

DIEM

Dubrovnik International Economic Meeting



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DIEM - Dubrovnik International Economic Meeting

IMPRESSUM

DIEM is a scientific journal that consolidates the research papers from the DIEM conference (Dubrovnik International Economic Meeting), and is issued by the University of Dubrovnik. It publishes high quality papers that contribute to the theoretical, methodological and empirical findings in the complex field of economics and aims at familiarizing the national and international scientific and professional community with it.

DIEM focuses on topics from all fields in economics and interrelated fields in the following topic areas: Banking and Accounting, Business Statistics/Econometrics, Controlling, Corporate Governance, Corporate Social Responsibility, Crisis Management, E-Business and E-government, Economic Growth and Macroeconomic Management, Education, Universities and Lifelong Learning, Environmental Economics, Regulation and Management, EU and new Member States, Financial Markets and Regulation, Infrastructure, Transport and Economics, Innovation and Innovative Business Models, Insurance and Risk Management, International Finance, IT Management, Labour Economics and HRM, Leadership, Marketing, Management, Mass Media and Economics, Microeconomics, Organization in new Business Environment, Organizational Change and Sustainability, Projects - Efficient Mechanism of Innovation and Entrepreneurship, Public Finance, Quality Management, Region and Regional Development, Risk Assessment and Management, SME and Entrepreneurship, Social Capital, Social Entrepreneurship, Strategic Management and Monetary Policy, Strategy and Competitiveness, Sustainable Development, Taxation and the Green Economy, Tourism, Trade and International Trade, Transparency, Ethics in Business and Policy Making.

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4th Dubrovnik International Economic Meeting

„Global Trends and Challenges in the Era of the Fourth Industrial Revolution (The Industry 4.0)“

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4th Dubrovnik International Economic Meeting

DIEM 2019

„Global Trends and Challenges in the Era of the Fourth Industrial Revolution (The Industry 4.0)“

**Under the auspices of the
President of Croatia Mrs Kolinda Grabar-Kitarović**



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Vanessa Druscat, Associate Professor of Organizational Behavior at the Peter T. Paul College of Business & Economics at the University of New Hampshire, Durham, NH, USA; world expert on group emotional intelligence

Title of the keynote: **THE ROLE OF SOCIAL AND EMOTIONAL INTELLIGENCE FOR LEADERSHIP EFFECTIVENESS DURING THE 4TH INDUSTRIAL REVOLUTION**



Frank Bezzina, Dean, Head of Department and Associate Professor Faculty of Economics, Management & Accountancy, University of Malta; Director of the Central Bank of Malta

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Title of the keynote: **AGAINST ALL ODDS: DIGGING UP THE EVIDENCE IN MANAGEMENT PRACTICE**



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Title of the keynote: **INDUSTRY 4.0, AI AND CIRCULAR ECONOMY – OPPORTUNITIES AND CHALLENGES FOR A SUSTAINABLE DEVELOPMENT**

FROM THE EDITORS

After the successful three conferences organised in 2013, 2015 and 2017, the University of Dubrovnik, Department of Economics and Business Economics organised the 4th Dubrovnik International Economic Meeting (DIEM 2019), an international conference for presentation of research results in the fields of economics and business economics, with the emphasis on global trends and challenges in the era of the fourth industrial revolution (The industry 4.0).

The mission of DIEM International Conference 2019 was to stimulate discussions of ideas, empirics and models for the Industry 4.0. Industry 4.0 is not a new technology; it is a new approach to achieve results that weren't possible 10 years ago thanks to advancements in technology. It is the move towards digitisation. Industry 4.0 will use the Internet of Things and cyber-physical systems such as sensors having the ability to collect data that can be used by manufacturers and producers.

We welcomed innovative applications, theoretical contributions, carefully evaluated empirical papers, and we particularly welcomed the work that combines all of these elements.

To this end, the meeting aimed to attract participants with different backgrounds, to foster exchange of opinions between different research fields, and to expose and discuss innovative theories, frameworks, methodologies, tools and applications.

Four eminent researches gave key note speeches and presented their work at the Conference:

- Vanessa Druscat, Associate Professor of Organizational Behaviour at the Peter T. Paul College of Business & Economics at the University of New Hampshire, Durham, NH, USA; world expert on group emotional intelligence, title of the keynote: THE ROLE OF SOCIAL AND EMOTIONAL INTELLIGENCE FOR LEADERSHIP EFFECTIVENESS DURING THE 4TH INDUSTRIAL REVOLUTION

- Frank Bezzina, Dean, Head of Department and Associate Professor Faculty of Economics, Management & Accountancy, University of Malta; Director of the Central Bank of Malta

- Vincent Cassar, Deputy Dean and Associate Professor Faculty of Economics, Management & Accountancy, University of Malta, title of the

keynote: AGAINST ALL ODDS: DIGGING UP THE EVIDENCE IN MANAGEMENT PRACTICE

- Erskin Blunck, Deputy Dean and Professor for International Management and Program Director of the MBA International Management at Nuertingen - Geislingen University, title of the keynote: INDUSTRY 4.0, AI AND CIRCULAR ECONOMY – OPPORTUNITIES AND CHALLENGES FOR A SUSTAINABLE DEVELOPMENT.

The fourth Dubrovnik International Economic Meeting - DIEM 2019 takes pride in participation of more than 150 scientists and practitioners from 21 different countries and co-operation with 15 partner institutions from national and international universities: Croatia, Bosnia and Herzegovina, Malta, Spain, Lithuania, Czech Republic, Poland and Macedonia. To our greatest pleasure DIEM has been recognised as an excellent platform to present new, contemporary issues and an active promoter of economic profession in the future.

Throughout the duration of this project, members of the Programme Committee, Organising Committee, Editorial Board of the journal DIEM, all the members of the international reviewing team and colleagues from partner institutions did their utmost and to them we express our warmest gratitude.

Dubrovnik, September 2019

Associate Professor Ivona Vrdoljak Raguž, PhD, Editor in Chief
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AGAINST ALL ODDS: DIGGING UP THE EVIDENCE IN MANAGEMENT PRACTICE

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1. INTRODUCTION

The fourth industrial revolution has begun and it's very different from the previous three revolutions. It's not about the steam which powered our factories in the first revolution, or the mass production model that dominated the second; It doesn't even have to do with the emergence of computer driven systems from the third revolution that we're living in today. Industry version 4.0 (i4.0 here after) is about connectivity; It's an opportunity to radically change the way industry responds to the needs of society and while the previous industrial revolutions were led by innovations in manufacturing processes and systems, the advancements of i4.0 will be driven by a smart, interconnected, pervasive environment. This new space requires new sorts of leaders and new sorts of managers; managers that are data driven and who see data as a means to add value to opportunities; but above all managers who can see beyond the data they are presented with; in other words, complex non-linear and non-prescriptive thinkers and decision-makers.

Is this achievable? Indeed, the opportunities for disruption are huge and those left behind will feel it immensely. There is still space for leaders of this new revolution to emerge but the race has already started, and understanding what current leaders are doing will help us appreciate what needs to be done to join them.

2. BACKGROUND

Most keynotes would often start with a list of ‘figures’ to point out the immense importance of the topic at hand. So here’s our best try and fair share of figures and we begin to argue that few doubt the potential significance or value of i4.0. The case for technological advancement in the manufacturing sector has never been stronger. And the expectations for i4.0 have never been higher. Analysts suggest that the i4.0 market will be massive. Gartner, a leading research and advisory company, believes that the Internet of Things (IoT) market will be worth almost US\$3.7 trillion by 2020. Morgan Stanley’s research suggests that the cyber security market will be worth around US\$183 billion by then. And IDC thinks that the virtual and augmented reality market will be worth US\$162 billion. In fact, according to KPMG, a rough estimate of current analyst estimates for the component markets of i4.0 suggest the market may amount to more than US\$4 trillion by 2020. But, and that is an emphatic ‘but’, we also believe that the real value of i4.0 comes not from the component technologies or capabilities but rather through the *integration* of automation, data, analytics, manufacturing and products in a way that delivers unique competitive advantages and unlocks new business and operating models. And this cannot be accomplished without achieving larger scale, greater integration across functions and a willingness to disrupt the status quo. In light of this we concur with a number of other field thinkers like Thomas Erwin, Global Head of KPMG Lighthouse, and part of the CoE for data-driven technologies, who argues that as companies learn to tap into the potential of the vast amounts of data emerging across all areas of operations, decision-making and action-taking are taken to a new level. The key words we want to ponder on here are therefore: *decision-making* and *action-taking*!

And we wish to focus on this specific issue because at the heart of all that renders the realisation of i4.0 is the fabric quality of our leaders, our managers and those in the current formation of our executive class.

But before we expand on these quality challenges, we first highlight the essence of i4.0 to create the background and establish the setting of our points in this keynote speech.

3. THE ESSENCE OF I4.0

Cleaning through the various models and literature of i4.0, we are struck by a number of simple but significant principles. These principles are more about the way *we should think* rather than *what we should do*.

We condense these principles into two: first, the need to focus on value and performance *before* technology; and second, the need to be bold enough and ask *why* one is pursuing change in this direction.

With regards to the first, we advocate that technology is a mediator in this process and not a precursor; i4.0 is not a new technology but it is a new approach to

achieve results that weren't possible 10 years ago but which we can now thanks to the advancements in technology if only we realise the added integrated potential of such technologies. With regards to the second principle, we need to reflect deeply about our ability to provoke our status quo, to think beyond what we often know, to see beyond what we can see and to undo a prescriptive mode of thinking, all which are paramount to i4.0. These are in essence, basic principles or drivers that push for a i4.0 'mentality'.

Therefore, more fundamental to these thinking processes, is the question: *How do we prepare our future leaders to think at this level and in this way in an era where data, information and evidence is on the one hand so accessible and yet, on the other hand, requires a fine skill of sieving and evaluating it to ensure better quality decision-making?*

For the purpose of this conference, we wish to approach this perspective as educators at heart and science-practitioners in the field, while also recognising and respecting the criticisms leveraged at evidence-based management (e.g. Learmonth, 2006, 2008; Morrell, 2008), we state up-front that we use EBM in its broadest sense (c.f. Morrell & Learmonth, 2015) and adopt it as our framework in our arguments. We emphasise largely the need to prepare our future business students with a strong appreciation for evidence and even more, a stronger appreciation to confront the available evidence and ask further bold questions.

We are quite aware that most traditional business schools and Business faculties still purport information in a taxing and over-loaded approach. As Jelley et al. (2012) have noted: "...the fact remains that MBAs and other management students are not typically taught to know or use evidence in their decision-making" (p. 337). Part of this deficiency arises because those engaged in the teaching of management are not themselves trained in the science of learning. And yet, this is in essence so much required for the realisation of i4.0.

In putting forth this keynote, we are indebted to the many ideas generated by scholars including Goodman and O'Brien (2012), Charlier, Brown and Rynes (2011), and our friend and colleague at the Centre for Evidence-Based Management and Professor at Carnegie Mellon University, PA, Denise Rousseau (2012a).

Let's take a time-line perspective of the 'history' of management first to take us through the journey leading to the 'i4.0 manager'.

4. AN OLD PROFESSION

Management is one of mankind's oldest practices in organized societies and there is profuse evidence that archaeologists and historians unearthed over the past decades.

The work by Witzel (2012) in his book 'A History of Management Thought' describes many of these milestones. In 1790BC, Babylonians wrote and observed the famous code of *Hammurabi* that enshrined laws and regulations related

to the transfer of goods and the conduct of trade. The Ancient Egyptians were masters of bureaucracy, adopting and maintaining very strict and tight control over the general management of people, workers and slaves. In India, classical Indian texts written around 2nd to 3rd century BC described how to manage society and its members. These texts present a form of a dialogue between the god *Krishna* and his follower, the warrior *Arjuna* and comprises of a number of philosophical thoughts including administration and the handling of power. In China Master Kong who is better known as *Confucius*, believed in a regulated economy and argued in favour of a balance between supply and demand to ensure the cutting down on waste. In Ancient Greece and Rome, influential philosophers like *Plato* inspired millions to follow through his important work on administration entitled *The Republic*. Deeply influenced by the Greeks, the Romans too had their own thinkers of administration like *Virgil* and *Vegetius*. Early Islam also took note of the traits of the virtuous leader, the importance of the profit motive and the need for free markets as captured in the works of *Ibn Khaldun*.

Management thought has remained in development throughout the later periods of world civilisation – from the medieval period to the Renaissance with recognisable advancement in the Industrial Revolution marked by approaches such as *Scientific Management* and the *Human Relations Movement*. Modern history of management is shaped and coloured by the growth of various management disciplines like marketing, leadership, theories about people at work, strategy, international business and the growth of business education.

5. IS MANAGEMENT AN ART OR A SCIENCE?

With time, management evolved to become *both* an art and a science. Let us take you back to the times of the boater hats, flat caps, the first talkies, Rudolph Valentino and Greta Garbo – or the roaring 20s for those who are less versed with modern history. Then Alfred Sloan advocated the scientific approach for management, arguing that: “*it is only a problem of management*”. However, management evolution often meant that the artistic portion often manifest itself as managers’ opting for choices as they feel best – or an attitude at the expense of management’s reliance on more perhaps scientifically driven evidence. It is unsurprising to note that management critics of the time often linked management to prevailing ‘quick fixes’ and relegating management discipline to a mere ‘management experience’. Peter Drucker – an influential and revered management thinker proposes that “*Management’ means... the substitution of thought for brawn and muscle, of knowledge for folklore and superstition...*” Indeed, a cursory review of some ‘best management guru tips’ casts doubts on the real scientific and trusted evidence-based foundation of these works and whether the prescribed formulae provided make any sense for managers in today’s complex realities of organizational life.

It is unsurprising to note that management scholars addressed this state-of-affairs in a number of studies, intended to separate, for example, research-based

principles from mere fads and fallacies. Pfeffer and Sutton (2006) comment on the lack of evidence-based decision making among managers in that *“managers are actually more ignorant than doctors about which prescriptions are reliable – and they’re less eager to find out”* (p. 2). In 2002 Rynes and her colleagues distinctively revealed that managers have a number of misbeliefs about specific topics that have been researched all too often but which for some reason, most managers will simply throw out and rely on what they guess should work best. Rynes et al., (2002) conclude that one of the main reasons for the propagation of incorrect management principles lies in the lack of up-to-date knowledge practitioners hold. More recently in 2008, Sanders and her colleagues assessed the gap between research and practice amongst Dutch managers, only to replicate more or less earlier findings. They suggest that there are large discrepancies between practitioners’ beliefs and what evidence might state. Similarly, Barends and his colleagues (2015) surveyed over 1,500 managers to assess the motives underlying managers’ apparent ‘ignorance’ in Belgium, the Netherlands and the US. This study revealed that time to consult evidence is a main barrier for translating research into practice. And finally, our own study in 2017 (Bezzina et al., 2017) showed similar results.

Beyond the details of these studies, what are the implications of these results to us as educators of management? To what extent can our management students and therefore future managers utilise the evidence and think critically about it without simply resorting to fads? In addition, what are the implications of these approaches to harnessing an i4.0 culture mind-set? But first, we’ll briefly sketch the inceptions of Evidence-Based Management which highly marks the approach we emphasise as part of this management thinking transformation.

6. THE INCEPTION OF EVIDENCE-BASED MANAGEMENT

In the early 1990s, two physicians at McMasters University in Canada (David Sackett and Gordon Guyatt) challenged traditional teaching of medicine to students by reporting on their ‘bedside teaching’ technique. Although the medical community of the time was colder than lukewarm towards this new paradigm of medical education, evidence-based medicine eventually became the teaching norm in some major medical schools. Evidence based approaches followed suit in other fields like policy development, environmental studies and education. However, in management education, the ‘revolution’ of how and why managers adopt specific practices as opposed to others remains mostly an art in the rawest form and subject to misconceptions, cognitive biases and personal preferences for methods that seem to work only in the eyes of the beholder.

The question here is why should we emphasise researched and trust-worthy evidence to feed management practices?

William Edwards Deming is credited a dictum: *‘Without data you’re just another person with an opinion’*. Data is at the heart of i4.0 and data in the transformed form of reliable evidence is information; Information generates

knowledge; and knowledge is power. Ensuring that information is reliable and valid is the challenge of every manager who acknowledges that there is little use for unreliable and/or invalid information to support decision-making, an integral component of the i4.0 transformation process but this shift is neither natural nor straightforward because it does not depend on technology but on the mind-sets adopted by managers.

Evidence-Based Management (or EBM) partly provides the tools to critically assess, evaluate and extract the best quality of information from different sources that managers access, to reduce the uncertainties around any decision that matters. EBM recognises four specific sources of evidence: the researched scientific literature, data generated by the organization, stakeholders' views and associated power issues and the managers' own expertise. EBM also recognises the need to integrate these four sources and to be aware of each of these sources' potential limitations: Research may suffer from publication bias, company data may be selective, stakeholders may have hidden agendas and ethical issues while managers may be carriers of fads and misconceptions. Beyond these limitations, merely relying on old or time tested formulae is not necessarily the 'best' and neither is there any guarantee for managers that depending on old formulae offers reliable results.

