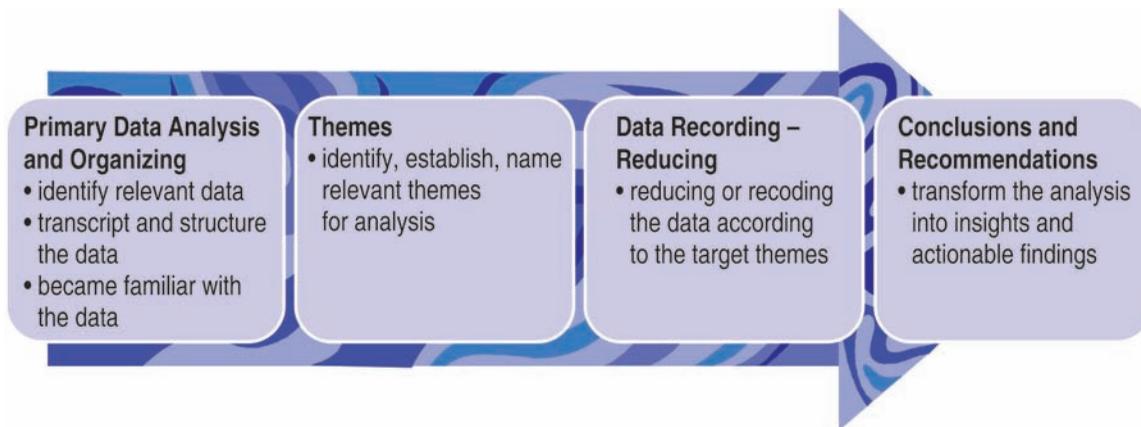
Figure 1 – *Phases of Thematic Analysis*
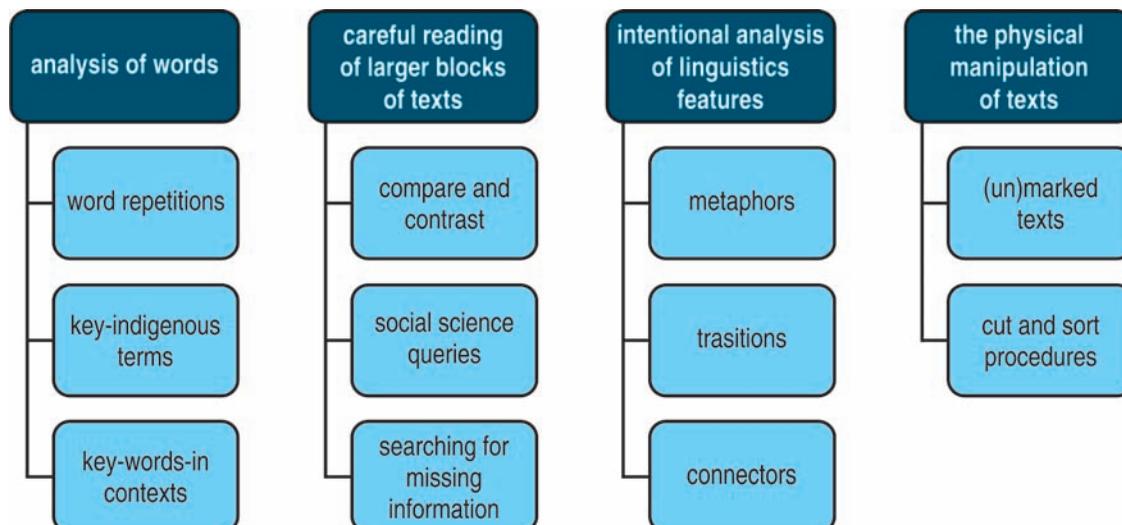
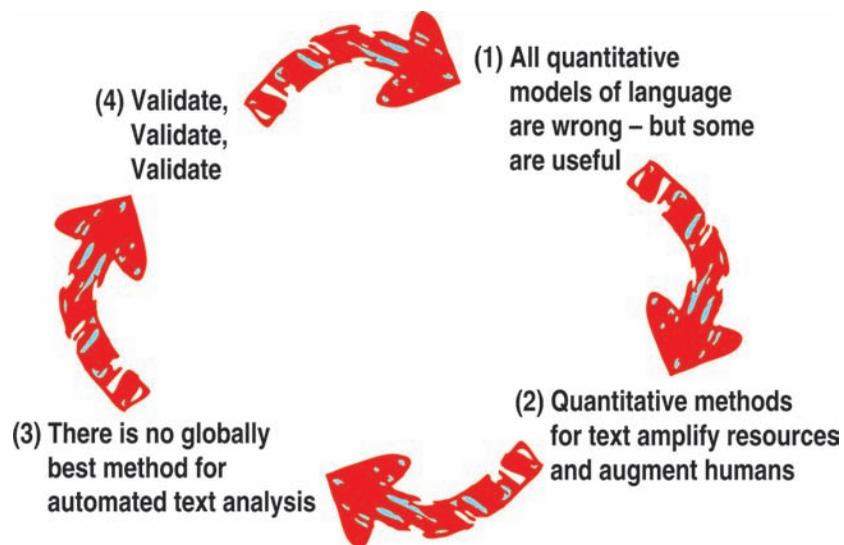**Figure 2** – *Techniques for theme discovery and defining*

grasp for insights and understanding of analyzed processes (analyzed public's perception, attitudes, behaviour) a qualitative approach mixed with quantitative tools is recommended.

Automatic Tools for Thematic Content Analysis

A number of tools for automatic content analysis have been developed and technological developments make these tools more and more sophisticated. Using such tools could provide advantages such as: processing large amounts of data within a reduced time span; improved capacity to generalize the findings of the research;

Deciding to use quantitative tools to content analysis should be guided by principles such as Figure 3 (Grimmer and Stewart, 2013, pp. 1-31).

TCA could contribute to analysis and decision making through its explanatory and exploratory values. For large volumes of data, employing quantitative tools for TCA might be beneficial however for a better

**Figure 3** – *Four principles of quantitative text analysis*

Relying completely on automatic tools for TCA is not possible, they need to be complemented in interpreting and establishing the relevant themes and methodology by researchers.

Applicability of TCA for Software Applications

The results of a thematic content analysis could contribute to a number of areas, often time correlated. These areas might be different depending on the model of business, nature of the product and/or service, addressed target group, software's life cycle stage, etc. TCA findings could contribute to decision making in areas such as: Strategy, business; the product (software) itself (design, testing, implementation, maintenance); Communication; Sales process; Customer support.