Decisions lie at the core of EBM as much as the act of making decisions lies at the heart of management practice in an i4.0 environment. Integrating different sources of evidence while filtering out the noise in an intelligent, conscientious, explicit and judicious way is a philosophy underlying the principles of EBM and a requirement in the i4.0 environment. Quoting from KPMG's (2018) reality check of C-suite and CEOs in view of i4.0 we read: "The road is complex. Success requires CEOs and C-suite leaders to step up as dedicated agents of change, overseeing development and execution of intelligent and integrated i4.0 roadmaps into the future. These leaders will offer clear strategies at the enterprise level — abolishing functional silos and integrating people, processes and technologies" (p. 6).

Decisions bear monetary, time and resources implications and are an important foundation for managers' learning. We live in a business environment where the market topography is complex, filled with challenges, uncertainties and therefore risks. Prescriptions, linearity and strict functional order will be less and less accommodating to the realities of i4.0 which will require many of the principles underlying EBM. This topography of business landscape is increasingly in need to undo failed business models and to develop new organizational capacities to forecast and manage risk in the process of adaptation. Managers ready for i4.0 require the need to be bold; indeed, bolder. For some, being bolder means seeing the bigger picture, thinking about how i4.0 technologies could disrupt their traditional end-to-end value chain and building a plan of action to respond. For others, being bolder will mean using actionable insights to drive a new rate of development progress to create the next generation of product or service. In both cases it requires adopting an open-mind to evidence from all sources, to filter out the noise and to take the

necessary actions to integrate the evidence to present a bigger picture which till then may be invisible to the naked eye.

7. CHALLENGING OUR DECISION-MAKING PATHWAYS

Thus let's take a look at two simple decision-making pathways, both of which are extremes. Let's imagine two polar scenarios of knowledge mode production and hence decision making.

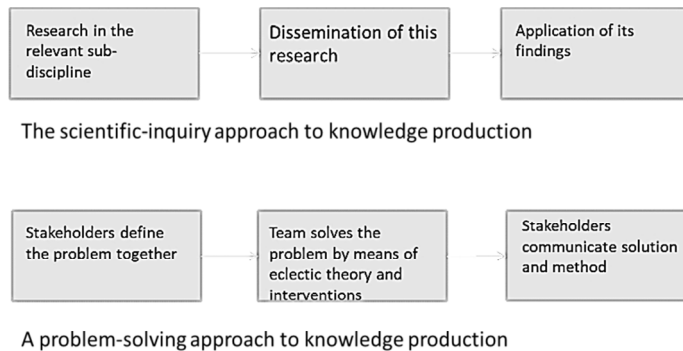


Figure 1 Modes of knowledge production

Scenario 1 we'll call the pure scientific-inquiry approach which stems from the gathering and evaluation of scientific data to taking action by applying these findings. In this scenario, we're interested to implement solutions for which data from science already exists; of course we assume the data to be trustworthy, reliable, all-encompassing and unchanging (which is hardly ever the case). On the basis of this understanding, we utilise this knowledge to generate applications in terms of solutions but by and large maintain the status quo. Scenario 2 we'll call the problem-solving approach to knowledge production. In this scenario, stakeholders define the problem together and the team provides an eclectic understanding to best intervene before letting the stakeholders communicate the way forward to solve the issue. In this scenario, the intervention is based primarily on the stakeholders' world view of the situation and their understanding of the reality which requires to be corrected and improved. The solution is derived from this sense-making process which is driven by data generated by each and everybody's mental model of the current situation and the views towards a more idealised situation. The data is driven from within rather than from without but it is subject to many shortcomings not least the influence of a closed culture, a narrow view of alternatives and a biased understanding of stakeholders.

These two scenarios are uniquely far from ideal in a reality which demands one's full potential to adopt and embrace all evidence in a critical way to be able to take action based on best quality decisions.

We'll come back to these two modes of decision making very soon.

Let's turn our attention for a moment back to i4.0. The common approach is to be performance driven which mark new value opportunities being explicitly defined and utilising cross functional teams to define the i4.0 roadmap. This therefore deserves a new mode of thinking and deciding. Generally, the trend is to acquire the technology that exists and explore the values that one can reap from it. After doing that one evaluates the value driven. It's almost a retro approach that tries to place value in something that already exists and follows the sequential mode of decision-making which pushes us to first define the problem, plan the way forward, find the resources to address the way forward, implement, diffuse the solutions and maintain them. Your factory might run a bit more smoothly. Costs could decline. Customer satisfaction may rise. But maximizing i4.0 value hinges on interconnected technologies whose vast capabilities are integrated at a product and value-chain level and this requires a more complex way of looking at things and at the multi-source evidence and then making decisions. It requires managers to first determine the sources of the value, then explore alternatives to capture the value and then apply the technologies that if integrated lead to the defined added value. This is the hardest because it leaps us into an unknown space; it is a space where experimentation and creativity and the ability to see pieces of the jig-saw as they link together to be bold enough to understand the potential opportunities. We still need to travel from definition to maintenance but it's more about being proactive with the evidence and being leaders in creating new world scenarios rather than following the rest and jumping on the band-wagon.

Thus this new way of thinking and decision-making is in essence a hybrid of the two modes of knowledge production that we have referred to previously. It requires an understanding of what exists (science) but also of where we can take this knowledge to the next level (problem-solving) and by integrating and utilising cross-functional capabilities, creating a new composition of realities that did not exist before. These are the disruptors that will create new world scenarios which are unprecedented; they base their growth on what we know (the scientific inquiry approach) but then stand out to think critically about what we know and come up with new eclectic and integrated solutions (the problem-solving approach). These are the lessons taught in EBM – to harness all sources of evidence in an integrated, holistic and reliable way to challenge our status-quo. But this is also risky and bold as it may push us away from our familiar territory.

The i4.0 generation of managers requires to see the whole picture and accept non-linearity in the way things happen; to appreciate a rather ordered fuzzy configuration of those enablers that push the creation of an i4.0 generation namely: the state of governance and risk of the firm, the state of technology and systems, one's customer experience, operational experience, people and the right strategy that harnesses the optimal business model for the firm. No hard and fast recipes exist but it thus requires one to stand out of his or her comfort zone, one's silo and see the world from others' point of view, share that and make the best of it. The rest will be lagers and probably remain so.

8. THE CHALLENGE AND THE CURRENT REALITY: PLACING EBM BACK INTO MANAGEMENT EDUCATION

There's a challenge therefore here for contenders seeking the i4.0 order to things and this has to do with the decision-making capabilities of their CEOs, managers and executives. Turning data into information and knowledge that is applicable is often not direct or straightforward and therefore does not come easy. While these are interlinked processes, they exist in a perpetual cyclical fashion. Transforming data into information and knowledge is developmental and sequential. Managers adopt a degree of selective attention to the most appropriate and valid data that can elicit applicable results because not all the information gathered can be justified with a favourable level of good evidence. More so, translating information through evidence into practice requires closing the gap between what is known and what is practised. Turning data into evidence into practice is a process of critical thought, insightful reflection and active questioning. This is at the heart of EBM at digging up the evidence. It prophesies at moving away from using evidence that does not quite apply or is just not good enough. Managers' decisions then would seemingly rely on plausibility rather than accuracy – concurring with Weick's (1995) work that proposes seven properties of sense making behaviour. Sense making, in essence, involves the formation of reasoning that is not necessarily correct but seems to fit the facts at that moment in time without the effort to break down the decision-processes into smaller and complete chunks. Sense making happens either because managers lack time or complete information or both. Pfeffer and Sutton (2006) observe that it is not unusual for managers to neglect new evidence and to base their decisions on dogma and belief.

Putting back the *evidence-based* component in management education curricula is likely to pave the way for better managers who can face tomorrow's dilemmas in a more reliable manner and be protagonists at realizing the i4.0 culture mind-set – indeed, relying on sound facts rather than simply on the latest 'Best Seller' fads. An inquisitive mind that is brave and able to ask questions leads to learning. An inquisitive mind is the questioning mind-set that is needed in effective managers. The implementation of EBM is slow but the need to re-think conventional management practices is urgent.

In relating to management education, Hughes and colleagues (2011) propose that *"the link to practice is important because it is about the question of how close academics are able to get the reality of management in their research"*. Most traditional management teaching is strongly attached to the theoretical stance. There is a big need for management education and training institutions that prepare practitioners in the field to make the leap towards contextualizing research and theory into practice. For example, rather than presenting courses of study in the traditional manner, management programmes should be intended to create a critical perspective about organizational realities and provide the necessary tools for evaluating the evidence.

Management education also requires a context. Hughes et al. (2011) observe that a strong theme in contemporary organizational thinking is that where management thinkers recognize that knowledge is socially constructed in communities and is not confined to formal sources of specific information or data. These claims imply that theoretical parameters may not necessarily be universal and that it would make more sense to support the advancement of management knowledge by reflecting back on its applications in specific cultural and economic contexts. In addition, one may need to challenge the formal system of education or ensure that management education is blended with other important forms and experiences of learning. The 1978 Nobel Laureate, Herbert Simon's anticipated many of the challenges business schools face today and captured these ideas in his 1967 article entitled '*The business school: a problem in organizational design*'. In fact, Rousseau (2012b) calls for developing actionable knowledge for professionalizing managers. This shift in pedagogical approaches may well require us to re-think the current meaning of a 'business school' whereby knowledge of evidence-based and field-tested principles form the core of professional management.

9. THE QUALITIES OF THE MANAGER AS A 'SCIENTIST'

We ask then: Given our understanding of the emerging complexity in organizational life, can we really portray the manager as a scientist-practitioner who integrates both modes of knowledge production described earlier? The evidence relying manager is a critical thinker who can see the big picture composed of a multitude of facts. The picture is a jig saw puzzle of 1001 pieces, covering this hall. It can only be seen in its entirety if one steps back to get all pieces in plain sight.

EBM is, after all, a way of thinking, rendering the manager 'the thinker in the practitioner'. Evidence relying managers adopt many techniques to evaluate information prior to making the decision, without resorting to imitation and relying on copycat practices from other companies. This notion is consistent with Redfield's 1912 maxim that "*efficiency means keen self-criticism*". Redfield was then the first US Secretary of Commerce.

Managers need to move out of the office to the shop-floor and challenge all that is sacred or fixed. Management researchers and educators have a role in helping formulate the effective manager's mind-set. Management graduates, in today's competitive world should recognize six month old practices are ancient, justifying the questioning of the *status quo* in everything they see. Indeed, any development programme related to managers should hopefully combine four fundamental activities that are relevant to managers' everyday judgement and decision-making. First is the use of the best scientific findings; the second relates to managers gathering and attending to organizational facts and metrics in a systematic fashion to increase information reliability and usefulness; the third is the on-going use of critical, reflective judgement and decision aids in order to reduce bias and improve decision quality; and finally a consideration of ethical issues including the short- and

long-term impact of decisions on stakeholders. If we, as educators, work hard to impart these skills and attributes, then we would have certainly contributed in no small way towards creating the scientist-within-the-manager. If not, then the whole idea of evidence-based practitioners is likely to remain a pipe-dream and we may be accomplices to failing the what we call the i4.0 Management generation.

10. THE I4.0 MANAGEMENT GENERATION

In view of the scope of i4.0, and in the spirit of the principles underlying EBM, allow us therefore to speculate on those qualities of the new management generation that is required to embrace these changes. And we ask ourselves: if we were to imagine the kind of *forma mentis* the new manager in the i4.0 generation would require, what would these be? Is it those who adopt the craft model and are taught to emulate their masters without asking any questions or is it those who adopt the EBM principle model and are encouraged to be sceptical and to demand high reliable evidence to enable them to see new things?

Picking up on the latter model we envisage this trend to be contagious down all the management team and not just a characteristic of the CEO or his / her most senior team. It requires a mind-set and a culture. Therefore, we envisage that senior managers will generally set strategies and be responsible to shareholders and other stakeholders. They need to be confident about their own judgements; Middle managers will have their primary focus on tactical execution and the organizational context will affect their readiness to implement evidence-driven tactics; finally, supervisors will have their prime focus to implement processes through individual contributors and teams. Indeed, first line supervisors in constructive cultures may be more open to experimentation when supported by superiors.

Thus in outlining the ideal profile of the i4.0 generation of managers, we imagine managers to champion reflection and judgement and also envisage the need for managers to be encouraged to develop a questioning mind-set. In view of the first aspect legitimate questions are:

- Do management students have the ability to make mindful decisions based on the combination of both scientific evidence and organizational facts?
- Do they understand the dynamics of effected stakeholders?
- Do they show the ability to carefully attend to stakeholder issues?
- Do they have the capability to design decisions that reduce unintended consequences by considering relevant issues upfront?
- And in view of the second aspect, we ask:
- Do they show a willingness to unfreeze old habits?
- Do they willingly and proactively question assumptions?
- Do they make their decisions more explicit to reduce decision neglect?
- Do they avoid making decisions on autopilot?
- Do they try to engage in more mindful and deliberate decision making?

This is a challenge for management educators too who have to wrestle with the idea of re-engineering management education to go away from the prescriptive mode to the critical-alternative mode. One of the authors, for example, is currently awaiting funds for an EU-funded project who together with 4 other European institutions will evaluate the management education experience of students; the managers of the future. The concept relies on the nature of programmes to provide a challenging experience to students to formulate their thinking and decision making on varied sources of information, making the right questions and weed out unreliable data. This is moving away from the prescriptive mode of thinking and suggests that students build a robust mental model that is also susceptible to be challenged and amended with new incoming evidence. Figure 2 depicts the diagrammatic version of this model for the project.

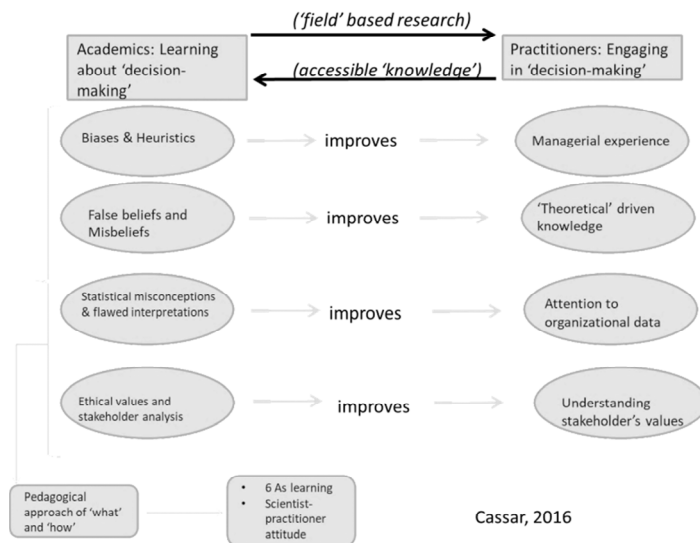


Figure 2 Evidence-Based Teaching in Management Education

11. CONCLUSION

To conclude, i4.0 is a reality that demands new mind-sets of decision-makers and new ways to use the available knowledge and data. The data and the evidence demand that we embrace them flexibly, critically and holistically; it requires us to see beyond our lines of responsibilities and to extend our views beyond. I4.0 presents a unique opportunity to expand on management's past and rich history and transform management thinking. It also requires that we educators of management also embrace these requirements and transmit them to our students by challenging old formulae of learning and harnessing our students' capabilities to think as disruptors. In doing so we would have helped the managers embracing i4.0 to look at data in a factual and critical manner to create the next set of disruptions

that add value. In this vein, we conclude with a quote by Denise Rousseau (2012a): “Not everyone is motivated to use evidence. Some people fail to learn new things because they don't want to make the effort. Non-evidence-based practice tends to be the norm for decisions regarding managing people, structuring work, and developing business strategy... Ironically it is poor performers who are most likely to overestimate their expertise. Evidence-based practitioners are willing to invest time and effort to expand their knowledge, expertise, and personal depth” (p. 22).

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INDUSTRY 4.0, AI AND CIRCULAR ECONOMY – OPPORTUNITIES AND CHALLENGES FOR A SUSTAINABLE DEVELOPMENT

UDK: 004.8

JEL classification: O33

Abstract

Over the past years, rapid advancement in technology and massive industrial development around the world has been clearly seen. Business leaders of large corporations started incorporating concepts like Industry 4.0 and artificial intelligence (AI) in their businesses to advance fast in the economy and keep up with the modern world. In order to attain this economic growth and achieve unprecedented prosperity along with generating substantial environmental benefits, moving towards a more sustainable Circular Economy (CE) model facilitated by these technologies is essentially needed. Circular Economy enables restoration and a shift towards sustainable development by preserving finite and scarce resources. Industry 4.0, also called the Fourth Industrial Revolution, is known as the digital transformation of industries based on the notion of connectivity and AI is a central subset of the technologies enabling the emergence of this revolution. This paper offers a two-side look; the first side, looks on possible implementation barriers on country and corporate level and the second side offers a brief look on how the technologies of Industry 4.0 and AI can accelerate the transition to CE and offer huge ecological opportunities. The paper reveals that despite some challenges and barriers associated with the

implementation of these concepts; these are not as massive and cumulative as the challenges and negative impacts offered by the current economic model. It is also evident that the ecological opportunities might outweigh the negative impact. Therefore, the main conclusion of this research is that recent advanced technologies of Industry 4.0 and AI can hide massive potentials for rapid and sustainable growth thereby enabling successful transition to Circular Economy world.

Keywords: *Industry 4.0, Artificial Intelligence, Circular Economy, Sustainable growth*

1. INTRODUCTION

In the last years, the concept of Industry 4.0 has been mentioned in multiple headlines and discussed by companies and researchers around the globe. Many corporations exhibited huge interest in the possible positive outcomes of using the advanced technologies of Industry 4.0 in various areas, especially with regard to productivity. More recently, the concept of Artificial Intelligence is also gaining remarkable attention, also with regard to the impact of Artificial Intelligence (AI) in the context of Industry 4.0. Another concept with fast growing importance is Circular Economy (CE), which people and corporations are paying more attention to and are becoming more aware of its great potential impact on our environment and ecosystem. However, implementing Circular Economy principles by using Industry 4.0 and Artificial Intelligence technologies is not being discussed as deeply and frequently.

Combining these three concepts together has the potential to result in huge development and benefits to our society and environment. Klaus Schwab stated in his book the Fourth Industrial Revolution: “Let us together shape a future that works for all by putting people first, empowering them and constantly reminding ourselves that all of these new technologies are first and foremost tools made by people for people” (Schwab, 2016). Based on that, people are key players in reaching a successful implementation and transition to a more sustainable world and economy since these new technologies are made by people aiming to enhance their own life.

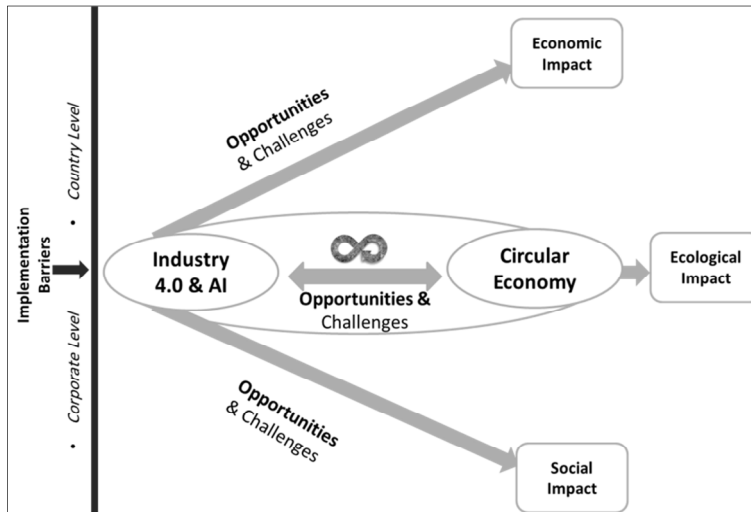


Figure 1 Accelerating the Transition to CE using I4.0 & AI Technologies (own representation)

The main purpose of this work is to explain the benefits and opportunities of Industry 4.0 and Artificial Intelligence as enablers for the transition to a Circular Economy and how this relationship, if implemented correctly, can lead to huge ecological and economic opportunities. In order to reach positive outcomes, barriers for implementation of the technology as well as ecological, economic and social challenges need to be considered (see figure 1).

To summarize, this paper offers a two-side look; the first side, looks on possible implementation barriers on country and corporate level and the second side offers a look on how the technologies of Industry 4.0 and AI can accelerate the transition towards CE and offer huge ecological opportunities (see figure 1). This paper is based on a literature research that will be further developed in the future with the help of primary empirical data.

2. THE CONCEPT OF INDUSTRY 4.0 AND ARTIFICIAL INTELLIGENCE

2.1. The Concept of Industry 4.0 (I4.0)

Over the history of industrial manufacturing, there are four fundamental technological innovations, which need to be recognized as they led to huge increase in productivity and change of the society. Industry 1.0 was based on mechanization and the introduction of water and steam power engines. Industry 2.0 was based on mass production achieved by electrical energy and electrification. Industry 3.0 was based on the use of electronics and information technology to further automate production in which we refer to as the digitalization era (Wyes, 2018) and in recent

years, Industry 4.0 has emerged and gained remarkable attention among manufacturing industries.

Industry 4.0 represents the digital transformation of the manufacturing industry with the notion of connectivity and with the help of various cutting-edge technologies, such as intelligent robots, autonomous driving, sensors and 3D-printing (Bundesministerium für Bildung und Forschung, 2016). In addition to this, recent terminologies, such as the internet of things (IoT), Artificial Intelligence (AI), big data, and cloud computing are being coupled together with Industry 4.0. Industry 4.0 sets a perfect example of innovation and can improve the top line of business by integrating people and digitally controlled machines with the internet and information technology. People are key players in this concept, and their work is facilitated to a greater degree than ever by software-based systems.

The concept of Industry 4.0 is already proving its potential to create global value chains at points beyond the design phase. This involves the entire value stream: objects being produced or used in manufacturing are always uniquely identifiable and communicate independently with one another. Information flows vertically from the individual components all the way up to the company's IT platform and the other way around. Information also flows horizontally between machines involved in production and the company's manufacturing system (Robert Bosch GmbH, 2017). One example is the German automaker Daimler, who has rolled out 'Mercedes me' scheme, which, amongst other features, tracks the usage of key automotive parts to help service automobiles more effectively (Anbumozhi & Kimura, 2018).

Klaus Schwab, the executive chairman and founder of the World Economic Forum, pointed out the importance of the **Fourth Industrial Revolution** for society, economy and the world in the 2016 Annual Meeting of the World Economic Forum. Schwab defined the Fourth Industrial Revolution, in his book **The Fourth Industrial Revolution** as "the fourth major industrial era since the Industrial Revolution in the 1800s, characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres, marked by emerging technology breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, the internet of things (IoT), 3D printing and autonomous vehicles." (Schwab, 2016)

Industry 4.0 consists of four elements, which are among others essential when designing a smart factory in a manufacturing industry. These are:

1. Cyber-Physical Systems (CPS).

Cyber-physical systems are simply physical objects with embedded software and computing power, which connect the real and virtual world. They describe the technological basis of IT in combination with the physical world, meaning they connect information technology with mechanical and electronic elements. These systems of collaborating computational entities are therefore in a steady intensive connection with

the surrounding physical world and its ongoing processes (Monostori, 2014). Such CPSs can also be used within manufacturing systems, where the intelligent cross-linking is for example realized by embedded sensors, processors, software and connectivity in products, coupled with a product cloud in which product data is stored and analyzed. These data can be used to improve product functionality and performance (Stock & Seliger, 2016).

2. Internet of Things (IoT)

The internet of things is described in various ways by companies and organizations. But most commonly it is described as an “ecosystem of technologies monitoring the status of physical objects, capturing meaningful data, and communicating that information through networks to software applications”. Through the internet of things it is possible to connect everyday objects to remotely determine their state via information systems, which collect up-to-date information on these physical objects and processes continuously. Equipped with own sensor- and actuator-technology these smart real objects are able to integrate each other to form complex, autonomous systems (Blunck & Werthmann, 2017).

The IoT is considered to be a modern manufacturing concept under Industry 4.0 and has adopted recent advances, such as cutting-edge information technology (IT) infrastructure for data acquisition and sharing, which greatly influence the performance of a manufacturing system. By the application of IoT technologies in manufacturing, on-demand use and efficient sharing of resources can be enabled (Blunck, Werthmann et. al., 2018).

3. Big Data

Through Industry 4.0 applications there is a change of the whole industrial value chain through an increasing digitalization and networking. The huge and continuously produced amount of data through the ever growing use of sensors, networked machines in CPS and the development towards an industry with smart factories is called *big data* (Blunck & Werthmann, 2017).

4. Smart Data and Artificial Intelligence

To make use of big data, for example to generate forecasts and enable companies to take fact-based decisions, it is important to consolidate and evaluate these data in an intelligent way (Sauter et al., 2015) through converting this data into smart data. Consequently companies must face the challenge to develop smart predictive informatics tools to manage big data (Monostori, 2014; Lee, Kao, & Yang, 2014). Therefore, smart data can be described as the conversion of the big data stored in clouds in order to filter

the information really needed and to evaluate the generated data in a proper way, which eventually leads to the successful design and development of artificial intelligence applications and systems.

Combining all these technologies together, we will be able to form the smart, digital factories of the future (see figure 2).

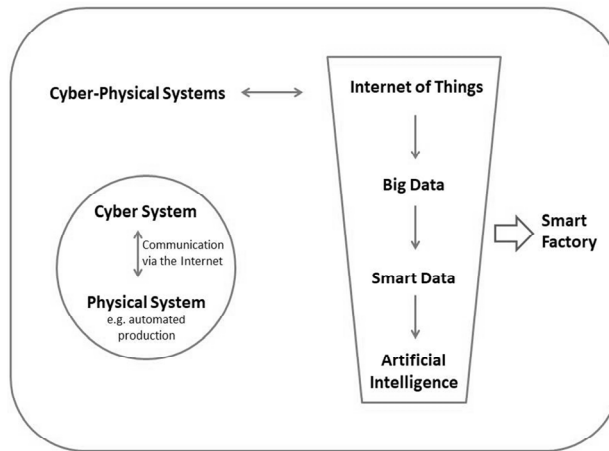


Figure 2 Essential Elements of Industry 4.0 (own representation built on Blunck & Werthmann 2017)

2.2. The Concept of Artificial Intelligence (AI)

Artificial Intelligence can be considered as a central subset of the technologies paving the road to the Fourth Industrial Revolution. Within our fast-growing world, it is impossible not to recognize the important role AI plays in enabling the systematic shift towards the Fourth Industrial Revolution.

Gartner, a leading research and advisory company defined artificial intelligence on February 5, 2019 as a "Technology that appears to emulate human performance typically by learning, coming to its own conclusions, appearing to understand complex content, engaging in natural dialogs with people, enhancing human cognitive performance (also known as cognitive computing) or replacing people on execution of non-routine tasks. Applications include autonomous vehicles, automatic speech recognition and generation and detecting novel concepts and abstractions (useful for detecting potential new risks and aiding humans quickly understand very large bodies of ever changing information)."

The development of an AI algorithm follows a process of data collection, data engineering, algorithm development and algorithm refinement (see figure 3). An algorithm is typically a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer. Based on the algorithm

output, decisions for solving a particular problem can be made (EMF, 2019). Machine-learning algorithms associated with AI can now spot patterns of behaviour and predict what you are likely to need next. For example, face recognition software which is already used and applied by some sectors can now identify emotions (WEF, 2019). Another example is in the field of autonomous driving; the camera in the car must now reliably detect when a pedestrian suddenly runs in front of the car and start the braking process immediately corresponding to automatic image or pattern recognition software (Robert Bosch GmbH, 2018).



Figure 3 The AI algorithm development

Source: Ellen MacArthur Foundation 2019, p. 10)

To facilitate the road to achieving valuable artificial intelligence systems and technologies, the quality of the input data appears to be an important prerequisite. Since AI works with models and systems that perform functions associated with human intelligence, such as reasoning and learning, humans must be able to ask the right questions to identify the problem and its relative solution in order for AI to work properly and for the benefit of the people and the planet. Thus human identification of the input (problem) and output (solution) is fundamental for achieving successful AI systems and technologies, because badly engineered data leads to poor quality outputs following the principle of rubbish in, rubbish out (EMF, 2019).

Artificial intelligence can complement people's skills and expand their capabilities. It allows humans to learn faster from feedback, deal more effectively with complexity and make better sense of abundant data (EMF, 2019).

3. THE CONCEPT OF CIRCULAR ECONOMY (CE)

Circular economy is a path leading to a sustainable society (Kim & Jin, 2018) and aims to redefine growth by focusing on positive society-wide benefits. Circular Economy enables restoration, a shift towards sustainable development using renewable energy and the elimination of the use of toxic materials and waste production. It is identified as a closed-loop of production patterns within an economic system that builds economic, natural, and social capital and aims to

protect the environment, reduce carbon emissions and circulate resources where the value of products, materials and resources is maintained in the economy for as long as possible. The transition to a Circular Economy involves a fundamental change, which means rethinking the way products are designed, produced, consumed and brought back into the value chain and therefore is based on three essential principles (EMF, 2019).



1. Design out waste and pollution (Recovery and Recycling)

The main principle here is that the production and consumption systems in which everything that used to be considered waste is revived and used for other purposes (Allwood, 2014). Companies either recover end-of- life products to reuse valuable materials, energies and components or they reclaim waste and by-products from a production process (Wyes, 2018). This will eliminate the negative impact on natural systems and human health. For example, Procter & Gamble Company operates 45 facilities on a zero-waste basis (Wyes, 2018).



2. Products and materials are kept in use (Product Life-Extension)

Shifting from only selling things to activities that keep products alive and reusable to preserve the embedded energy, labor and materials is the main focus here. It also means moving customers from transactions to relationships, tailoring upgrades and alterations to specific needs. For example, Dell Inc. Computers, through its refurbishment business, takes back old equipment and resells units when possible (Wyes, 2018). For technical materials, the best way to apply this principle is by designing for durability, repair, reuse, remanufacturing and at the end recycling. However, for biological materials, the best way is the cascaded use of by-products before nutrients are returned back to the biosphere (EMF, 2019).



3. Regenerate natural systems

The focus here is on regenerating, rebuilding and reviving the natural systems, for instance by applying agricultural practices that avoid the degrading of soil as well as rebuilding and regenerating health over time (EMF, 2019). One example is CRAiLAR Technologies Inc., a company that produces renewable biomass resources using flax and hemp to create fibers as good as cotton without environmental impact (Wyes, 2018).

The Circular Economy model in contrast to the traditional linear model stands for an industrial economy that produces no waste and pollution as well as reserves finite resource (Wyes, 2018), reduce emissions and protect the environment. It identifies two cycles in order to achieve future benefits; these are,

the technical and biological cycles. In biological cycles, food and biological materials feed back into the system through processes such as composting and anaerobic digestion. These cycles regenerate living systems such as soil, which provide renewable resources for the economy. In technical cycles, the main idea is to recover and restore products, components and materials through strategies like reuse, repair, remanufacturing or recycling (EMF, 2019) (see figure 4). The figure below gives a clearer vision of the Circular Economy model and illustrates what has been defined above.

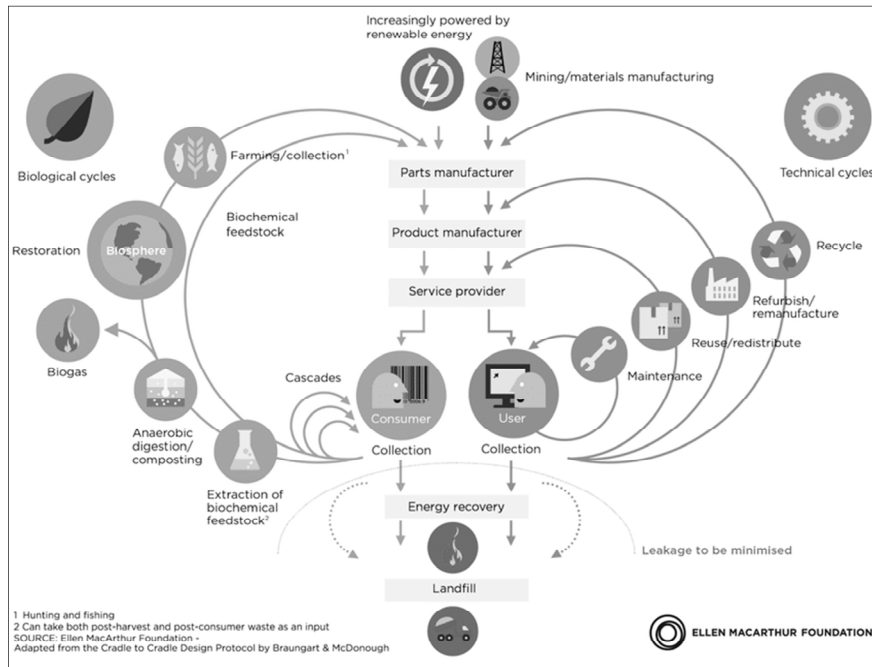


Figure 4 The Circular Economy system diagram (Ellen MacArthur Foundation 2019, p. 8)

Source: <https://www.ellenmacarthurfoundation.org/circular-economy/infographic>

Not only corporations can consider this new way of thinking, also consumers can contribute with a changed behaviour. When consumers are buying a product, there are five simple and easy steps they can follow to facilitate and help moving towards a more sustainable Circular Economy model. First, consumers can make something beneficial out of the product they own in order to extend its life, second they can thrift as much as possible to reduce resource consumption and waste, third they can swap their belongings with someone else which encourages use of resources and extending the product's life, fourth they can borrow things they need from people who don't need them anymore to reduce waste and emissions,

fifth they can use what they have and try to prevent and eliminate waste as much as possible (see figure 5).