Another overarching component influencing all of the above refers to the organization/company, internal processes and culture. The process of making a change falling under any of these components needs to be correlated with the implications brought about by all the others (Figure 4).
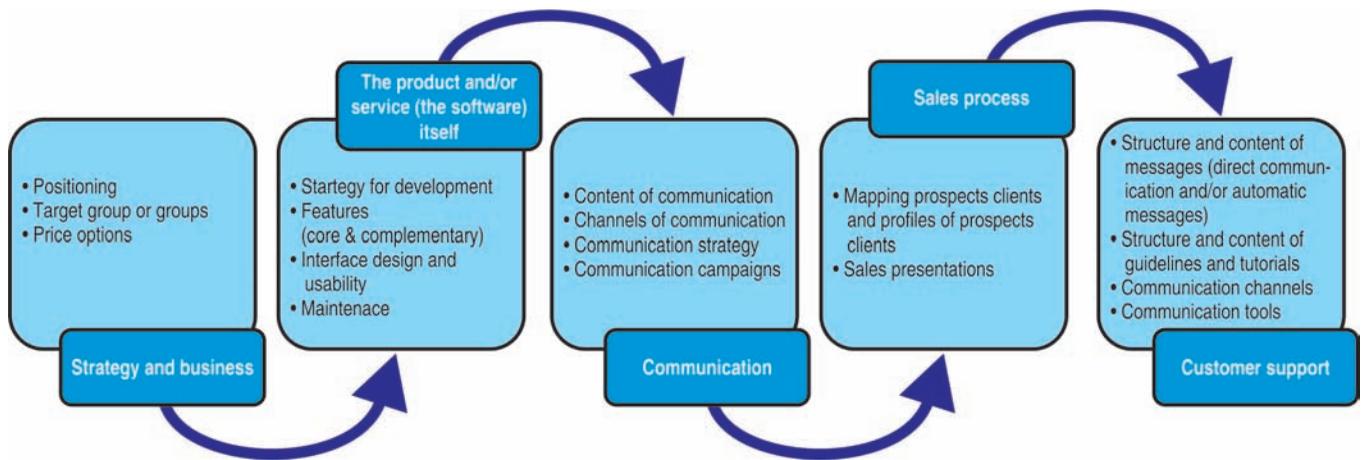
Figure 4 – *Areas due to benefit from the findings of TCA*

1. Strategy and business:

a. Positioning – identify and/or consolidate a „unique selling proposition" that would distinguish the software application from another similar competitor;

b. Target group or groups – identify, describe and treat distinctively different segments of clients (based on their needs and resources) to whom the software application addresses. Possible criteria for segmentations might include: demographic characteristics; region geographic spread, venue; size in terms of users, sales, etc.; industry, etc. Segmentation criteria vary a lot depending on the industry;

c. Price options – aligned with the positioning and segmentation decisions.

2. The product:

and/or service (the software) itself (features, usability, user-friendliness, viewability) in relation to access to info when using the software, navigating through menus, tracking price changes, etc.

a. Strategy for development
b. Features (core & complementary)
c. Interface design and usability
d. Maintenance

3. Communication:

a. Outgoing communication: Content of communication; Channels of communication; Communication strategy; Communication campaigns;

b. Customer support: Structure and content of messages (direct communication

and/or automatic messages); Structure and content of guidelines and tutorials; Communication channels; Communication tools.

4. Sales process:

a. Mapping prospects clients and profiles of prospects clients;
b. Sales presentations.

Using TCA research could provide the grounds for further comparative monitoring and analysis regarding customers' needs, behaviour and experience in relation to a company's products and services. TCA findings could be integrated into a broader analysis using other data and tools such as: competition analysis; feedback questionnaires and/or interviews with users; consultative sessions with customer support, developers and other internal relevant departments interacting with the software application; explore publicly available secondary data e.g. forums, groups, statistics, relevant research reports & white papers.

Table 1 – *Phases and stages of TCA*

Phases and stages of theme development in qualitative content and thematic analysis (*)	Phases of TCA (**)	Steps in analyses employing thematic networks (***)

Initialization
   Reading transcriptions and highlighting meaning units;
   Coding and looking for abstractions in participants' accounts;
   Writing reflective notes.
 Construction
   Classifying;
   Comparing;
   Labelling;
   Translating & transliterating;
   Defining & describing.
 Rectification
   Immersion and distancing;
   Relating themes to established knowledge;
   Stabilizing.
 Finalization
   Developing the storyline
	Phase 1: familiarizing yourself with your data
	 Phase 2: generating initial codes
	 Phase 3: searching for themes
	 Phase 4: reviewing themes
	 Phase 5: defining and naming themes
	 Phase 6: producing the report
		Analysis stage a: reduction or breakdown of text
		 Step 1. Code material
		  (a) devise a coding framework
		  (b) dissect text into text segments using the coding framework
		 Step 2. Identify themes
		  (a) abstract themes from coded text segments
		  (b) refine themes
		 Step 3. Construct thematic networks
		  (a) arrange themes
		  (b) select basic themes
		  (c) rearrange into organizing themes
		  (d) deduce global theme(s)
		  (e) illustrate as thematic network(s)
		  (f) verify and refine the network(s)
		 Analysis stage b: exploration of text
		 Step 4. Describe and explore thematic networks
		  (a) describe the network
		  (b) explore the network
		 Step 5. Summarize thematic networks
		 Analysis stage c: integration of exploration
		 Step 6. Interpret patterns

(*Vaismoradi, 2016, **Braun and Clarke, 2006, ***Attride-Stirling, 2001)

Conclusions

Two important landmarks, in relation to the users, in designing, operating and maintaining software applications are user experience and usability. There are standards issued by International Organization for Standardization that define both these concepts. In the same time, the amount of data taken into consideration for different business and technical decision include data from a different source: code reviews, source code, bug reports, execution data, user feedback, and telemetry information.

This paper argues that a qualitative method, thematic content analysis (TCA), could provide useful insights for business and technical decisions in the context of designing, operating and maintaining software applications. Developed in the field of social sciences, TCA extended its use in other domains, a software application could be one of these.

Literature review reveals the following steps or phases of TCA: Primary Data Analysis and Organizing; Themes; Data Recoding – reducing;

The findings of TCA could contribute to improving business and technical decision making processes in areas such as: Strategy, business; the product (software) itself (design, testing, implementation, maintenance); Communication; Sales process; Customer support.

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„In the new economy, information, education, and motivation are everything."
William Clinton
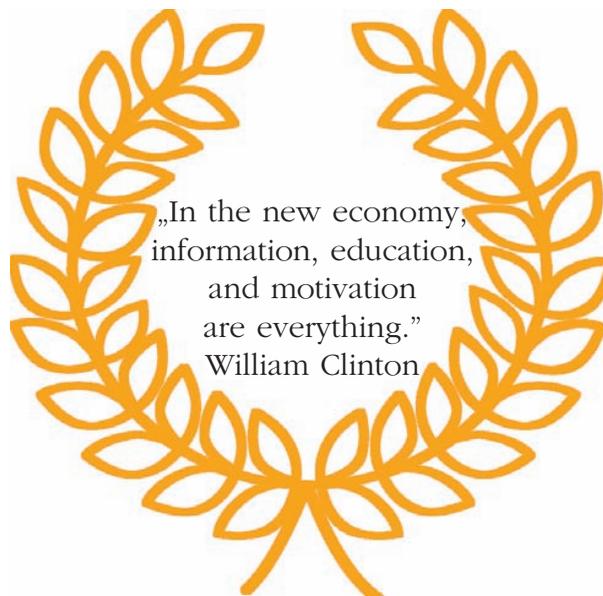
A New Structure for the Music Industry

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Abstract

The music industry is preparing for a new and secure online standard digital audio format, namely „.bc – dotBlockchain", which uses Smart Contracts and Blockchain technology distribution through encrypted virtual currency transactions. Such radical changes are imminent in the near future and will represent the interconnected decentralized inclinations of the socio-technological systems in the music industry, in order to balance the transparency of the copyright of the online digital musical content. The purpose of this paper is to highlight the differences between classic and modern system architectures and to analyze the process of creating a balanced system for the music industry. The secondary research aim is to identify, on one hand, the weaknesses of the centralized systems and on the other hand, the advantages of the system-of-systems which attract the attention of market development. The research findings can be of real interest to developers and experts seeking ways to reposition the interdisciplinary domain of music.