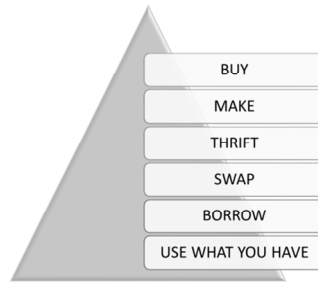


Figure 5 Simple steps facilitating the road to Circular Economy (own representation according to SarahL.com)

As said by the Folk Singer & Social Activist *Pete Seeger*:

“If it can’t be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, designed or removed from production.”

4. INDUSTRY 4.0 AND AI ENABLING THE TRANSITION TO CE AND POSSIBLE IMPLEMENTATION BARRIERS

4.1. Industry 4.0 and AI as Enablers for the Transition to CE

As previously mentioned, AI is an important element for accelerating the transition to the ‘Fourth Industrial Revolution’, as such it can support and accelerate the pace of human innovation to design circular products, bring together aspects of successful circular business models and optimize the infrastructure needed to loop products and materials back into the economy (EMF, 2019).

The manufacturing industry needs to shift away from maximizing material supply to providing the right material for the right product at the right place. Coupling the concept of Industry 4.0 and AI technologies with the principles of the Circular Economy leads to a different and more effective approach for the sourcing and management of materials (Anbumozhi & Kimura, 2018).

For a company to create a feasible decision-making model for the Circular Economy, it must be able to collect large quantities of product and customer data to analyse it, take into consideration a combination of factors regarding the product’s condition and then choose the next use cycle for each returned product, such as reuse, remanufacture, or recycling. In order to achieve that, it needs to implement a powerful AI-based analytical model, where problems such as the fluctuating demand and supply of used products and components and the varying condition of the returned products can be solved to make reverse logistics and remanufacturing work (EMF, 2019).

An industry survey on the future of the waste industry and Industry 4.0 conducted by the International Solid Waste Association (2017) showed that new biodegradable materials and sensors technologies will have the highest impact on products, in terms of redesigning the products and changing the recycling practices. In order to drive and enable this impact, development and investment in big data and artificial intelligence are necessary (Anbumozhi & Kimura, 2018). Pioneering companies in the digital era, such as Google and IBM, are driving the development of new technologies to enable the successful transition to Circular Economy (Anbumozhi & Kimura, 2018).

The introduction of AI technologies and robots in waste sorting and material processing will enable the production of higher-value recovery materials and the production of new higher-grade secondary products. It will impact waste collection and recycling schemes and allow strong progress in material recycling and current landfilling practice (Anbumozhi & Kimura, 2018).

As a conclusion, AI capabilities can help speed up the transition to Circular Economy at a faster rate than would be possible without AI. By implementing AI, new circular products and businesses can be designed and developed. AI technologies can simplify the transition to Circular Economy by implementing the following principles (EMF, 2019).



1. Design circular products, components and materials

Using innovative AI technologies, it is possible nowadays to design new materials and products with characteristics based on the Circular Economy model, such as being environmental-friendly with low carbon emissions and contributing to the conservation of natural resources. The development of this design can empower cycles of reuse, repair, refurbishment and recycling of technical materials and the cascading and looping of biological nutrients. However, in order to fully apply the principle of Circular Economy model, the design of these products, materials and components should take several features into account, such as disassembly, upgradability, or recycled content. This can be overwhelming and complex, but with the emergence of AI technology; the complexity of encompassing these features into the design of products can be simplified significantly. AI technologies can analyse significant amount of data about the structure and properties of materials in a short time period and accordingly suggest new materials (EMF, 2019).

If AI technologies were applied broadly, this can lead to the rapid prototyping and design of materials, components and products, which can be used and reused and safely circulated in the economy (EMF, 2019).



2. Operate circular business models

The successful operation and development of circular business models requires the incorporation of all business functions with following the principles of Circular Economy. It also involves the emergence of new innovative business models, such as product-as-a-service and asset sharing (EMF, 2019).

In the product-as-a-service model, consumers lease or pay for products by use, this results in the shift of the business model positively as well as the replacement of the 'ownership' concept. One example is Koninklijke Philips NV, which is using 'lightning as a service' to charge by output instead of unit sales practice (Wyes, 2018).

The asset sharing model, assisted by the digital technologies such as the dynamic pricing and matching algorithms, offers new relationships and business opportunities for consumers, companies and micro-entrepreneurs who rent, share, swap or lend their idle goods. This way, consumers have a new way to both make and save money. Examples for sharing and access models for things like cars, apartments and clothes include Uber Inc., Airbnb Inc. and Kleiderkreisel Inc. (Wyes, 2018).



3. Optimize infrastructure to ensure circular product and material flows

An efficient and extensive infrastructure for collecting, sorting, separating, treatment and redistribution of biological waste streams as well as for reusing, repairing, remanufacturing and recycling of technical product streams is inherently essential. The challenge is that both streams are usually mixed and heterogeneous. AI technologies has enabled the effective recovery and enhanced valorisation of valuable materials as well as the homogeneous, pure flow of materials and products, by sorting post-consumer mixed material streams through visual recognition techniques (EMF, 2019). For example, ZenRobotics works with cameras and sensors, whose imagery input allows AI to control intelligent waste sorting robots. These robots can reach an accuracy level of 98% in sorting myriad material streams from plastic packaging to construction waste (EMF, 2019). Another similar example is the RoCycle (a recycling robot), which was developed by a team of researchers at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) and can detect if an object is paper, metal or plastic and separate accordingly (WEF, 2019). This will have positive impacts on labour, costs and time.

Artificial intelligence and Industry 4.0 technologies can not only boost circularity in areas like consumer electronics, but also in nature-related areas (biological areas) such as the food system by putting it on a path to a regenerative future.

4.2. Possible Implementation Barriers

It is evident that I4.0 and AI technologies can have huge impact on accelerating the transition towards sustainable development and Circular Economy. However, it is likely that barriers will appear and stand in the way of achieving a successful transition. These barriers can be categorized into two main levels: country level and corporate level (Kim & Jin, 2018) (see figure 6).

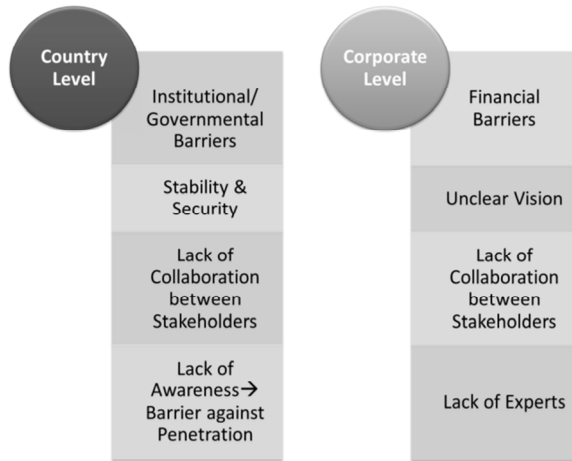


Figure 6 Possible Implementation Barriers on Country and Corporate Level (own representation)

On country level, there are multiple factors that can be referred to as barriers standing in the way of successful implementation. Institutional limitations and governmental regulations within a country is one example. Institutional limitations vary from one country to another and it depends on various factors within each country. Some countries are deeply absorbed in the linear mindset, where for example the economic viability of recycling is questioned and where their industries are considered low-level and technological advancement is barely noticed. The regulatory structures or governmental policies in these countries can be inflexible and is not willing to change their deep-rooted habits or invest in the transition process. They might have unstable political systems, where the issue of advanced technologies is not even discussed or brought into attention (Kim & Jin, 2018). Thus governmental regulations, rules and policies play a big role in limiting or even sometimes prohibiting the use of advanced technologies in the transition process into a more sustainable and Circular Economy model. It is the cost, which has to be invested in order to innovate and facilitate the road to growth and prosperity.

In addition, in countries where war exists or there is the possibility of war, strike or demonstration, a stable and secure business operation is almost impossible to establish and therefore will be hard to realize a thriving and competitive industry in those countries, which forms another critical barrier (Kim & Jin, 2018).

Moreover, lack of awareness from people is considered another barrier against the penetration of these concepts in the society. Although the concepts of I4.0, AI and CE are being increasingly mentioned and discussed recently, it is evident that they are spread more among separate research groups. On the other hand, if we ask the general public, they might have heard about the concept of I4.0 or AI, but not about CE or vice versa or even not heard about the three concepts.

Furthermore, even when people have heard about these concepts, they are not quite involved. Some people prefer sticking to their usual habitual practices and are not willing to use or learn new concepts and some do not realize how the practices of today's world have a huge negative impact on our planet in the long-term and how urgent the change to a more sustainable and Circular Economy model is needed. Therefore, it is important that the level of awareness has to be levelled up and awareness campaigns need to be carried out.

On corporate level, high initial development costs, unclear vision as well as lack of experts and human resources are all factors affecting a successful implementation. It is expected that the development costs for I4.0 and AI technologies will be initially high and will need sufficient investment, whereas the payback period may be too long or uncertain.

Organizations need to form a suitable infrastructure for AI and I4.0 technologies. This means for example, to capture value from AI, organizations need to establish digital processes, an open culture around AI and an appropriate processing power to handle all data inputs (EMF, 2019). This will require sufficient material income to cover the high development and transition costs. For instance, in the food industry, many farmers are already operating on low margins and the investment in time, equipment and operational changes required to adopt regenerative practices may be difficult to finance (EMF, 2019).

Since the development of AI models and systems requires first a development of algorithm which typically follows a process of data collection, data engineering, algorithm development and algorithm refinement, experts with digital education background are needed to operate in that field to develop these algorithms, prepare training data and translate the algorithm output into results that make sense for humans (EMF, 2019). This can be in the way of implementation considering the different backgrounds and different education levels of people, especially the elderly generation where their opportunities of getting new jobs will become less.

Successful implementation of I4.0 and AI technologies to facilitate the transition to Circular Economy will depend primarily on the willingness of different stakeholders to collaborate both on country and corporate level. The collaboration should include companies, governments, NGOs as well as citizens in order to agree on a common future-oriented vision to enhance, enrich and preserve the society's and people's life.

Every stakeholder can play a role in realizing the opportunities of the transition to a CE model using advanced technologies. Governments can deliver infrastructure and innovative policy. Companies can collaborate to open new markets through sharing data and intellectual property. Investors and donors can provide growth capital and enable entrepreneurs. Systems leaders can help bring these actors together to bridge gaps, agree on common objectives and enable innovation. Continuous dialogue and collaboration is needed to understand and realize the opportunities of these technologies and to harness them for positive effect (WEF, 2019, p. 5). Therefore, collaboration between different stakeholders is needed both on the country and corporate level.

In the following chapter, we will be discussing the impacts of Industry 4.0 and AI as enablers for the transition to Circular Economy by displaying the possible opportunities and challenges of these advanced technologies and focusing mainly on the positive ecological impact on the environment, society and economy.

5. IMPACTS OF I4.0 AND AI APPLICATIONS

A successful company is mainly characterized by the implementation of a business model that creates value for its customers and knows how to capture that value, in other words; how to make money out of that value (Iansiti & Lakhani, 2014). Based on that, a company that wants to implement I4.0 and AI applications should also pursue an environmental and ecological impact, which not only preserves natural resources, but also encourages people to buy their products, bearing in mind that these products create ecological, economic and social value in the short- and long-term. This can be achieved through the implementation of the Circular Economy model and moving towards more environmental- and eco-friendly systems and applications.

The transition to Circular Economy does not only amount to adjustments aimed at reducing the negative impacts of the linear economy. Rather, it reflects a systemic shift that builds long-term resilience, durability, generates business and economic opportunities and provides environmental and societal benefits (EMF, 2019).

However, the road leading to these benefits and opportunities is paved with some difficulties and challenges that are inevitable and must be overcome to achieve a successful transition. For instance, in order for AI technologies to know specifically what they need to solve and have a positive impact on the environment, humans have to ask the right ecological questions to have a clear understanding of the problem they want to solve and how they can tackle this problem and accordingly find the appropriate solutions. Otherwise, a machine cannot solve a problem on its own (EMF, 2019) and will result in malfunctions and unrepresentative data, which can lead to more costs in the attempt of fixing the resulting errors in the future.

In this chapter, some of the key ecological, economic and social opportunities and challenges are presented in order to have a more clear understanding, move forward in the correct direction and ensure a smooth transition.

5. 1. Ecological Opportunities

Advanced technologies such as AI, have the ability to collect large quantities of product and customer data using analytical models to make sense of it. This can help a company take a combination of factors into account like the product's condition as well as the current market situation in order to choose the next suitable use cycle for each returned product, such as reuse, recovering components through parts harvesting for remanufacture, or recycling (EMF, 2019). Resulting in thrift of resources and maintaining existing products longer.

AI can help optimize the infrastructure of Circular Economy by for example sorting post-consumer mixed material streams through visual recognition techniques. Mainly, the better material streams are pre-sorted and separated, the higher the recovery level, the more components can be identified for reuse and remanufacture and the higher the quality of materials extracted during recycling (EMF, 2019). This means that AI technologies enable the thrift of resources and thus the shift towards a more sustainable and environmental-friendly economy.

Furthermore, more accurate demand forecasts as enabled by Industry 4.0 applications lead to reductions in waste, because needed input materials could be projected more accurately, which will reduce inventory and overproduction. This will decrease the need for large amounts of raw material within the supply chain and transportation, because only on-demand spare parts are created. Accurate demand forecasts will also ease the implementation of CE principles, because also the reuse and preparation of already used materials can be planned more precise. If companies can be sure to cover actual demand by cycling of already used materials or the reuse and remanufacturing of products, fewer resources will be extracted for the production of entirely new goods and thus less waste and pollution (Blunck & Werthmann, 2017).

In the food industry for example, AI can improve the efficiency of supply chains by reducing overproduction and overstocking as well as enable better matching of supply and demand, thus reducing waste and emissions. Embedded system technologies and smart production processes, as part of Industry 4.0 will radically transform production value chains and will enable new options to maintain the embedded value of materials and components in products by remanufacturing and high-quality recycling (Wilts, Lah, & Galinski, 2018), which results in better environmental and ecological protection.

A multifaceted example by Ellen MacArthur Foundation (2019) is illustrating the capabilities of AI technology: “**Digital capabilities** support distributed food production and by-product treatment. **Drones** make it easier for farmers to accurately determine soil health. **Blockchain** helps create traceability and

transparency so people know where their food is coming from. **‘Smart’ bins** in cities allow more effective separation and sorting of food and non-food waste. **Food labs and start-ups** are using algorithms to rapidly prototype plant-based proteins and lab-grown meat as alternatives to conventional animal protein sources” (p. 19).

Another example for prototyping plant-based proteins was published in spring 2019 by the World Economic Forum about meat consumption. It explains that scientists grew meat on blades of grass, which could help feed the world without harming the planet or killing any animals. This would have to be implemented on a large scale, in order to have a real impact on food security and climate change; here the role of advanced technologies is very important to make this process feasible. Scientists are trying to make meat grow faster in grass by fine-tuning nutrients and growing conditions. Without the help of recent advanced technologies like AI, this would not even be imaginable (WEF, 2019).

Additionally, the recent technologies of I4.0 and AI help in the optimum use of resources. Intelligent and connected assets can enable predictive maintenance to prolong the asset life, thus reducing emissions. Blockchain can create transparency in supply chains to reduce waste and repair is made easier by 3D printing of spare parts (EMF, 2019) (see figure 7). It will be possible to exactly assess the amount of resources needed for each production step. Processes with excess resource consumption can be identified and optimized or even eliminated.

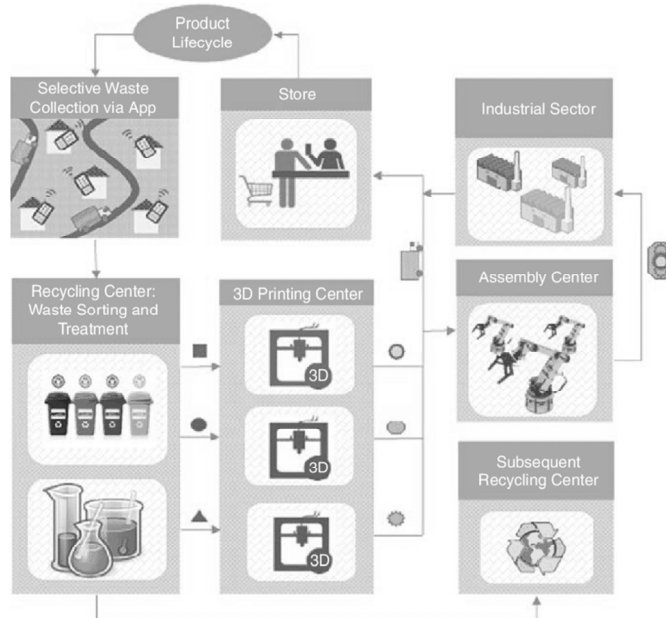


Figure 7 Using I4.0 Technologies in Waste Recycling (Nascimento, D., Alencastro, V., Quelhas, O., Caiado, R., Reyes, J., Lona, L., Tortorella, G. (2018)

Source: https://www.researchgate.net/publication/329220560_Exploring_Industry_40_technologies_to_enable_circular_economy_practices_in_a_manufacturing_context_A_business_model_proposal

The figure above sets a perfect example of how the new technologies of 14.0 can improve business sustainability through waste recycling. After the consumer buys a product and a product completes its lifecycle, 14.0 technologies including different mobile Apps help in locating waste collection points, then conduct the process of selective waste collection, waste sorting, waste treatment, product printing using 3D printing technologies and product assembly. This helps in minimizing resource consumption and negative environmental impacts by reinserting waste into the supply chain to manufacture products on demand (Nascimento et al., 2018).

Through the incorporation of 'smart materials', equipped with sensor- and actuator- technology, these resources can be observed not only during the production process itself, but also throughout the whole life cycle of the product they are incorporated in, which saves material and causes less emissions. The observation of state and location of valuable materials (e.g. rare metals used in electronic parts) by using RFID-technology will reduce waste and will increase the reuse of these scarce resources. This will enable or at least ease to hold technical and biological nutrients within their cycles. It also makes it possible for example to trace energy and water consumption during each step of production, and results in shorter production time, which typically consumes less resources like energy and therefore reduces emissions (Blunck & Werthmann, 2017).

Moreover, Industry 4.0 applications definitely ease the management of inventories. Through real-time data about stock levels, it is possible to reduce waste and energy needs for storage space (Song & Moon, 2016). This hides a lot of potential with regard to sustainable economic activities, since too much inventory leads to unused and excess resources, which causes in return more emissions and pollution. By applying Industry 4.0 and AI technologies, drivers of excess inventories can be tackled by addressing problems like unreliable demand planning and overproduction. This becomes possible through for example an intelligent system, which automatically reorders if the minimum fill level is reached and will avoid surplus materials (McKinsey, 2015).

Through the use of Industry 4.0 and AI technologies, the consumption of resources such as material, water and energy can be minimized and increased product quality can be achieved, which leads in return to less waste during the production process. Furthermore, products with higher quality will be able to be kept much longer within the operational phase, meaning that the PLC and its use phase can be extended. Customers will need new products less frequently, which will reduce waste and push us one step closer to the Circular Economy model (Blunck & Werthmann, 2017).

A very good example of Industry 4.0 applications is traceability initiatives. Traceability initiatives can help in reducing greenhouse gas emissions and lessen

fresh water withdrawals by using Industry 4.0 innovative technologies. It would be possible to calculate multiple metrics related to food production in real time, such as CO₂ per product and the environmental impact of excess water usage. For example, Purdue University, in partnership with Hewlett-Packard Enterprise, have implemented an IoT test-bed infrastructure to measure weather and climate effects and to trace the increased impact of nitrogen emissions on agriculture production, water and air quality. Soil-bound sensors could measure how much water was applied to the crop and link to precision irrigation systems. Such a granular approach would not only help increase water efficiency but could also help identify areas in a value chain with the largest environmental footprint (WEF, 2019, p. 17) and therefore can reduce food waste moving us one step closer to achieving Circular Economy. Food-sensing technologies, internet of things for real-time supply chain transparency and blockchain-enabled traceability are all examples of innovative traceability technologies that help in reducing food loss and waste (see figure 8).

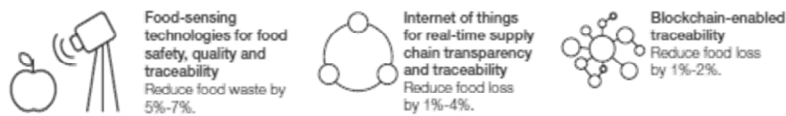


Figure 8 Innovative technologies enhancing food systems

Source: WEF 2019, p. 10

Another good example for Industry 4.0 applications is additive manufacturing, which has the potential to create geometrically complex parts that require high degree of customization, using less material and producing less waste. This makes the method largely material efficient when comparing it with traditional processes. Furthermore, the material used has less impact over its life cycle, resulting in a lower carbon footprint and less embodied energy (Mani et al. 2014, p. 419-421).

Industry 4.0 and AI services lead to new possibilities of repairing products and to the chance to keep them longer operational. New business models will emerge. There will be models where products and services will only be leased or borrowed instead of being bought, which hides potential for sustainable improvements. On the one hand, products provided can be kept longer operational by the support through maintenance services and repairs. On the other hand, it will be easier for the provider to get back products after their use phase, because products and parts can be traced by the provider over the whole PLC. Consequently, products can be recycled or remanufactured and parts can be reused and kept within a Circular Economy (Blunck & Werthmann, 2017).

5.2. Ecological Challenges

Nowadays companies are thriving to reach the great outcomes anticipated by using Industry 4.0 applications. However, their need for essential and additional resources to help them in this transition would lead to congestion of demand on

resources. This increased need would eventually result in lack of resources at least at the beginning, and the setback might be huge compared to the desired and awaited future goals, which could have a negative impact on the environment.

In addition, the rapid development in technologies and the manufacturing of the advanced applications of I4.0 and AI will lead to extensive use of resources. An important point to consider is the fact that the needed material might not be environmentally-friendly and would cause emissions and pollution.

It is also likely that in order to reuse, remanufacture, regenerate or recycle resources, the advanced technologies and applications of AI and I4.0 will be needed to respond to the increased demands and requirements of different people for their returned product, which will put more pressure on energy and water consumption to operate fast and have a qualitative yield. This might cause increased pollution and affect the availability of water and energy, which will initially threaten the environment and affect the economy and everyday life. For example, if the internet would be considered as a country, its amount of energy consumption can currently be categorized between the fourth (Japan) and the fifth (Russia) most energy intensive country in the world (Stuttgarter Zeitung, May 11, 2019).

Contribution to climate change is another possible negative impact of the Fourth Industrial Revolution. Massive industrialization, rapid development in technologies, increased urbanization, excessive deforestation, limitless resource depletion, desertification, rapid population growth, water scarcity, food insecurity etc. may hamper the natural environmental balance of earth (Nath, 2018).

Moreover, promoting the longer use of inefficient appliances could increase emissions or degradation and increased mobility through for example, car sharing or low-price access to holiday accommodation (using the asset sharing model) could also increase emissions by fuel combustion, which harms the environment and can degrade the healthy natural ecosystems (Wilts et al., 2018).

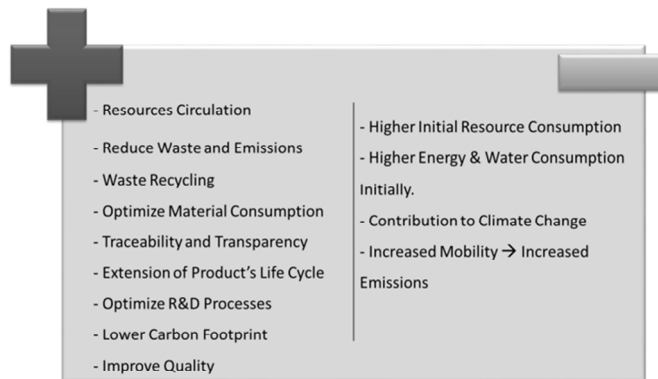


Figure 9 Ecological Opportunities & Challenges for I4.0 & AI enabling the Transition to CE (own representation)

5.3. Other Opportunities (Economic and Social Opportunities)

In addition to the various ecological opportunities of using I4.0 and AI technologies, there are a set of economic and social opportunities, which are also worth mentioning. AI technologies and connected assets can enable predictive maintenance, which decreases material costs by less defective goods and optimize processes (in yield and speed). Through the permanent, remote monitoring of machinery conditions, it becomes possible to reduce machine downtimes or changeover times by an early detection of possible problems and continuous maintenance, which can therefore save costs, increase product quality leading to less rework and less production time and drive production throughput (McKinsey, 2015).

Furthermore, by using the new technologies of I4.0 and AI, labour productivity can be increased, since it will be possible for example to reduce waiting times between different production steps in manufacturing or by accelerating the R&D process. In addition, the complexity of tasks can increase the speed of the manual production steps executed by workers (McKinsey, 2015).

The emergence of I4.0 and AI technologies will also offer new job opportunities for skilled workers and the younger generation. These jobs will probably offer better incentives, be better paid, less physically hard and cause less damage on health. Furthermore, AI and I4.0 applications have the power to personalize the relationship between companies and customers making customers 'clients' again by tailoring services to them as individuals with particular likes and dislikes (WEF, 2019). These benefits will surely encourage people to help in the transition into a more efficient and sustainable economy.

5.4. Other Challenges (Economic and Social Challenges)

AI technologies could lead to a performance gap between companies that fully absorb AI tools across their enterprises (front-runners) and companies that do not implement AI technologies (slow adopters). By 2030, front-runners could double their cash flow, while slow adopters may experience a decline in their cash flow. This is due to strong competitive dynamics among firms, which could shift market share from slow adopters to front-runners and may prompt debate on the unequal distribution of the benefits of AI (McKinsey, 2018).

In addition to the performance gap between companies, AI can also widen gaps between countries, reinforcing the current digital divide. AI leaders (mostly in developed countries) could increase their lead in AI adoption over developing countries. Leading countries could capture an additional 20 to 25% in net economic benefits compared with today, while developing countries may capture only about 5 to 15%. Developing countries tend to have other ways to improve their productivity, including catching up with best practices and restructuring their industries, and may therefore have less incentive to push for AI (McKinsey, 2018).

Furthermore, rapid migration of people for better opportunity and clustering at one place, leaving another isolated creates pressure at one part of the earth while the development of other part stays behind. This causes environmental imbalance as well as unequal global development, which causes social inequality globally as well as environmental pressure (Nath, 2018).

There is also the risk of having underemployed and resentful people and in order to avoid this from happening, the focus should be on AI seen as an assistant that augments and supplements human experience, rather than being viewed as a rival. If people feel they are being replaced by computers, chances are they will resist and not accept. These technologies must also be designed in a way to be accepted by different generations and age-groups (WEF, 2019).

An example would be autonomous driving or self-driving cars. These cars have the potential to make transport safer, more efficient and therefore less damaging to the environment. However, the crucial part is what will happen to the drivers who currently spend much of their lives behind the wheel. The risk would be leaving them underemployed and resentful (WEF, 2019).

Therefore, the main challenge here would be to invest time in teaching, empowering and developing new skills, which would also require financial support as well as a sense of motivation and willingness from people to learn and absorb new technologies and concepts as well as adjust their everyday lives accordingly. Otherwise, resistance would still take place, and people would not want to change their human behaviour and purchasing patterns.

Digital bias and inequality of data is another threat for implementing successful AI models. This requires the availability of sufficient high quality data. If data were to be engineered badly, this will lead to poor quality outputs. An essential point for AI is that it depends and learns from its captured data. If however, this data isn't representative or is not being collected evenly across the world or across different social groups, then AI will interpret and learn the wrong lessons (EMF, 2019).

For example, in some cities like Stockholm, Copenhagen, Amsterdam and Reykjavik, there are suggestion platforms linked to their website or offer apps, where citizens have the chance to provide information about the city's infrastructure and environment. Despite the fact that cities are becoming more aware of the importance of sustainability and environment, it seems that these communication tools tend to exclude non-digital people like the elderly or simply less-informed inhabitants, which in return lead to digital bias. In order to include all inhabitants, indicators such as means of offline engagement (a dedicated office, door-to-door and phone surveys) for example have to be implemented (WEF, 2019). Accordingly, digital bias is a serious issue which must be tackled and addressed seriously, and accordingly preventive or counter measures have to be implemented in order to introduce the concept of smart cities in the correct unbiased picture.

A big concern for implementing AI and I4.0 technologies is also data privacy and cyber security, which can limit usage and can make people reluctant to using these advanced technologies. For example, in a secondary market for consumer electronics, consumers may fear that personal information might be left on a device or they might have uncertainty around the condition of a second hand device (EMF, 2019).

Moreover, a challenging point in the Circular Economy model would be separating the technical and biological nutrients. If both streams get mixed-up by not defining the inputs and outputs clearly or by using inappropriate technologies, it will cause even higher negative impact on the environment and natural systems.

6. CONCLUSION

Although the concepts of Industry 4.0, Artificial Intelligence and Circular Economy are gaining more attention these days, the attention is mainly directed on each concept separately, yet the relationship between the three concepts is barely discussed. If people and companies collaborate to make the relationship between these concepts more transparent and apply the right principles, there will be a high potential of ecological, economic and social growth. To make sure we are moving in the right path, a set of challenges has to be overcome and solutions need to be proposed or suggested.

The application of Circular Economy principles with the help of I4.0 and AI technologies might emerge gradually and be visible only over time. It provides a long-term perspective for shareholders and employees by addressing the increasing resource-related challenges, help extend the use period of products and components, increase material efficiency, reduce waste in production, recover e-waste and optimize the R&D process, generate growth and jobs and reduce negative environmental impacts such as carbon emissions. The Circular Economy model creates an economy that is distributed, diverse and inclusive.

On the other hand, ethical issues, such as digital bias, resulting from the wrong interpretation of results might emerge and is currently considered a key challenge. If data is not representative or is not being collected evenly across the world or across different social groups, then AI will interpret and learn the wrong lessons leading to inequality and bias in AI. In addition to focusing on profit maximisation, companies should also look at sustainability and ethical issues more attentively.

This research is primarily a literature research based on secondary resources. In the future, additional empirical research with primary data needs to be conducted including interviews with experts in advanced economies in Europe and other regions. Based on such data more empirically supported and specific conclusions and recommendations can be given.

As a first conclusion to this literature research and based on the discussion points mentioned in this paper, AI and I4.0 technologies have the potential to make

significant changes to our current economy and environment, moving us from a linear mind-set to sustainable development and Circular Economy. If these technologies based on the Circular Economy principles were to be implemented and adopted in the right and unbiased way, a drastic and positive change to our environment and eco-system will take place and can help solve mankind's main challenges.

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THE ROLE OF SOCIAL AND EMOTIONAL INTELLIGENCE FOR LEADERSHIP EFFECTIVENESS DURING THE 4TH INDUSTRIAL REVOLUTION

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JEL classification: M54

Abstract

During the 4th Industrial Revolution, organizations will need leaders who can successfully motivate their employees and teams to learn, adapt, and contribute throughout an unprecedented technological revolution. We propose that the primary skill required for such leadership is emotional competence. Herein, we discuss the reasons why emotional competence is necessary and specify three sets of emotionally competent abilities leaders must develop in order to support and transform themselves, their employees, and their teams: emotional intelligence, social intelligence, and the ability to develop emotionally intelligent, collaborative, teams.

Keywords: emotional intelligence, collaborative teams, leadership

1. INTRODUCTION

Founder and Chairman of the World Economic Forum, Klaus Schwab, proposes that “The 4th industrial revolution will affect every essence of our human experience,” and will “...fundamentally alter the way we live, work, and relate to one another.” This industrial revolution is coming at a time when employees and organizations around the world are already experiencing the stress of a work context that has been characterized with the acronym, VUCA: volatile, uncertain, complex, and ambiguous. Thus, people and organizations already feel they are facing multi-faceted change at an unprecedented rate. Yet, the 4th industrial revolution, with its

artificial intelligence, robots that make better and more accurate expert decisions than humans, and self-driving cars that displace entire industries of drivers and automobile makers, cannot and will not transpire without the inspiration and talents of the people required to design and carryout the change. The success of the 4th industrial revolution relies on human brainpower, ingenuity, adaptability and collaboration. The current challenge for leaders is to determine how to best unleash and motivate these talents during a time of unprecedented change. Moreover, this must occur despite the great stress, discomfort, and intimidation that leaders and employees typically feel during such transitions (See Bridges & Bridges, 2016)

In this article we propose that *emotional competence* is the principal ability leaders will need to develop in order to successfully inspire and motivate people, teams, and organizations through the 4th industrial revolution. Motivation requires emotion -- emotion serves our lives by moving us toward or away from something (Elfenbein, 2007). Herein we argue that leader emotional competence provides leaders with the knowledge and skills to motivate employees and organizations toward both the risks and excitement inherent in the 4th industrial revolution. Emotional competence is defined as the ability to monitor one's own emotions and the emotions of others, to discriminate among emotions, and to use that information to guide one's own and others' thinking, decision-making, and actions (see Mayer & Salovey, 2003). An awareness and understanding of emotion are critical for leaders during periods of great change when employee cooperation, learning, and adaptation are essential, but are often reduced by the stress and fear generated by the transition (Bridges & Bridges, 2016; Huy, 1999).