Keywords: Decentralized databases, System of systems, Blockchain technology, „.bc" digital file format, Economic aspects of the music industry

Introduction

The contemporary music industry uses centralized database models, which are in a considerable number on a global scale (Suich, 2013). There are over 180 core international databases such as iTunes Music, Google Music, Spotify, YouTube, Soundcloud and others and more than 5.000 distinct, non-interoperable databases established on the ownership principles of a company. A major drawback of centralized databases is a single point of failure vulnerability. As it is represented in Figure 1(a),

„We are drowning in information but starved for knowledge."
John Naisbitt
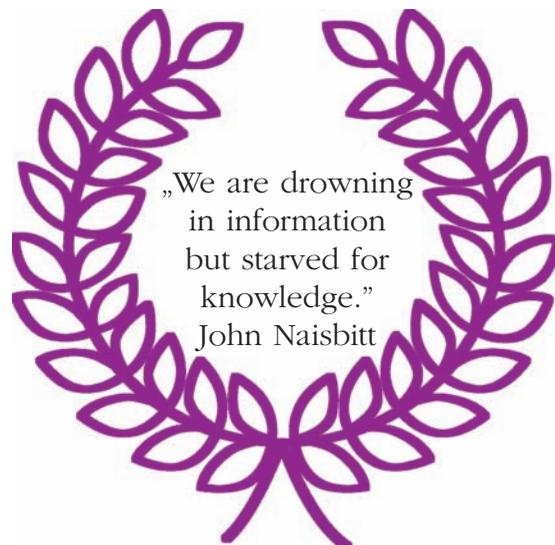
Once the centralized database fails to function, the whole system will stop working. The consequences of such failure are considerable in terms of scalability of a company.

Especially the potential points of failure are extremely high in the current centralized architecture of the music industry (Meyer, 2017).
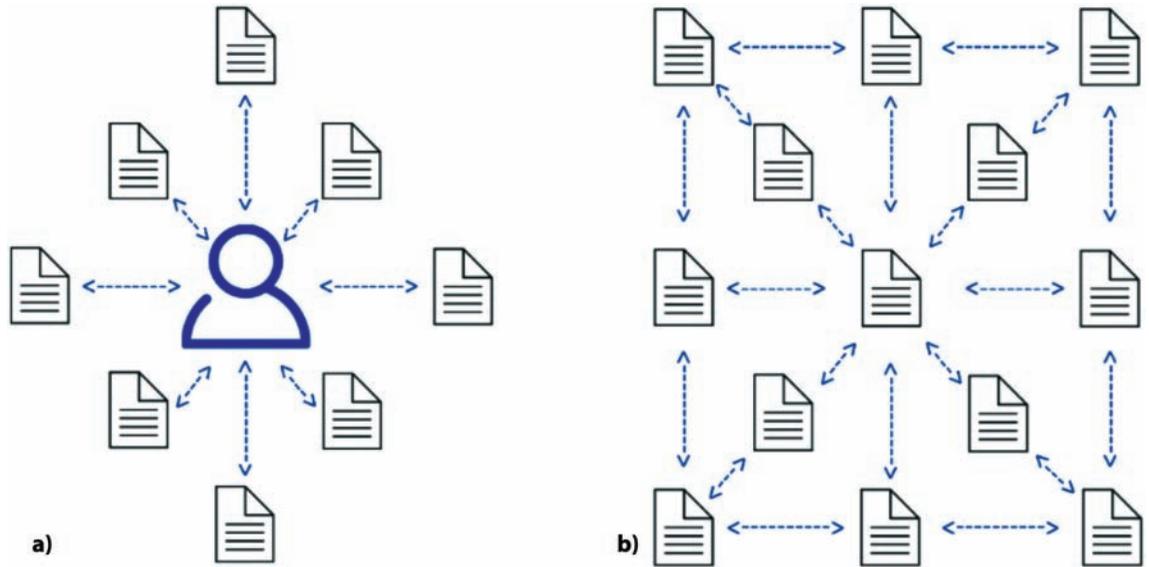
Figure 1 – **(a)** *Interaction model of centralized user databases*
(b) *Interaction model of distributed databases*

Blockchain technology is a decentralized distributed system architecture, which allows its users to run and interoperate with a common database. As represented in Figure 1(b), in Blockchain-based system architecture, there is no central database and all users interact with each other peer to peer.

The fact that nodes in the blockchain based network are interconnected and share same information at each time, holds the maintenance of public information (such as users and consumers) kernel. Also, the distribution degree of the blockchain-based architecture will drastically reduce the single point of failure vulnerability, because it is very difficult to simultaneously attack millions of connected nodes in the distributed network with the purpose of shutting down the whole system. Because even if one node is attacked, other nodes will keep the

network working. The other important feature of the blockchain architecture is the level of transparency and traceability of the system. Any change in the system at any time is reflected in „*Blockchain"* and is visible to all the users simultaneously. This feature will ensure the confidentiality and integrity of the information inside the system.

Since blockchain technology is in the first stage of diffusion in different industries including the music industry, the advantages, and disadvantages of the technology has been not stated clearly. Therefore, this paper aims to highlight the differences between classic and modern music system architectures and to analyze the process of creating a balanced system for the music industry using blockchain technology. The rest of the paper is as follow: Section two will provide the methodology description

for creating a blockchain based music format. In section three an open architecture structure based on system-of-systems models is proposed for the blockchain based system. Section four concludes the discussion on blockchain technology advantages for the music industry.

A primary research has been done by the authors, regarding the aspects of the modern online music file formats that have become unsafe and problematic to trace in an ever-growing Internet. Concerning the study of implementing a new digital format for the music industry is an important step in its future. The „.bc" – dotBlockchain audio format, in other words, **My_Song_Name.bc** instead of the classic **My_Song_Name.mp3**, is a new type of compressed digital secure format owned and managed by the music industry, such as the logic of popular classic audio format such as Microsoft Word (.docx), Google Docs, etc., in order to reduce the volume of a digital file (Suich, 2013). The dotBlockchain audio format is specially programmed in order not to be generated without the manual introducing in its content the minimal viable data and a copy of the song. The common language that „*dotBlockchain*" establishes is confirmed by the fact that every time a.bc file is created, it records itself permanently on the Blockchain and monitors each change, allowing for effective communication across the distributed networks of the future music industry.

A New System-of-Systems Based Online Architecture

An open online architecture structure based on system-of-systems models is proposed upon a blockchain system. All information in a Blockchain system is replicated and synchronized on distributed networks, using link bridges called „plugins". These offer each type of actor in the music industry to communicate with the Blockchain technology through the system-of-systems' common „.bc" digital online format, as shown in Figure 2.
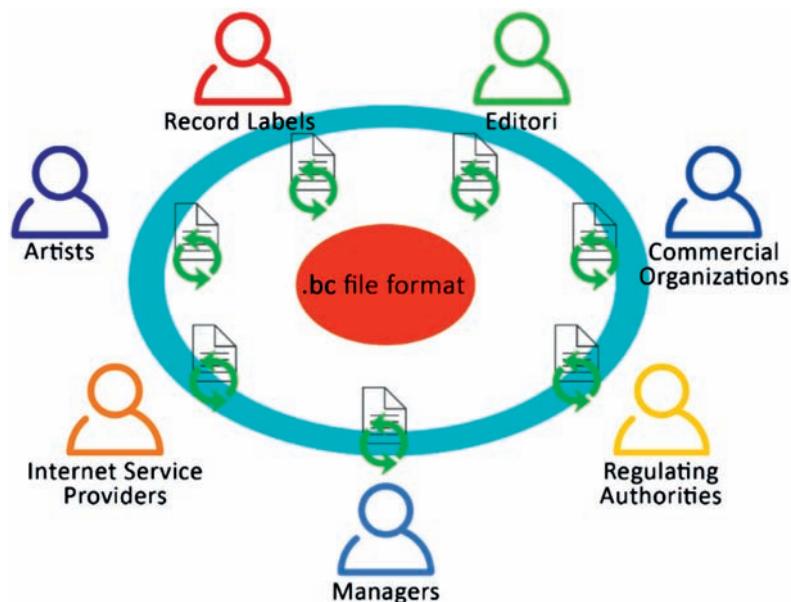

Figure 2 – *Actors in the modern music industry – distributed and interoperable databases*

If the musical content is detached from the „.bc" format, the song becomes un-readable on modern digital devices and digital service provider networks, in compliance with regularization formalities. The industry will develop and produce new and special electronic devices that will be able to play „.bc" files because it is the „trust" that the system requires from users and it brings together all music industry actors to communicate effectively with each other by exchanging the information in a transparent and secure way.