Our argument draws from three decades of research in psychology, social neuroscience, and organizational behavior that reveal emotionally competent leaders who understand and empathize with employee emotion are better able to inspire the positive emotions that motivate the effort, adaptation and collaborative teamwork necessary to successfully move people, teams, and organizations into and through transitions (Damasio, 2018; Fredrickson, 2013; Goleman, Boyatzis, & McKee, 2013; Mayer, Roberts, & Barsade, 2008). We define effective leadership as that which guides people and teams to meet or surpass personal and organizational goals while advancing their ability to learn, adjust and, importantly, thrive because when employees thrive, they are more capable of learning and adapting to change.

This article proceeds as follows. First, we share research on the role of emotion on human cognition and behavior. This research underscores the relevance of leader emotional competence during times of transition and change. Second, to more fully define emotional competence, we overview three sub-sets of emotion-focused abilities that support emotionally competent leadership. These include: (1) emotional intelligence, (2) social intelligence, and (3) the ability to develop emotionally intelligent teams. Third, we discuss how each sub-set of abilities adds significant value to leaders as they transform their organizations during the 4th industrial revolution. Finally, we'll conclude with the practical implications of our ideas for leaders, teams, and organizations.

1. 1. Emotion Influences Attention, Motivation, and Cognitive Competence

Emotion is defined as the personal display of affected or agitated states, which is referred to as emotional arousal, e.g., contentment, joy, love, embarrassment, fear, anger (Fineman, 1991). Although emotions affect our thoughts and behavior, humans are not always consciously aware of their emotions. To *feel* is to be aware of the bodily state of an emotion. Although emotions can cause feelings of frustration and joy, that is not their purpose; the human brain evolved to develop a finely-tuned emotional system in order to provide us with information about our environment and social conditions, so that we can regulate and save our lives (Damasio, 2018). Emotions warn us about risks and dangers to be avoided and inform us about opportunities to approach.

Psychologist, Daniel Kahneman, who received the Nobel Prize in Economics for research on how emotion unconsciously influences cognition and behavior, uses a simplified model of the brain to explain the role of emotion on human thoughts and actions (For a summary of his research see Kahneman, 2011). He explains that the brain's highly complex operations can be separated into two primary systems: "Systems 1 and 2." *System 1*, the emotional system, is instinctive and operates so quickly that it's work is involuntary and primarily unconscious. System 1 continually scans the environment and uses instinct and past experience to detect anything unusual, especially anything that signals danger or threat. When detected, System 1 triggers emotion and behavior to seize attention and motivate action. For example, an on-coming car would instantly trigger fear and physical movement. A less immediate threat, such as the suspicious behavior or a teammate, would generate fear, anger, or curiosity, depending on the context. But its lower emotional intensity would not create the same immediate physical movement.

Two features of System 1 are relevant for our thesis on the role of emotional competence during the 4th Industrial revolution. First, to save human lives the emotion system evolved to work so efficiently and quickly that it takes in approximately 11 million-pieces of information per second; humans are consciously aware of approximately 40 of these pieces of information (Wilson, 2002). Thus, System 1 operates like "wireless broadband" that works primarily outside of human awareness to constantly scan for information that instinct and previous experience suggest requires attention.

Second, when threats or potential threats are identified, System 1 uses the brain and body's energy and attention to focus on the threat. This strategic use of limited physical and cognitive resources depletes the energy required by the brain to fully focus and utilize the brain's *System 2*, which is our analytical, problem-solving system. The stronger the perceived threat identified by System 1, the greater the depletion of resources, which otherwise would be used for fueling System 2's optimal cognitive functioning. Paradoxically, the work necessary for the 4th Industrial revolution will require a strong and sharply focused System 2. To put it plainly, fear and stress over the on-coming 4th Industrial revolution will reduce a

person's ability to think clearly, learn easily, adapt efficiently, and thrive during the transition.

Because System 2 controls our ability to cognitively analyze information, make decisions, and solve problems, unlike System 1, engaging it requires abundant attention and effort. The brain's System 2 processes information slowly, deliberately, and logically. It is the headquarters of the brainpower used to invent the technology that led to the first, second, third, and, fourth industrial revolutions. People with well-exercised and developed System 2 brains excel at intelligence tests. Thus, System 2 has been referred to as the IQ brain.

Yet, it is noteworthy that the brain's System 1 is also necessary for a successful transition during the 4th Industrial revolution. System 2 provides the brainpower required for developing science and technology. System 1, the headquarters of emotion, provides the motivation to inspire System 2 to focus attention and work hard. System 1 conjures motivation from instinct and past experience to get people out of bed in the morning, show up to work, and focus their attention on goal achievement. Without System 1's emotion, there is no motivation. Motivating employees requires inspiring employee emotion. Though, if leaders also wish to enable employees' best analytical work, they must also focus on reducing threats to employees' basic needs, which takes attention and brainpower away from high levels of performance and employee well-being. Below we discuss the basic human needs that, today, most often trigger threats and negative emotion in work organizations.

1.2. Human Needs that Predictably Trigger Emotion in the Workplace

If leaders are to manage employee, team, and organizational emotion during the 4th industrial revolution, it is useful to know the human needs that are most likely to be affected by workplace change, and thus most likely to generate positive or negative emotion as the result of the oncoming transition. Several taxonomies of basic human needs have been proposed (for a review see Pittman & Ziegler, 2007). The one most commonly applied to workplace behavior is Maslow's Hierarchy of Needs (1943; 1970). Maslow proposed that basic human needs can be placed into a hierarchical model from most urgent need to least. He used an image of a five-step pyramid to depict them. The most important needs for human survival are presented at the bottom of the pyramid, and the least important to survival are at the top. Thus, the bottom of the pyramid includes *physiological* and *safety* needs, which represent the human need for food, water, and safe shelter. When applied to the workplace, these needs represent the salary necessary for purchasing these fundamental needs. In other words, if a person cannot pay for food, water, and safe shelter – these needs occupy the person's full attention. Moving up the pyramid, Maslow next proposed three social needs, in order of proposed importance for survival, these are belongingness, self-esteem, and self-actualization. Belongingness

is the affective and cognitive sense that a person has strong stable relationships and is accepted by group members (i.e., not likely to be ostracized or rejected) (Baumeister & Leary, 1995). Self-esteem is the cognitive and affective sense that one is valued by the group for the important, distinctive, contributions they make (see Fiske, 2014). Self-actualization is defined as the cognitive and affective sense that one has added value to the group by fully developing one's talents and by sharing the wisdom and advice, they have learned from achieving their goals.

There is wide-agreement that the basic human needs in Maslow's pyramid model innately motivate human attention and behavior. That is, people are strongly motivated to satisfy these needs; they experience well-being and thrive when they are satisfied, and experience threat when they are not satisfied, or if they sense that their satisfaction in the future is at risk (see, Baumeister & Leary, 1995; Deci & Ryan, 2000; Fiske, 2014; Pittman & Zeigler, 2017). Notably, each of these needs is commonly perceived to be at risk or threatened during times of organizational transition and change (see Bridges & Bridges, 2016; Huy, 1999, 2002; Liu & Perrewe, 2005). Without a doubt, the 4th industrial revolution, with its unprecedented risks and opportunities arriving from artificial intelligence and nanotechnology, will significantly affect every day work life. From self-driving cars, to robots who use big data and computer programs to diagnose medical problems or provide mental-health counseling— jobs and ways of life are changing. Stable employment in order to meet one's basic needs will require learning new technological skills, undertaking major changes in job roles and responsibilities, and retraining. Unless leaders proactively work to design this future and influence employee opportunities and reactions to the change – threats and potential threats to employee basic needs will draw employee attention towards the threat, reduce productivity, and lower employee well-being.

Researchers and practitioners, alike (Bridges & Bridges, 2016; Huy, 1999, 2002; Liu & Perrewe, 2005) propose that large organizational change initiatives require psychological transitions that always include feelings of threat to one's basic needs including: job security (i.e., physiological and safety needs), employee sense of inclusion and belonging in the changing organization, and to one's sense of competence and self-esteem. During periods of organizational ambiguity, the emotional system of employees (i.e., the System 1 brain) will be actively scanning the environment for threats or potential threats to one's basic needs, which will reduce employee ability to focus and use their System 2, *IQ*, brain. Ironically, this is the brain region most required to successfully transition into and through the 4th industrial revolution.

We propose that emotional competence enables a leader to empathize with employees' feelings of threat and to understand and recognize the implications of emotional threats on employee attention, behavior, and job competence. Below, we discuss how emotionally competent leaders can use their emotion-focused skills and abilities to recognize when employees feel nervous about threats to their basic needs because of the change. They can also pro-actively anticipate the emergence of these feelings during an organizational change initiative and, therefore, intervene early in

the change process with programs that can help employees experience a sense of control over their future. For example, by including employees in conversations about the transition, future work roles, and how the organization can best manage the change.

2. THREE EMOTIONALLY COMPETENT LEADERSHIP ABILITIES

2.1. Overview

We use the term *emotional competence* as a comprehensive label for three specific abilities necessary for demonstrating emotionally competent leadership: (1) emotional intelligence, which involves awareness and regulation of one own's emotions, (2) social intelligence, which involves awareness and guidance of others' emotions, and (3) the ability to develop emotionally intelligence teams, which involves building a team culture that engages in actions to achieve social awareness among team members, and actions to manage emotional triggers within the team. It is noteworthy that each of these three specific emotional abilities requires sub-skills focused on: (a) awareness of emotion, and (b) management of emotion. We propose that effectively leading transformative change requires demonstrating each of these three abilities.

Emotion scholars have now been defining emotional competence and its effect on leader, employee, and team effectiveness for over three decades (Cherniss, 2010). Given the large number of studies available, today most published papers present meta-analyses that combine hundreds of studies to analyze the pooled overall relationship between leader emotional competence and performance-related outcomes. These meta-analyses consistently reveal that even after controlling for leader IQ and personality traits¹, higher levels of leader emotional competence are associated with higher levels of: team effectiveness and goal achievement (Mills, 2009; O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011; Qian, Walter, Cole, & Humphrey, 2011), employee job satisfaction (Miao, 2016), employee job performance (Miao, 2017), and employee perceptions of a leader's authenticity (Miao, 2018). Research also shows a link between a leader's emotional competence and a team's emotional intelligence, which increases team performance (Druskat, et al., 2017; Stubbs-Koman & Wolff, 2008).

Given the clear positive link between leader effectiveness and emotional competence, much recent scholarship focuses on various ways of developing leader emotional competence (see Mattingly & Kraiger, 2019). Development requires knowledge about the specific abilities that define emotional competence. Figure 1

¹ Controlling for leader IQ and personality allows researchers to argue that the positive effects of leader emotional competence on job performance are not due to leader IQ or personality characteristics, which for years were considered alternative hypotheses about the influence of emotional competence (see (Matthews, Zeidner, & Roberts, 2002).

depicts the emotional competence ability model we propose to be most important for leaders approaching the 4th industrial revolution. This model is an adaption of a previous emotional intelligence model developed by Goleman, Boyatzis and McKee (2013). It presents six specific skills that represent emotional competence. These can be categorized by three overall abilities – each of which focus on a difference audience (i.e., oneself, others, teams). Below, we provide definitions and descriptions of each specific emotional competence ability and its sub-skills.

Sub-Skills	Emotional Intelligence	Social Intelligence	Team Emotional Intelligence
Awareness of Emotion	Self-Awareness	Social Awareness	Team Social Awareness
Management of Emotion	Self-Regulation	Guiding Others' Emotion	Team Emotion Management

Figure 1 Leader Emotional Competence Ability Model²

2. 2. Emotional Intelligence (EI)

Emotional intelligence (EI) includes two sub-skills: (a) awareness and (b) regulation of one's own emotion. EI is the most critical ability in the emotional competence ability model because it is impossible to fully engage the other abilities and skills if one cannot identify, understand, and manage their own emotions.

2. 2. 1. Self-Awareness

The emotion system (i.e., our brain's System 1) scans our environment so quickly that its work is conducted almost entirely out of our awareness. Yet, at any time, humans can also become self-aware of their emotions by "tuning-in to" or attending to the feelings generated by their emotional system. They can also increase their self-awareness by activating their IQ brain (i.e., System 2) to assess and think about what caused those feelings. Cultures around the world differ in norms and values related to human emotion, including whether children are taught to tune-in to and think about their feelings, or whether they are taught to ignore or suppress them (see Levy, 1984). This latter idea often assumes that suppressing feelings enables a person to exhibit "rational" behavior rather than emotionality. It also assumes that the human emotion system can "turn-off." In fact, as discussed below, feelings provide information about the relationship between oneself and the situation or environment. Awareness of feelings can also emotions and feelings easier to regulate and calibrate so that the resultant behavior is "appropriate" for the situation. For example, if I think about my feelings and recognize that I'm feeling anxiety, not anger, over my need to learn a new task, I can calm myself down enough to focus on

² Adapted version of Goleman, Boyatzis and McKee's (2013) model of Emotional Intelligence.

information about the new task and use my energy to ask questions rather than to fight and object to the change.

According to Goleman and colleagues (Goleman, Boyatzis, & McKee, 2013), overall, emotional self-awareness enables a person to: (a) tune-in to how they feel at any time and use those feelings as information about themselves, their situation, or others around them, (b) understand the impact of their emotions on their decisions and behavior, and (c) anticipate how other's might experience their emotion and behavior. Due to the high visibility of a leader's role, it can be particularly important to recognize how their emotions affect others. Consider a situation where a leader arrives at work feeling anxious and frustrated about a high-level meeting in which leaders disagreed about organizational priorities relative to the organizational change. A self-aware leader would notice the tension and frustration visible in their non-verbal facial expressions and body language and would not want employees to "catch" that stress or interpret it as indicative of problems in the organization. Thus, the self-aware leader has a few options. They might choose to self-regulate or manage their emotions so that during their entrance to work their feelings are undercover and do not get noticed by employees. Or, they may choose to provide some but not all of the information to employees they meet or pass in the hallway, so that those who notice their tension might learn that they have come from a meeting where upper-management expressed lots of enthusiasm about the change and, naturally, there are some differences of opinion – and that the leader is looking forward to resolving those feelings. This kind of authentic response is often appreciated by employees. It's not surprising that leaders with higher levels of self-awareness have been found to build team climates that are rated as highly positive by team members, while those with lower levels of self-awareness build team climates that are rated as negative by team members (Malloy, 2011).

2. 2. 2. Self-Regulation

Informally, this sub-skill is labelled *the fire and the brakes*. Because emotion is contagious (Barsade, 2002), sometimes a leader needs to ignite their positive emotion in order to turn-on other's positive emotion and motivation (see Szczygiel & Mikolajczak, 2017). However, just as often, leaders need to curb their own negative emotion in order to reduce its effect on others and on how others interpret the leader's behavior. Also, as discussed, strong emotion (e.g., especially negative emotion like fear) reduces the attention and resources a person has available for their System 2, IQ, brain. Thus, once a leader is self-aware of their negative or strong emotions, they improve their ability to self-regulate those emotions. Self-regulation of emotion can help in ways as diverse as increasing one's motivation to focus their own attention and hard work, to presenting a polished, confident, and positive presence during interpersonal interactions. Emotion self-regulation is a necessary part of any leadership role.

As organizations move toward the 4th industrial revolution, one of the most important applications of emotional self-regulation is a leader's need to manage

their own fears and anxieties about their future and the effects of the transition. Leaders are human beings whose well-being will be as significantly altered by large change as everyone else's. Leaders are also more likely to be informed about the timing and scope of upcoming change than those they lead. Unless leaders take actions to, first and foremost, recognize and regulate their own trepidations about the future, they cannot enact the role of the positive, forward-looking, and steadfast leader that their employees, teams, and organizations need to lead them into the oncoming change.

Managing one's own emotion during a period of change may require collecting information and taking actions to comprehend the change and its implications in order to create some sense control over that future. It may also require re-thinking and re-framing one's thoughts and feelings about the change in order to identify positive aspects of the change for oneself and the organization and its employees. Reframing how one thinks about a situation enables one to stop the emotional system from focusing on the threat and instead, focus on the positive opportunities ahead. Reframing thoughts is a central feature of *cognitive behavioral therapy*, one of the most successful forms of therapy, because it changes feelings in order to change behavior (see Ciarrochi & Brelsford, 2009; Ciarrochi & Mayer, 2007). Whatever the method of emotional self-regulation used by a leader, it is essential that leaders care for themselves and their own well-being so that they can effectively lead and care for others during the 4th industrial revolution.

2. 3. Social Intelligence (SI)

Social intelligence (SI) includes two sub-skills: (a) awareness of others' emotion and (b) managing or guiding others' emotion. Research now reveals that the basis of *interpersonal or social skills* is the ability to tune-in to other's emotions (Lieberman, 2013). Between the emergence of the idea of emotional intelligence (see Salovey & Mayer, 1990) and the development of the field of social neuroscience, which focuses on the role of emotion in the brain's processing of social information (Damasio, 2018), it is now understood that social skills emerge from a person's ability to observe and interpret the emotions of others and to guide that emotion in a direction that is pleasant for the people involved (Lieberman, 2013). Thus, social skills require the ability to listen and tune-in to emotion. This knowledge is informative for teaching and developing the social skills of children and teenagers in public school systems (see Bridgeland, Bruce, Hariharan, 2013; Weissberg, & O'Brien, 2004).