The „Trust" of users in Blockchain system-of-systems architecture

Trust in technology has always been viewed with some scepticism by society until it has been scientifically demonstrated. Social platforms such as Facebook and Twitter use a simple concept called *Tagging"*, based on the principles of **APPROVE**, **IGNORE**, and **DENIAL**. The Facebook platform has introduced the person tagging model in a digital photo or video, posted by a user, represented in Figure 3 (Meyer, 2017).
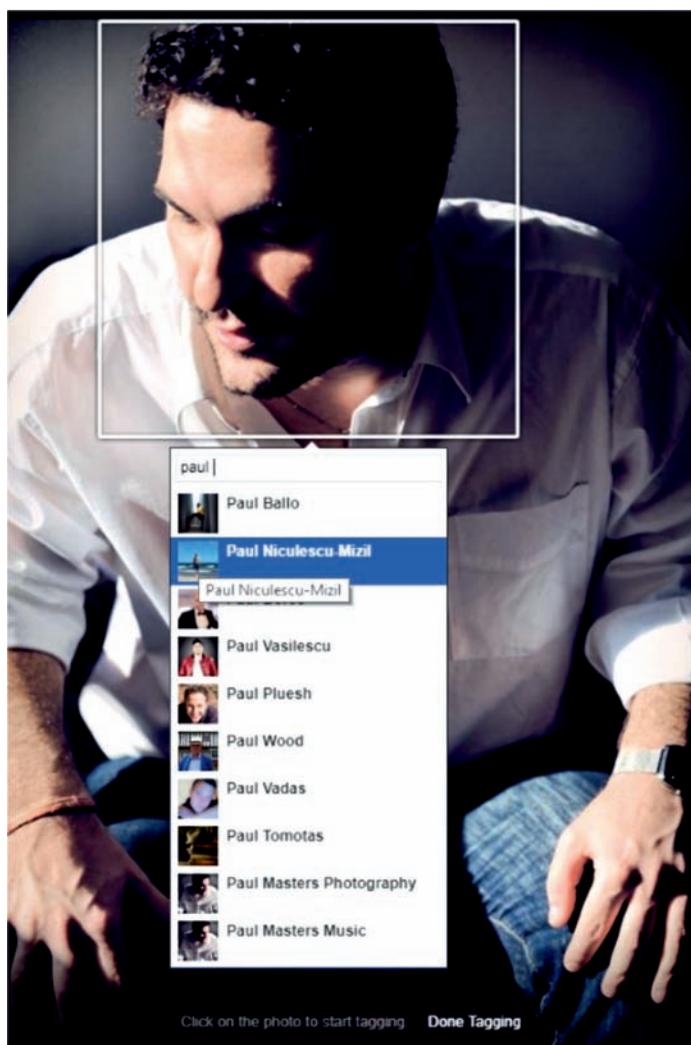
Figure 3 – *The Facebook tagging system*
(Source: S.M, 2018)

This analogy contributes to the way „Trust" is built into a public ledger because once people have tagged themselves on digital content such as photos, music or video content, and they have approved „marking", a new version of the „Truth" is reproduced through this content:

- **APPROVE** OF „MARKING" = **TRUE**
- **IGNORE** OF „MARKING" NEARBY = **TRUE**
- **DENIAL** OF „MARKING" = **DISPUTE**

All these „Trust" states are intended to be solved and ultimately lead to „Truth", such as the „Tagging" and „Pending" models represented in Figure 4.

Figure 4 – *Graphic illustration of the contents of a „.bc" file*
(Source: S.M, 2016)

A way similar to Facebook's social platform to build „Truth" and „Trust" in the architecture of the music industry is in the form of the approval of all involved parties, such as artists, members of a musical band, artist information, contacts (such as PayPal), as well as regulatory bodies such as record labels, publishers, copyright collections, licenses, social platforms (Facebook, Twitter, Instagram, Spotify, etc.) as represented in a complex system-of-systems like Figure 5.

The viability threshold for musical content can be observed and verified in detail, as presented in the SOCAN interface, where the information of a song is updated, checked and approved by the various regulatory bodies, see Figure 6. As long as the information remains persistent in the digital audio content, even if it is on multiple databases, only Blockchain technology can play back the status of a song from the perspective of information enclosed.

The „.bc" (dotBlockchain) architecture is developed to be a system of self-regeneration of the information contained, and this is achievable by allowing the expression of digital rights. The authority is registered at the level of the user and digital music content, a multi-functional authorization, a „Tagging" system and synchronization of nodes in the distributed network to save the changes in one direction, namely ahead. Blockchain logs cannot be changed or manipulated in previous events because the architecture of this kind of system is immutable and intended to recreate the historical truth of musical creation.
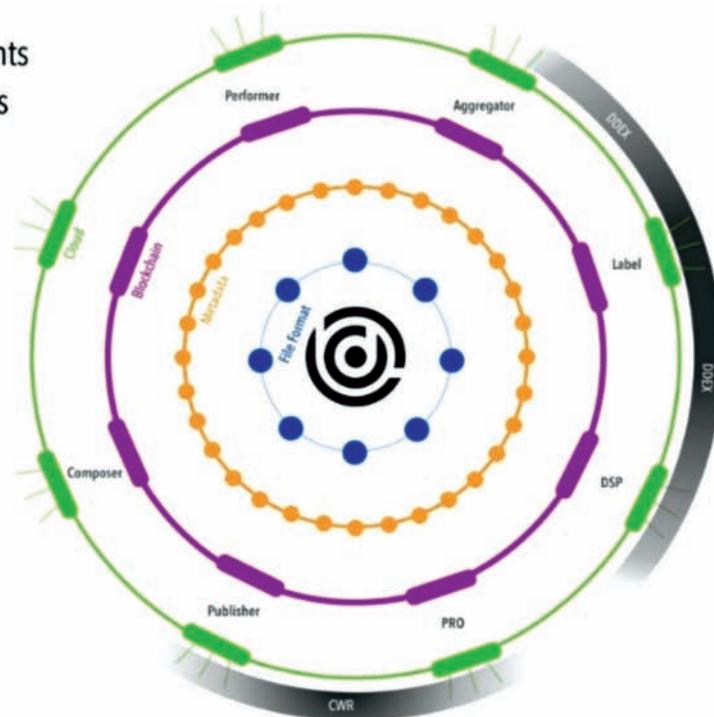
Figure 5 – *dotBlockchain concentric system-of-systems architecture*
(Source: S.D., 2016)
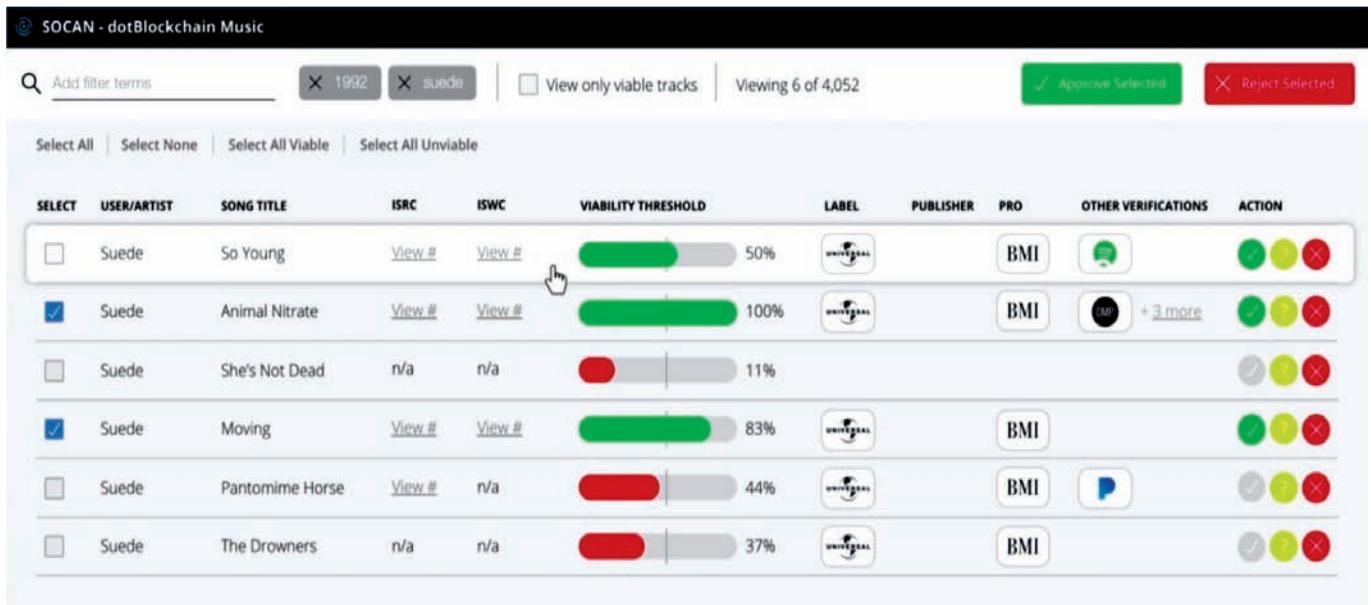
Figure 6 – *Graphical illustration of the viability threshold monitoring*
(Source: Socan 2017)

Any other information beyond the minimum viable data is optional, because when one creation is made public (e.g., copyright of expiration date) is considered to be private between contractors (sensitive data and investments) (Nielsen Statistics, 2017).

Conflicts are resolved and are run across the distributed network. The parties involved have the opportunity to work together to resolve the dispute and once solved in the Blockchain database architecture, it is resolved across the entire network as well as in the digital music content as the first secured existing key is accessed.

For an efficient peer-to-peer distribution of global music creations, a distribution warehouse is created, which is the establishment of the first place on the Internet where users can see the history of the creations historically and legally.

The most important factor is that the participants with non-constructive intentions

will reveal themselves to all those using these Blockchain decentralized system-of-systems. Permanence creates a deficiency that allows each digital content to own „permissions" and „obligations", namely the ability of an artist to grant permission to use his creation, in exchange for obligations to an applicant on increasing levels of interest, such as the level of album creation, the level of a movie or commercials, and more, for an efficient and rapid monetization of each creation in the future (Taylor, 2014).

The created „.bc" file (dotBlockchain) is added to a globally distributed database of copyrights, every time a song is composed to create scalability of the system. Users who will be affected by this new type of digital format are those who are currently taking advantage of the lack of transparency, piracy or those who are slowing royalty payments for digital music content.

Users Versus Revenue from „Payment Subscriptions" and „Advertising Payments"

This model offers many companies the ability to reach the goal of a business, capturing as many customers as possible. The benefits brought by this model are favourable when there is a considerable audience on an online platform, and companies are willing to pay for it to access with personalized advertisements (Shubber, 2014).

Table 1 and Figure 7 describe the revenue generated by the „subscriptions" model and the „advertising subscriptions" model and the number of users in 2016 from the global online music industry. The revenue measurement unit is set in millions of users and millions of USD.

Table 1 – *Proceeds from the „subscriptions" model and the „advertising subscriptions" model and the number of users in 2016*

|	Users (millions)	Revenues (millions USD)
Subscriptions	68	2100
Advertising subscriptions	900	634

(Source: IFPI, 2016)

The graphical representation in Figure 7 shows the existence of a market value difference between „subscription" model users and those using „advertising subscriptions" model, namely the free access. This critical distortion is the unbalanced way of remunerating artists and investment in the music industry.

The European Commission reported this situation in 2016 and accepted government intervention by initiating legislative proposals. This intervention was caused by the grouping of many affected sectors in the music industry, with the position to move to action to redress the critical situation (IFPI, 2017).

„We need to be diligent in resolving the difference of value to ensure that the income generated by music, which brings so much to people's lives, is appropriately weighed up by artists and investors. It is truly a step forward, recognizing this situation by the European Commission" Stu Bergen, CEO, International, and Global Commercial Services, Warner Music Group, 2016 (Oliver, 2016).
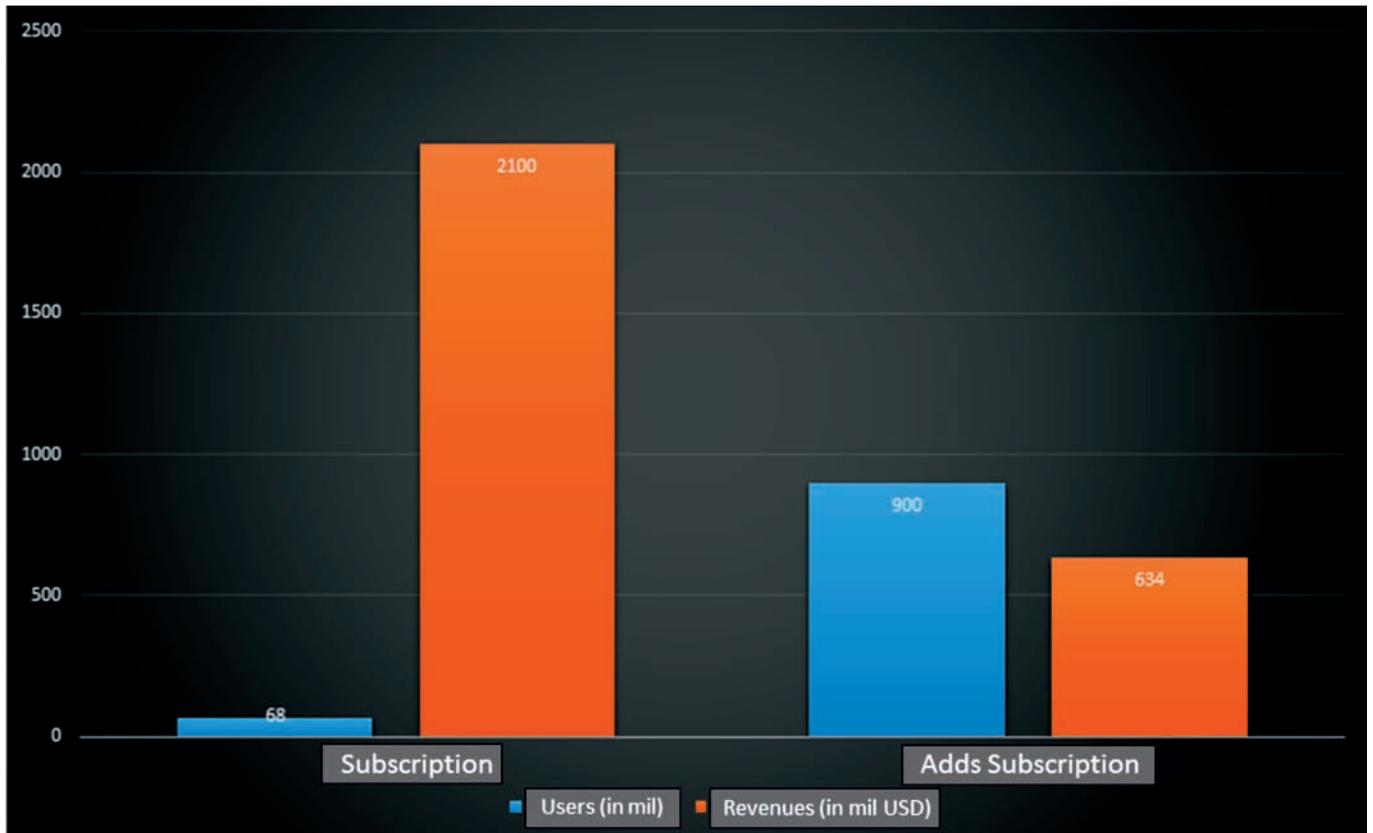
Figure 7 – *Graphic representation of global revenue from subscriptions vs. users in 2016*
(Source: IFPI, 2016)