2. 3. 1. Social Awareness

The human brain evolved to develop the capacity to tune-in to (i.e., feel) other people's emotions and to use that information to hypothesize about how that person feels and why they feel that way. As discussed, the human unconscious brain takes in 11 million bits of information per second (see Wilson, 2004) -- to other

people's emotions. When we see emotions on another person's face, we "catch" those emotions. When you look at someone who is embarrassed, you see it on their face, and you can feel that embarrassment. We are physically designed to be able to do this and it is necessary to utilize this ability. As leaders we need to know when other people are nervous or over excited so we can calm them down, make them feel united rather than alone. This all starts with social awareness.

Helen Riess, a Psychiatrist at the Harvard Medical School teaches social awareness skills to medical students so that they are better able to tune-in to (i.e., feel) and understand the needs of patients. Riess's own research on empathy led her to develop a seven-step process for demonstrating empathy that she describes through the acronym: EMPATHY (for a summary see Riess, 2018). Step one requires making eye contact with the person (i.e., E is for eye contact). Every emotion has a unique facial signal that is primarily conveyed by the eyes and secondarily by voice tone and other non-verbal signals (Ekman, 2003). Beyond helping the listener see the emotional expression in a person's eyes, eye contact also encourages a person to share information, which always provides additional clues about the person's emotions.

Steps two and three in Riess's model require observing the muscles in a person's facial expression (i.e., M is for muscles of facial expression), and their overall physical posture (i.e., P is for posture). Although everyone's facial expressions are unique, one way the brain helps us catch other's emotions is by unconsciously triggering us to mimic the expressions on other's faces. This mimicry causes us to feel the emotion exhibited by that expression and thus, feel what the other person feels. An example is when a person yawns, others also yawn. Observing a person's posture has a similar effect. A person's posture non-verbally communicates how a person feels. For example, even subtle differences in a person's posture can communicate different messages about their level of engagement or self-confidence.

Step four requires noticing and naming the emotion on a person's face (i.e., A is for Affect, a technical term for emotion). Riess argues that it is not enough to simply notice emotion. Labelling the emotion to the best of one's ability allows the listener to begin interpreting and thinking about their reaction to this emotion. For example, whether the listener labels the other person's emotion as anger, fear, bitterness, or confusion will influence their response to the speaker. That response can be more intentional and constructive if the emotion has been consciously labelled and interpreted.

However, before the response which emerges at step seven, the listener must go through steps five and six. Step five requires attending to the person's tone of voice, which, according to Riess, conveys over 38 percent of the non-verbal aspects of a message (i.e., T is for Tone of voice). The tone of voice used when a person speaks is difficult to ignore. For example, the voice tone communicating the same information can sound sarcastic, loud, tentative, or respectful – each conveys a different emotion. Step six requires making sure the listener is hearing and attending

to the whole person (i.e., H is for Hearing the whole person). This requires suppressing one's own feelings to focus holistically on the person's words as well as their affective concerns. Step 6 is the last step in establishing empathy or emotional social awareness. The 7th step in Reiss's empathy model asks the listener to take-in all that has been learned from each step and use these clues to calculate a response (i.e., Y is for Your Response). This response is where relationship development or managing and guiding other's emotion begins. This takes us to the next social intelligence ability: *Guiding Other's Emotions*.

2.3.2. Guiding Other's Emotions

Due to the fear and stress employees often feel when organizational changes that are out of their control threaten their basic needs such as financial security, belongingness, and self-esteem, leaders must do more than understand these feelings and emotions – they must intentionally guide them in positive and productive directions. As emphasized by Kahneman, fear emerges from the System 1 brain and draws attention to the threat, making it difficult to focus attention on potential positive aspects about the change. Moreover, the stronger the fear, the less resources a person has available for focusing the IQ brain on learning the skills required for successful adaptation to the change and new ways of working. Thus, during times of stress and change, leaders must take actions to guide employee emotions away from tensions and threats and toward positive emotions and optimistic views of the future. Positive emotions such as gratitude, interest, and hope encourage employees to get involved in change initiatives, to explore new learning opportunities and to strive to excel during the transition (for a review of beneficial actions and attitudes that grow out of positive emotion, see Fredrickson, 2013).

Leaders can use reactive or proactive emotion management to guide employee emotion in these positive directions. Reactive emotion management involves addressing negative or disruptive emotions as they arise. Take the example of a leader working with an employee to learn a new job skill. If the leader tunes-in to employee apprehension, the leader can take immediate actions to guide that emotion in calmer and more productive direction. This can be done by first pausing to ask questions and listen empathically, as described above, to build a better understanding employee emotion. By itself, empathic listening is a helpful intervention for guiding employee emotion because it conveys care and respect. But, as discussed, it also sets up the leader to take more specific actions to guide the emotion. For example, the leader can convey that the employee is not alone and can obtain additional coaching and training. If, instead, the leader ignores the employee's apprehension, or mistakes it as irritation rather than worry, the leader will likely miss the opportunity to guide the employee's emotion in a more productive direction. Remember that anxiety maintains a person's focus on threats and reduces their ability to make full use of their system 2 brain to efficiently learn.

Proactive emotion management requires thinking in advance about how employees will feel about a change and using that information to and address

potential disruptive emotions before they arise. Emotionally competent leaders are in a good position to do this since they understand the power of emotion and are more able to foresee employee concerns about basic needs like financial security, inclusion and self-esteem as the 4th industrial revolution approaches. For example, a leader can anticipate that a job change requiring new technical skills is likely to induce fear in a group of employees. By providing extra training and time to discuss and ask questions about the new job, a leader can reduce fear from the beginning and at the same time allow the System 2, IQ, brain to operate with full functioning.

Overall, socially intelligent leaders understand the impact of emotions on the motivation and behavior of their team members. Guiding their emotions can be done with small actions (e.g., bringing coffee to a meeting), and larger ones (e.g., inviting the company president or CEO to speak about the importance of team members' work, or to answer questions about the purpose of a change initiative). Whether the focus is on generating positive emotions or reducing negative emotions, guiding people's emotions influences their thoughts, behavior, and motivation. The evolutionary intention of emotion is to move us toward (or away) from something. Thus, the source of motivation is emotion. Humans can be motivated by fearful, negative emotions, or by positive ones. Motivating employees through the 4th industrial revolution will require the social intelligence necessary to guide emotion in a positive direction.

2. 4. Team Emotional Intelligence

Emotional and social intelligence has also been conceptualized as a systems-level concept through which group culture can also promote social awareness and emotion management (Druskat & Wolff, 2001; Gant & Agazarian, 2004; Huy, 1999). Emotionally intelligent teams have shared values and behavioral norms (i.e., shared expectations about behavior) that produce a productive social and emotional team culture that motivates pro-social interactions that support team collaboration and high levels of performance (Druskat, et al., 2017; Stubbs-Koman & Wolff, 2008). Because effective team collaboration is necessary for developing the innovations required for entering and succeeding during the 4th industrial revolution, emotionally competent leaders must also be skilled at building and leading emotionally intelligent teams.

In particular, collaborative teamwork will be required for the complex technological and operational innovations that will shape the future and advance the 4th industrial revolution. These multifaceted innovations will not emerge from one or two intelligent or creative employees. The intricacy of the innovations requires the interactions and integrated knowledge of team members with diverse skills and experiences. Moreover, these team members will need to choose to share and debate their best ideas and knowledge and to focus their attention on the team's work. Research demonstrates that team collaboration is complex and difficult and does not emerge without strong leadership intervention (Mathieu, Wolfson, & Park, 2018; Randel & Jaussi, 2003).

Effective collaboration in emotionally intelligent teams emerges from strong team values and norms that build a productive social and emotional culture, in part because they satisfy team member basic social needs of belonging and self-esteem. As discussed earlier, the brain's emotional system continuously scans the environment for threats to basic human needs (Sterling, 2012). It turns out that team environments create high levels of emotional stress and threats – in fact, team scholars have labelled work teams *emotional incubators* because of the emotion generated within teams (De Dreu et al., 2001). This emotion comes from the elevated potential for threats to one's sense of belonging and competence (i.e., self-esteem) (see Fiske, 2014), especially during times of change (Bridges & Bridges, 2016). Thus, in team environments, the team member emotional systems (i.e., System 1 brains) are typically on high alert.

Therefore, it is not surprising that emotionally intelligent teams, which feature behavioral norms that satisfy team members' basic social needs, demonstrate high levels of team collaboration and effectiveness (see Druskat & Wolff, 2001; Druskat, et al., 2017). By addressing the basic needs of team members, these norms relax team members' emotional systems and enable them to fully access and focus their IQ brains during team debates and discussions. It also engages employee motivation because members are more engaged in the work of teams when they feel they are an integral and valued member of the team.

Our research suggests that emotionally competent team leaders intervene to build two categories of norms that create and sustain an emotionally intelligent team culture (see Druskat & Wolff, 2001; Druskat, et al., 2017). Those norms support: (a) Team social awareness, and (b) Team emotion management.

2. 4. 1. Team Social Awareness Norms

In an effective, collaborative, team, each member shares their best ideas, information, listening skills, and effort and integrates those efforts with others to produce an outcome that is better than anything that could have been produced by the same people if they were working separately. Team members are more likely to do this if they feel known, understood, respected and cared for with the team (Druskat, et al., 2017; Huber & Lewis, 2010; Kahn, 1998). Behavioral norms that support these combinations of cognition and emotion also meet member basic needs for belongingness and self-esteem.

Our research suggests two specific norms produce these outcomes: (a) understand team members, and (b) demonstrate caring. *Understanding team members* requires seeking out and working to appreciate the spoken and unspoken interests, concerns, strengths and areas of weakness for each team member. Such knowledge about one's team members builds familiarity, which facilitates the development of what Clark and colleagues refer to as communal, rather than exchange, relationships (Clark, Fitness, & Brissette, 2004). Communal relationships

involve deeper levels of knowing and understanding and allow team members to feel they are appreciated for who they are. This increases their sense of belonging.

The second norm, *demonstrate caring*, requires members of a team to actively convey appreciation, respect, and support for one another's needs and efforts. Every social interaction includes an exchange of emotion and sends signals about the relationships of those involved (Van Kleef, 2009). Scheff (1997) argues that at all times relationships are either being built or maintained – otherwise they are at risk of damage. Conveying care and respect signals the innate worth of a team member and that the member's presence is important to the team. Thus, it builds a team member's basic need for self-esteem.

2.4.2. Team Emotion Management Norms

Our research suggests a second set of behavioral norms that also contribute to the creation of an emotionally intelligent team culture. These two norms focus on maintaining the team's ability to manage and continually improve its culture and provides an outlet for using the feelings and concerns team members experience in the team as information relevant for creating change. Member feelings and insights provide information about what aspects of the team's operations are working well and what aspects are preventing optimal team collaboration and effectiveness.

The two norms are labelled: (a) review the team, and (b) solve problems proactively. They maintain team members' sense of control over the fate of the team and its outcomes and therefore help manage threats to the team and to team members' continued sense of belonging and job security. As its label suggests, *review the team*, routinizes discussions of the team's current reality, including strengths and areas for improvement. Research shows that teams that continually assess the effectiveness of their environment provide the opportunity to make timely changes that keep the team performing at its best (Tannenbaum & Cerasoli, 2013). Team members, rather than team leaders, are often the best judge of the current state of a team's culture, it is important that team member discussions are central to the assessment and change process (DeJong & Elfring, 2010).

The second norm, *solve problems proactively*, complements the previous norm. It requires using the team's analysis of its current state to proactively take control and make improvements to the team's norms and operational processes. This norm helps a team create a more offensive than defensive environment that controls its fate. Actions that support this norm frequently involve reaching outside of the team's boundary to interact with stakeholders at all levels of the organization (Druskat & Wolff, 2001). Such actions are not easy, but they build a culture of optimism, which builds resilience (Fredrickson, 2013) – a necessity during times of great change.

In summary, team norms and culture emerge in all teams. Without leadership intervention, they are rarely norms that address member basic needs, which disables their ability to produce an environment that supports effective team

collaboration. Due to their awareness of the relevance of emotion and of satisfying team member basic needs of belongingness and self-esteem, emotionally competent leaders are in a good position to build emotionally intelligent teams. They can intentionally establish a team culture that normalizes behavior that helps team members feel secure and in control of their environment and future success. This enables higher levels of collaboration and increased levels of team performance. Leaders who build emotionally intelligent teams will enter the 4th industrial revolution successfully. They will set up their organizations and employees to thrive during this period of tumultuous change.

3. CONCLUSIONS

We have argued that leader emotional competence is essential for moving organizations and employees into and through the 4th industrial revolution. There is irony in the idea that an industrial revolution focused on the development, implementation and use of sophisticated information technology, requires leaders with high functioning social and emotional, rather than technical, skills. But, ultimately, human beings will need to develop the complex technology that supports the robots and self-driving vehicles that will alter the workplace and the way people live. The changes, which may be overwhelming because of their grand scale, scope, and complexity, will also require human beings to learn and adapt to their use.

While technology advances quickly, the human brain is still a social organ that evolved over a period of 54 million years of tribal life (Stone, 2006). Thus, our brains have evolved to work most effectively when our fundamental social needs are satisfied. This is when we can relax enough to focus on the complex tasks and complex learning that will enable a successful transition into the 4th industrial revolution. Leaders who can use their social and emotional skills to engage the positive emotion and motivation of their employees, their teams, and their organizations, will thrive as they aid the success of the 4th industrial revolution.

The good news is that research suggests that emotional competence can be developed. According to intentional change theory (Boyatzis, 2006), which has been successfully used to develop emotional competence (Boyatzis, Stubbs, & Taylor, 2002), development begins with a baseline assessment of one's emotional competence to identify areas of strength and those for improvement. As discussed, building emotional self-awareness is a critical first step for building emotional competence. It is difficult to recognize and understand the emotion felt by others, if a leader cannot first recognize and understand the source of that emotion for themselves. Practice and the receipt of developmental feedback is also necessary for building emotional competence abilities and skills. Over time, practice re-wires the brain (Damasio, 2018) so that emotion is easier to access and use as information. Boyatzis and his colleagues have found that practice with others who are also working to develop their own emotional competence is particularly useful and

effective as people learn vicariously from others' development (Boyatzis et al., 2002).

Understanding emotion as valid and insightful information will take human talent and decision-making to higher levels – this is the next frontier in human evolution. It will also advance people, teams, and organizations successfully into and through the 4th industrial revolution. The intellectual challenges and landscape ahead of us during this next industrial revolution will require the full use of our IQ brain. We have argued, like others before us (Damasio, 2018; Goleman, et al, 2013; Kahneman, 2011), that the best way to do that is to understand the role played by emotion in encouraging and advancing our cognitive skills and technological capability.

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CORPORATE SOCIAL RESPONSIBILITY

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ENVIRONMENTAL AUDIT IN RUSSIA AS A MEASURE OF CORPORATE SOCIAL RESPONSIBILITY

UDK: 005.85:502.11](470+571)

JEL classification: O35, Q56

Abstract

This article is devoted to the investigation of environmental audit in Russia as a subject of corporate social responsibility in the context of the current ecological situation. The fourth highest level of carbon emissions in the world and the fifty-second place in environmental performance index rank in 2017 set an agenda of sustainable development in Russia, the ground zero for which is the evaluation of business entities' activities in terms of environmental impact. Hereby, the purpose of this study is to reveal the mechanisms for stimulating environmental audit as a part of corporate social responsibility. In the first place, the notion of "environmental audit" is determined regarding the type of its beneficiary. On this basis, operational and managerial natures of this term are distinguished, concerning the procedure regulations and the economic benefit for organizations respectively. The research also provides patterns of environmental audit proceeding from its stakeholders' interests. The methods applied for the investigation include theoretical modelling, benchmark analysis of Russian and foreign practices and statistical review of the non-financial reporting publications. Thereby, the main results of the study suggest that the development of environmental audit as a social responsibility requires the introduction of a legislative framework governing a binding nature of the audit in particular cases and providing a certain relief of ecological licensing procedure for those companies, which have performed the audit. The other solution implies the harmonization of non-financial reports

carried out through the promotion of the practice of using the GRI guidelines.

Keywords: Environmental audit, corporate social responsibility, non-financial report

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CORPORATE BRANDING THROUGH CORPORATE SOCIAL RESPONSIBILITY

UDK: 658.626:005.35

JEL classification: M10, M14, M19, M39

Abstract

The role of corporate social responsibility (CSR) in the corporate branding process involves managing corporate image and reputation in the minds of others. Contemporary organizations are aware that CSR actions are being carefully monitored not only by consumers, but also by all stakeholders. Enhanced interest in social and environmental issues highlights the need for corporate branding strategies to reflect cultural trends in a wider environment to which organizations belong.