Conclusion

The music industry encounters for some decades a true deficit in synchronizing musical content with the media formats and their value. Along these decades' enormous amounts of funds were insufficient well distributed towards a balanced remuneration to the main source of content- and value creating artists.

The modern age of pervasive computing capabilities of the latest technology, engaged the global distribution of music, at first through the main online sales platforms like iTunes Music, Amazon.mp3, Spotify etc., but all these business models failed to return the created value to the artists so that they can continue to produce

this intangible asset, vital for the music industry.

Along with these major global issues of the music industry, the Blockchain technology promises a different approach toward these issues. dotBlockchain Music – a young company from the United States of America, focused their interest in studying the file format divergences across the Internet and the file piracy issues and came up with the concept of a new digital online file format, namely „.bc" – dotBlockchain. This particular file format has its roots in the system of systems engineering of distributed databases and Blockchain technology. The high-security file format is designed to respond the needs of technological innovation to achieve a balanced
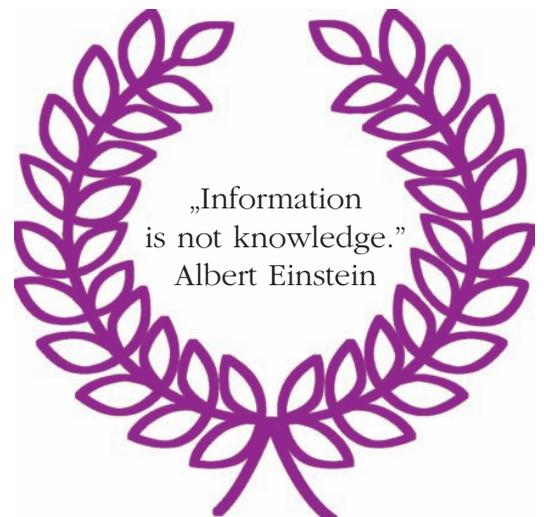
remuneration value towards the artists. The capabilities of such innovation will help the artists achieve their authority to decide what he or she wants to be done with its content in the digital virtual space era.

From the economic point of view, the introduction of proven „Trust" into the system-of-systems architectures, the secure distribution based on consensus can be achieved to be of automatized nature across the Internet, disrupting the contemporary business plans and dominance over the music industry by the big players like Warner Music Group, Sony Music, and others. Big budgets are being spent for embezzling cryptocurrencies in innovation investment for the music industry. Welcome to the Internet of Value.

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„Information is not knowledge."
Albert Einstein

Knowledge Process Outsourcing (KPO) and the IT Services

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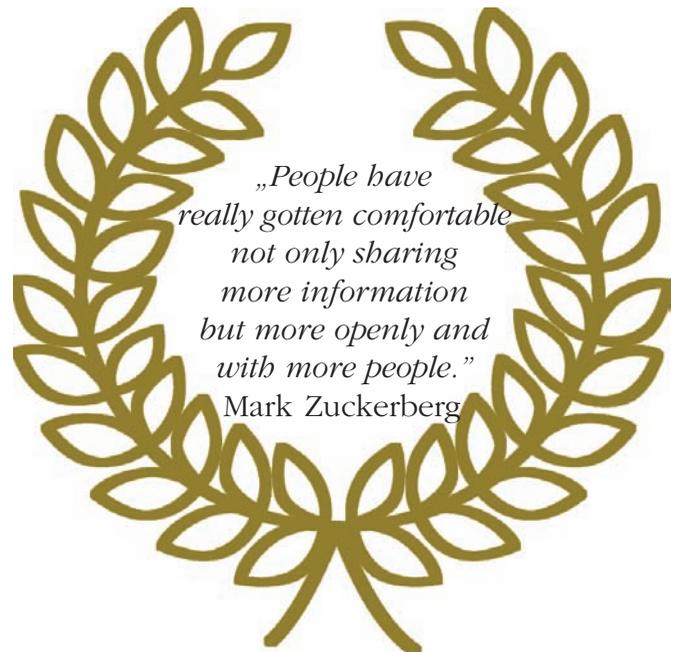(1) HXA BIZ Bucharest, Romania, (2) University POLITEHNICA of Bucharest, Romania

The progress in information technology and the growth of knowledge-based industries have created new business opportunities at international level. Corporations have evolved from outsourcing business processes to outsourcing high-value processes. This led to the emergence of a new trend Knowledge Process Outsourcing, KPO. This includes market research and data management, research and work on intellectual property, equity and finance, analysis etc. In this article we examine the premises that led to the appearance of KPO and how they are reflected in the literature. Also, a synthesis of the factors influencing the success of outsourcing processes has been made, which should be taken into account in the KPO decisions. Another important chapter is intended to present the benefits and risks of this process and it is suggested a way for an organization to increase the likelihood of success in implementing KPO.

Keywords: Knowledge Process Outsourcing, Intellectual resources, Quality service, Success factors, KPO risks

The Premises of KPO

In recent years, we are witnessing a rapid change from an industrial economy to a knowledge-based economy. In this type of economy, the efficiency of activities and processes is based on information and know-how. The key to success in the knowledge economy is the highly skilled workforce. Also, the long-lasting competitive advantage is based in particular on intellectual resources rather than natural resources or cheap workforce (Agarwal, Nisa, 2009).

„People have really gotten comfortable not only sharing more information but more openly and with more people."
Mark Zuckerberg

62   FAIMA Business & Management Journal

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Technological progress and the growth of knowledge-based industries have created new business opportunities in the current global context. One of the opportunities with a major impact on the evolution of the world economy is outsourcing.

A literature review suggests there have been so far three major trends in the outsourcing industry: Information Technology Outsourcing (ITO), Business Process Outsourcing (BPO) and Knowledge Process Outsourcing or KPO (Mudambi, Tallman, 2010, pp. 1434-1456). Industry reports and news articles also seem to agree (Prahalad 2005, Baldia 2007, KPMG 2008). However, we also find that most of the available research seems to focus only in the first two waves. A first decade (after the '90s), outsourcing covered two types of services:

⮑ ITO: outsourced of a specific application, including servers, networks, software upgrades.

⮑ BPO: outsourced a certain activity such as accounting, procurement, recruitment.

Since 2000, multinational corporations have begun outsourcing value-added services, thus appearing a new trend in outsourcing processes:

⮑ KPO: involves the transfer of activities with a much stronger impact on company performance and a much higher degree of complexity.

The main types of KPO projects include: Intellectual property, patents, Market research, Consulting, Training, Legal services, Medical services, Research and development in the pharmaceutical industry, biotechnology, various types of analysis and data collection. Providers of such services are required advanced analytical and technical skills and a high degree of specialization.

In Table 1 are summarized the main activities that appear in the types of projects listed above and the skills and abilities necessary for the persons responsible for their deployment.

As regard to the outsourcing decision, the literature research indicates as a primary factor the reduction of total costs (at least 10% to 15%), in addition to other business benefits, including improved service quality, business process and access to new markets (Lacity, Willcocks, 2012). A similar hierarchy of key outsourcing drivers is also apparent from industry reports, which also mention cost reductions, greater scalability of operations, and standardization of processes as key factors (KPMG, 2013).

It also reported that only 56% to 63% of outsourcing practices are considered successful or positive by clients (Lacity, Willcocks, 2012) and that firms see Hybrid Outsourcing & Shared Services as critical for their future operating model (KPMG, 2013).

Table 1 – *Skills and abilities for new types of projects*

| Types of projects	Types of activities	Skills & abilities required
Engineering R&D	• 3D modeling; • conversion: 2D to 3D; • finite analysis; • computational fluid dynamics analysis; • technical specifications for tenders; • value engineering	✓ CAD/CAM; ✓ drafting & modeling; ✓ product design
Market research & analytics	• secondary & primary research; • conversion of findings to knowledge; • writing & editing; • formatting client reports	✓ statistical tools; ✓ research techniques; ✓ report writing & presentations; ✓ database research
Writing & content development	• editorial; • content delivery; • digitization of content; • data enrichment & warehousing; • pre-press work; • proofreading; • template designing; • text composition	✓ communication skills; ✓ journalism; ✓ experience in writing
Pharma R&D	• research & development; • drug discovery; • clinical research	✓ doctors; ✓ master's degree in science; ✓ PhDs
Healthcare services	• diagnostic; • genetic profiling; • oncology tests; • HIV & allergy	✓ medical degree; ✓ specialized subject knowledge

Legal services	• reviewing transactional & litigation;
	  documents;
	• drafting contracts;
	• research memoranda & due diligence;
	• reports;
	• prosecuting patents;
	• negotiations
		✓ knowledge in regional and
		  international laws;
		✓ adept in legal application;
		✓ ability to reason & research

Education & training	• content development; • private tutors; • curriculum design; • pedagogy	✓ teaching methods/techniques; ✓ cultural sensitivity; ✓ online teaching methods

(Source: Sathe, 2006)

As can be seen from the information presented above, not all outsourcing processes are finalizing with a positive result for companies that implement such processes. Therefore, a constant concern of the management of the organizations was the study of the opportunity of such a decision and the research of the elements that can lead to the increase of its success. Following the analyzes on the outsourcing processes in general, the identified success factors are presented in the Figure 1.

Characteristics of KPO: Knowledge process outsourcing has the following characteristics (Aleman, 2014):

◆ It is based on thought and personal engagement. KPO involves analyzes based on the abilities, experience and thinking of the person conducting the process. The recommendations made are the result of personal reasoning and not of a clear set of pre-established rules.

◆ KPO provides a guide. The process is based on the skills, knowledge of the domain and the intellectual ability of the performer, which ultimately provides a guide and not a set of rules.

◆ The process is complex. KPO is an ample process that requires many stages. It requires interpretation, analytical skills and complex reasoning.

◆ Requires a high level of qualification. Running such processes involves the existence of staff with higher education and/or with specialized knowledge and skills.

◆ It is part of a complex process. Unlike BPO where a whole process can be outsourced, in KPO it is outsourced a part of a larger process, so the customer and the provider form a team.
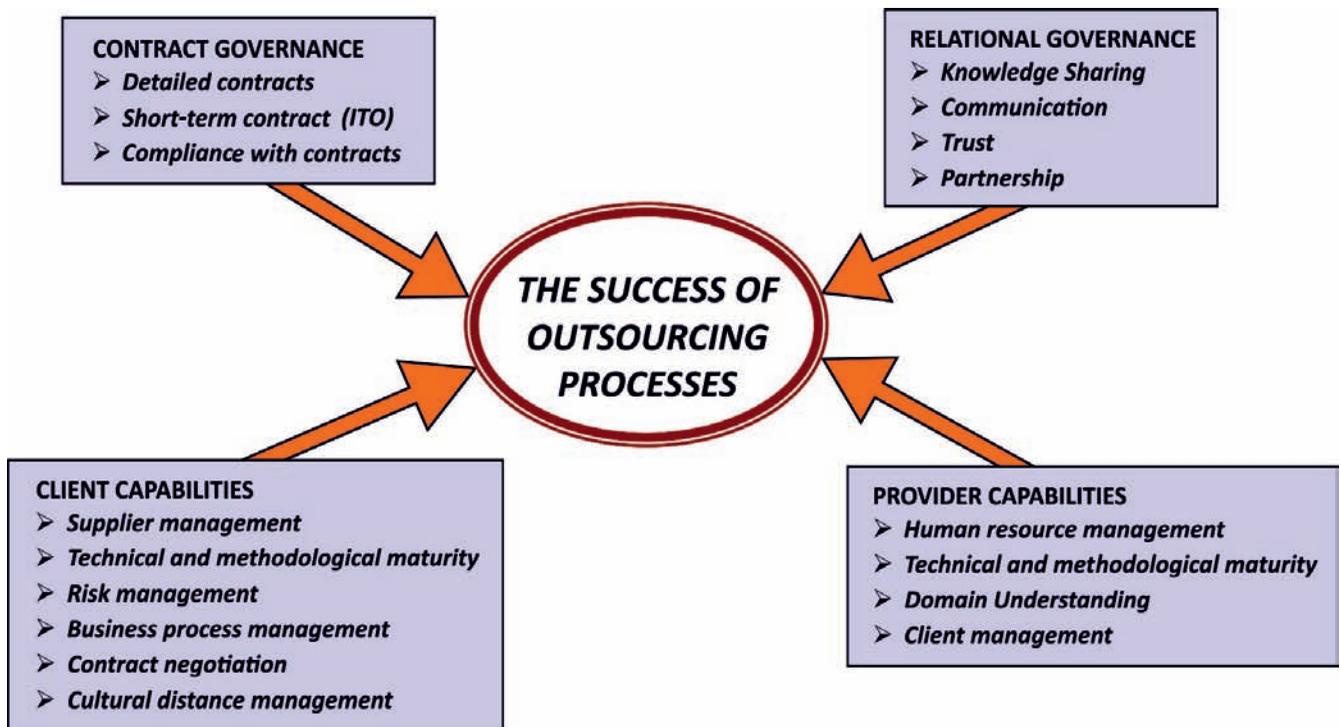
Figure 1 – *Success factors of outsourcing processes*
(Source: Lacity, Willcocks, 2012)

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The Benefits and the Risks

According to the specialized literature (Lacity, Willcocks, 2012), the total value of the KPO service market was estimated in 2016 at 28.94 mild. USD and is expected to increase in the next period. In the Figure 2 is presented the forecast of US KPO market evolution (in USD millions), by service category.

This increase will be driven, among other things, by the adoption of international standards for professional qualifications, the access to an extended range of professionals across the countries, the improvement of remote project management capability through the development of IT technologies.

KPO benefits. While the main benefits of BPO are to improve efficiency and reduce costs, the benefits of KPO are more difficult to quantify. By accessing a large mass of professionals in knowledge-based industries, companies can earn revenue growth or improve competitive advantage. In any case, the cost remains a considerable benefit, given that the cost of labor in the countries where these processes are outsourced is much lower than in the organization's home country. Another benefit of KPO is the transformation of fixed costs into variable costs, thus increasing the flexibility of companies that can increase or decrease staff according to the evolution of the business. A highly appreciated benefit of KPO is the ability to work in continuous flow, due to the advantage of time differences. For example, a financial institution may request an analysis of its equity by the end of a business day, and if a provider can carry out the overnight task, they may have it at the beginning of the next business day.
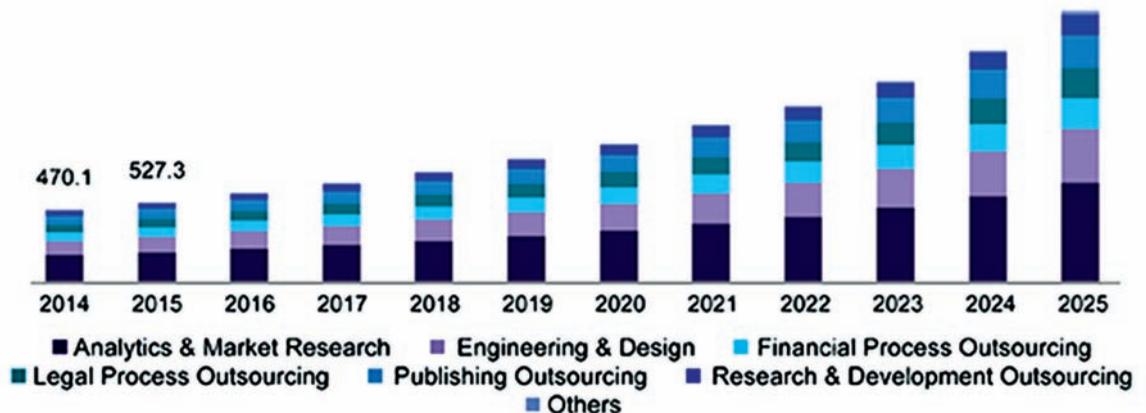
Figure 2 – *KPO – market evolution in USA*
(Source: Grand View Research, 2017)

KPO risks. In addition to the benefits described above, KPO also has a number of significant risks that need to be managed appropriately in order for the organization to achieve the maximum benefits of this process. Wrong management

66   FAIMA Business & Management Journal

of KPO risks can lead to losses and even to the definitive abandonment of the process. The risks involved in running KPO processes can be grouped into external risks and internal risks.

External risks refer to factors outside the organization and are less controllable.

◆ Finding a suitable KPO provider to deliver the necessary skills in terms of cost efficiency.

◆ Fluctuation of the exchange rate, which can have a significant impact on the cost of the process.

◆ Incapacity to protect the intellectual property of the firm.

Risks associated to the economic and political environment of the country where the KPO provider is located.

Internal risks are associated with the changes that will occur in the organization in the partnership with a KPO provider.

◆ Communication problems caused by language barriers; this aspect is of particular importance when a significant part of the process involves verbal communication;

◆ Risks related to the ability of organization to manage KPO providers located in another region/country.

Many managers lead their own teams without a formal process in which each decision is the result of analyzing specific parameters. As the team is in another location, in order to avoid a high level of subjectivism, it is mandatory to have quality and performance indicators.

◆ In some cases, the analyzes preceding the outsourcing reveal some weaknesses of the processes carried out in the organization, which determines the necessity of making a decision: either to optimize or outsource the process;

◆ Risks associated with the impact of KPO on employees.

KPO usually has a negative impact on employees' morale, and employees have an important role in document delivery and training of human resources of the KPO provider. During the outsourcing process, the organization is likely to lose some employees, and managers need to have a plan to reduce the likelihood of losing key talents before the process of transferring the necessary knowledge to the KPO provider is complete.

◆ The negative publicity which the organization may receive when it becomes known that it has transferred potentially private jobs, knowledge and information to a third party;

◆ Risks associated with the decision-making process and the KPO management program.

Success Factor

To increase the probability of success, an organization must use a structured approach to KPO's opportunity management. Such an approach is presented in the Figure 3.
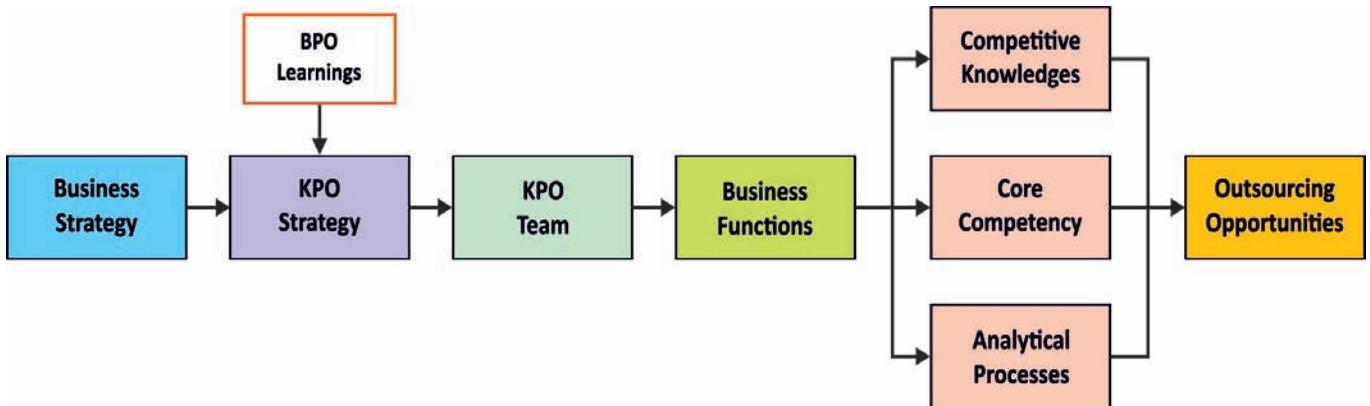
Figure 3 – *Structured Approach to KPO's Opportunity Management*
(Source: Sanchez, 2010)

Although organizations can build and implement KPO strategies without previous BPO experience, companies with such experience have a shorter learning curve, lower risk and a higher probability of success.

The project manager responsible for outsourcing should be someone with previous experience in such projects and with a high degree of empathy, given the project aspects human resources-related.

Organizations with experience in BPO and KPO have a central team that supervises a whole portfolio of outsourcing activities. This team establishes how projects are managed, evaluates compliance with outsourcing methodologies, and monitors provider performance during the project. Supplier selection must be based on their ability to provide significant competitive advantage and skills& talent.

Conclusions

KPO can reduce costs and increase process efficiency and allow companies to focus on revenue growth. KPO can also create professional opportunities for employees interested in monitoring and supervising positions. At the same time, KPO offers the possibility to outsource complex analytical processes that contribute to the development of new products and services and the exploring of new markets.

But KPO should not be considered the only option. Prior to making the outsourcing decision, companies need to look, based on internal resources, on better ways of doing business. The probability of failure caused by the previously exposed risks is high, and organizations must use a structured approach to implementing the KPO strategy.

This relatively new direction will continue to grow, and companies will know success if the KPO strategy is to be used to improve their services and performance and not just for cost-cutting considerations.

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„*The new information technology have practically eliminated the physical costs of communications.*"
Peter Drucker

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