Keywords: corporate social responsibility, brand, corporate branding, corporate image, corporate reputation.

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VOCATIONAL EDUCATION AND TRAINING AS A TOOL FOR IMPROVING SECONDARY EDUCATION IN BIH – THE TEACHERS' PERSPECTIVE

UDK: 377.091(497.6)
JEL classification: I 210

Abstract

The most important objective of education system of a country is utilizing the knowledge that would enable systematic economic and social growth. Accordingly, the key education stakeholders have to connect and harmonize education with all society segments. One such initiative, the EU Vocational Education and Training Project (EU VET), was implemented in BiH. Its main goal is improvement of secondary vocational education and students' competitiveness on the labour market. This research was aimed to assess the benefits that the EU VET introduced in BiH, and to assess its connection with the labour market, all from the perspective of the teaching staff. To properly address research objectives, a questionnaire was developed and sent out to 340 teachers from the F BiH, yielding 275 valid responses. The research results confirmed that the EU VET project had a positive impact on education system in BiH. However, the research also revealed that the educational actors have no analytical capacities necessary for harmonizing the curriculum with the labour market needs.

Keywords: *Vocational Education and Training, EU VET, Secondary Education, Labour Market*

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THE IMPORTANCE OF TEACHING ETHICS IN PROFESSIONAL STUDY PROGRAMMES

UDK: 37.017:174

JEL classification: A14, I23, L29

Abstract

Analysed in this paper are two aspects of teaching ethics in professional study programmes. The first part discusses the importance of teaching ethics, and the second part discusses the responsibility of professional study programmes in educating future managers, executives, and businesspersons. Scientific and higher education institutions emphasise how important it is to acquire knowledge, skills, attitudes and values in response to the challenges and requirements of some particular role or function in life. Therefore, highlighted is the importance of teaching ethics as a generic competence that is general, mutual and transdisciplinary, and necessary for a wide spectrum of jobs and situations. Business ethics is of vital significance for success in the contemporary world and this is a fundamental condition for any higher education study programme. Key reasons for teaching ethics are: to allow students to develop critical thinking skills, to expose students to opposing opinions through debates, to prepare students for making decisions, as well as to familiarise them with flawed rationalisation and social pressures. Ethical values are under the influence of culture and the upbringing of each individual. For numerous students, their studies are places of encounters with diverse attitudes and opposing opinions. By teaching ethics and applying ethical debates, not only are students exposed to opposing opinions, but they are also provided with the opportunity to understand diversity. As a result, students can expand their understanding of ethics, sometimes changing their own values and decision-making processes. Skills related to decision-making, such as creating values, critical thinking and leadership, are considered superior attributes for students who have

graduated. The development of decision-making skills provides young people with the opportunity to set themselves apart from others and respond to the demands and challenges they are faced with. The objectives of this paper, based on the research conducted so far and the existing, recent literature, determine the importance of teaching ethics in professional study programs. An added contribution to the work of an internal survey conducted among students that substantiate claims in previous researches.

Keywords: ethics, generic competence, values

ENTREPRENEURSHIP

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**THE ENTREPRENEURSHIP'S CRUCIAL ROLE IN
INTERNATIONAL TRADE**

UDK: 339.5:658.012

JEL classification: L26, F10, O24

Abstract

In the approach adopted by the Austrian School of Economics, the individual is the driving force in both the human action process and the economic activity, starting with the primary role in developing entrepreneurial acts. The purpose of this paper is to extrapolate the Austrians' approach to international trade by analysing the human action or the entrepreneurial action. In order to understand the entrepreneurship's importance in the market, it is necessary to identify the merits and flaws (imperfections) of international trade theories in the context of a limited explanation of the entrepreneur's role in international trade acts. By analysing the literature, we noticed that the role of the entrepreneurship and the entrepreneurial activity are not sufficiently or properly explained or exemplified, therefore such an approach is necessary to better understand the differences among various countries.

Keywords: entrepreneur, entrepreneurship, international trade

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WOMEN ENTREPRENEURSHIP IN THE REPUBLIC OF CROATIA

UDK: 005.34-055.2(497.5)
JEL classification: L26, M14

Abstract

Entrepreneurship is crucial for the development of any country. Starting a business is always challenging for people that want to become an entrepreneur, especially for women. It is necessary to encourage the development of entrepreneurship as a way of solving the unemployment rate of groups in the society that have a problem with the employment. Women are one of those special groups and that is also one of the reasons why women entrepreneurship is becoming a very important topic all around the world. The aim of the paper is to show the main characteristics of women entrepreneurship in Croatia and to show the main problems that women are facing every day in a business world. Different recommendations for the improvement of women entrepreneurship in Croatia are presented in the paper.

Keywords: women, entrepreneurship, the Republic of Croatia

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NEUROMARKETING OF FINANCIAL REPORTING: RUSSIAN VIEW OF METHODOLOGY FOR IMPROVING REPORTING

UDK: 339.138:658.14/.17](047.32)

JEL classification: M31, M41

Abstract

Neuromarketing of financial reporting is a topic of interest to all representatives of the professional accounting and auditing environment. This paper will present the main problems of modern financial accounting, and possible solutions to them using neuromarketing methods. Thus, in order for financial statements to allow companies to attract new investments, as well as to avoid penalties from the tax authorities, organizations need to regard reporting as a commodity whose main consumers are users of these financial statements. In order to make this product interesting for consumers, companies need to attract their attention using neuromarketing methods, which will allow investors, tax authorities and lending organizations to quickly and efficiently use of data on the company's business operations, as well as make the necessary economic decisions faster. Thus, an easy, understandable and accessible presentation of the results of an enterprise's economic activity at the reporting date may allow both firms and users of financial statements to interact more effectively.

Keywords: neuromarketing, financial reporting, accounting

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**NET PRESENT VALUE CALCULATION: REAL LIFE
APPROACH**

UDK: 330.322:336.748.12]:657.92

JEL classification: G11, E31

Abstract

Net Present Value (and IRR) is calculation considered as the most widely accepted measures of investment's financial evaluation. Both methods apply long-term cashflows for 5 to 15 years ahead. During that period inflation certainly has an effect on both cash inflow and outflow figures. Literature often does not take into account the inflation or suggest a simplified inflation-corrected calculation method. Author proves that it is not appropriate in case of long-term physical investments. A new method: life-long financial simulation is suggested by the author for financial evaluation of physical investments.

Keywords: NPV, investment, inflation

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THE IMPACT OF CORPORATE INCOME TAX ON FOREIGN DIRECT INVESTMENT IN SOUTH-EAST EUROPE

UDK: 339.727.22:336.226.1](4-12)

JEL classification: F38, H25S

Abstract

Many countries try to attract foreign direct investments in order to promote their economic development. FDI is considered as an important factor which can promote technological development, increase employment and raise economic growth in the context of less developed (developing) market economies. Previous empirical literature has shown that FDI promotes economic growth via complementary effects on domestic investments, increases in productivity and overall economic efficiency, giving rise to an increasing interest in understanding the key determinants of FDI. Among many policy initiatives to attract FDI, tax policy has been considered an important direct policy instrument. A small number of studies exist analysing the importance of tax policy regime in attracting FDI covering South East European countries. In this study, we rely on gravity econometric framework and examine the impact of tax policy on FDI using bilateral FDI flows between 8 home and 7 South East Europe host countries in the period 2000-2015. The seven SEE host countries included in the sample are considered of similar economic structures and institutional transformation which seems important in analysing tax policy effectiveness and minimising biases associated with econometric modelling of FDI determinants. Finally, we study this relationship in an integrated framework considering traditional gravity forces as well as a number of additional FDI determinants including institutional factors. We show that although tax policy seems an important determinant of FDI, its effect seems to be conditional on the level of

technological development. The results are robust to different model specifications and consideration of endogeneity.

Keywords: FDI, corporate income tax, tax incentives, gravity model, transition economies

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HEALTH EXPENDITURE AND ECONOMIC GROWTH: IS THE HEALTH-LED GROWTH HYPOTHESIS FOR SELECTED OECD COUNTRIES?

UDK: 330.567.4:614]:338.1

JEL classification: C23, I10, H51

Abstract

The aim of this study is to investigate the health-led growth hypothesis in selected 20 OECD countries. Therefore, in this study, different cointegration tests were applied to investigate the relationship between health expenditures and economic growth for the period 1980-2017. The coefficients of the panel regression equation is estimated by the fixed effect method. According to the results, long-term relationship between health expenditures and economic growth was found. Health-led growth hypothesis for selected OECD countries(Australia, Austria, Belgium, Canada, Denmark, Finland, Iceland, Ireland, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States) in which Turkey is also located are supported. That is, a long-term relationship between health expenditure and economic growth has been found.

Keywords: Health-Led Growth, Cointegration Test, OECD Countries

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INEQUALITY, SOCIAL CAPITAL AND VARIETIES OF CAPITALISM IN LATIN AMERICA

UDK: 330.56-021.23:330.342.14](8)

JEL classification: D31, O54, P10, P50

Abstract

Latin America is the region with the greatest inequality in the world, and the explanations are diverse, but the most relevant coincide in the institutions as a key factor. Social capital, as another kind of institution, is associated with inequality, because a society with low-income inequality is a consequence of greater social capital. There are several studies that analyse the relationship between social capital and inequality at an international and Latin American level, but none have considered the varieties of capitalism as an element that can affect the previous relationship. The aim of the paper is to show that the relationship between social capital and inequality is affected by the varieties of capitalism, and in the Latin America case, its Hierarchical Market Economy has a direct effect on this relationship. To do the above, we carry out a fixed effects panel data model to estimate the relationship between social capital and inequality considering the varieties of capitalism. Findings show that the relationship between inequality and social capital is negative and HME amplified such relationship.

Keywords: *Inequality, Social capital, Latin America, Varieties of Capitalism*

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**HEALTH ECONOMY: A STUDY ON THE
RELATIONSHIP OF WATER AND SANITARY WATER
SERVICES IN THE COSTS OF PUBLIC HEALTH IN
THE NORTHEAST REGION OF BRAZIL**

UDK: 351.77(811)

JEL classification: I11, I15, I18, H75

Abstract

Health services are characterized as meritorious goods, a type of semipublic good that, given its social character, the allocation of resources in these activities becomes socially desirable by the government so that they are allocated efficiently. One of the ways to control and reduce unnecessary health expenditures is the population's access to basic sanitation services that, when inefficient, cause negative externalities to the exposed population. In this sense, the objective of this study is to analyse the relationship between coverage of basic sanitation services and the costs of hospital admissions for waterborne diseases in the Northeast Region of Brazil, from 2005 to 2015. In order to do so, we used secondary data from the Department of Informatics of the Brazilian Unified Health System (DATASUS), the National Household Sample Survey (PNAD) and Finance of Brazil (FINBRA) for the construction of panel regression models with fixed effects. The main results indicate that access to sanitation services, mainly from the sewage collection network, reduces the costs of

hospitalizations for Diseases Related to Inadequate Environmental Sanitation (DRSAI) of the Unified Health System (SUS).

Keywords: Health costs, waterborne diseases, externalities

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CHALLENGES OF THE FOURTH INDUSTRIAL REVOLUTION: A CASE STUDY OF BOSNIA AND HERZEGOVINA

UDK: 004(497.6)

JEL classification: O33

Abstract

This study focuses on Industry 4.0 in developing countries and, in particular, that of Bosnia and Herzegovina, which is one of the least competitive economies in the Region. A review of the literature on Industry 4.0 and the current prospect of it in the developing countries will be presented and then collecting the required data from the secondary data. This study aims to explore the main challenges along with some opportunities to apply Industry 4.0 in Bosnia and Herzegovina. The challenges that will be tested include poor infrastructure, harmonization of the education system and labour market, expensive installation of technologies, lack of government supports and growing trend of depopulation. Through insight into the structure of world trade and technology achievement, we will also look at the fact that the new industrial revolution will bring an even greater gap between developed and developing countries and try to answer the question of why such a disproportion in development occurs. As this is one of the first research projects regarding Industry 4.0 in Bosnia and Herzegovina, the findings of the study will generate some recommendations and propose some alternatives to be considered that could be useful for the decision-makers both in government and the private sector.

Keywords: Industry 4.0, developing countries, challenges, disproportion

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EFFECTS OF INTEGRATION PROCESS ON COMPETITIVENESS OF BOSNIA AND HERZEGOVINA

UDK: 339.92:339.137.2](497.6)

JEL classification: F14, F15, F17

Abstract

World Economic Forum (WEF), in The Global Competitiveness Report 2018, identifies competitiveness with productivity level concluding that all countries benefit from being more competitive. The competitive economy is also productive economy; productivity growth leads to economic growth and higher standard of living. Theoretical and practical experience suggests that establishing a free trade zone leads to positive effects but also has negative consequences, especially in the short term. Bosnia and Herzegovina takes part in the Stabilization and Association Process, and the relative bilateral Stabilization and Association Agreement (SAA) has been signed in 2008, ratified in 2010, and entered into force in 2015. Meanwhile, the trade bilateral relations were regulated by an Interim Agreement. Adapted SAA entered into the force on February 1, 2017. The aim of this paper is to analyse the effects of trade liberalization on the level of competitiveness ten years after establishing free trade zone with EU, the most important trade partner, i.e. to estimate relationship between GDP pc, GCI and trade balance in the long run.

Keywords: GCI, productivity, EU integration process

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SHORT TERM EFFECTS OF CANNABIS LEGALIZATION IN URUGUAY ON CRIME: AN ANALYSIS USING SYNTHETIC CONTROL

UDK: 663.992-027.581:343.85](899)

JEL classification: K42, C49

Abstract

Uruguay is the only country in the world that has adhered to the legalization of marijuana production and distribution nationwide. The purpose of this paper is to analyze the short-term impacts of Uruguayan policy on crime (homicides and robberies) in that country, seeking to contribute to the literature by presenting the first results of this unique situation in the world. To do so, the paper employs the synthetic control methodology whose objective is to create a linear combination of the units of the donor pool, in this case the Brazilian states, mimicking the Uruguayan situation in the absence of the approved legislation. The results show that in spite of the fact that there has not been a trend break with regard to the two types of crime examined, a more exacerbated growth of both rates in the treated unit may have been avoided.

Keywords: Cannabis Legalization, Crime, Uruguay

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BROADBAND INFRASTRUCTURE AND ECONOMIC GROWTH: A PANEL DATA APPROACH FOR SELECTED COUNTRIES

UDK: 004.7:338.1

JEL classification: L86, O47, C33

Abstract

The world economy is increasingly becoming digital. The internet not only provides a faster and more reliable communication along the supply chain, but also expands the market for the firms by creating better opportunities to communicate with new customers. As literature stresses, broadband infrastructure stimulates total factor productivity by reducing the transaction costs of communication, leading to a higher GDP growth. In this paper, we analyse the effect of broadband subscriptions on GDP per capita using data for 57 countries covering the 2001-2016 period. By employing the dynamic GMM (Generalized Method of Moment) estimator between the years 2001-2016 for selected countries, we found the positive relationship between the broadband infrastructure and economic growth for these countries. The results indicate that the number of internet users also promotes GDP per capita. In this respect, states are advised to direct resources to broadband infrastructure with an aim to provide high quality, accessible and affordable telecommunication.

Keywords: Broadband, economic growth, GMM (Generalized Method of Moment)

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RELATIONSHIP BETWEEN MONETARY POLICY AND MACROECONOMIC VARIABLES FOR EMERGING COUNTRIES

UDK: 338.23:336.74](1-773)

JEL classification: C33, E52, E60, F31

Abstract

Monetary policy determinants determine economic and monetary policies by taking some variables as reference. In this regard, fourteen developing countries with similar characteristics with Turkish economy and the relationships between macroeconomic variables and monetary policy shall be described. In this study, relationships between monetary policy and macroeconomic variables are investigated for emerging countries. We used 2010M1-2018M12 period and analysed the relationship between panel data analysis methods, money supply, inflation, interest rate, exchange rate, export, import and oil prices. A cointegration analysis was used to investigate the long-term relationship between variables. According to the results of the panel data analysis, long term relationship was found between the variables. Inflation, interest rate and oil prices had a decreasing effect on money supply, while exchange rate and exports had a positive effect on money supply.

Keywords: *Monetary Policy, Macroeconomic Variables, Emerging Countries*

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**THE FOURTH INDUSTRIAL REVOLUTION AND
ECONOMIC GROWTH IN SUB-SAHARAN AFRICA**

UDK: 004:330.34(66/69)

JEL classification: L80, O40, C23

Abstract

This study aimed at investigating the relationship between the fourth industrial revolution proxied by total factor productivity and economic growth in sub-Saharan Africa during the period 1986-2016. To achieve this, static and dynamic models were estimated. This study found that the total factor productivity is not significantly impacted economic growth as expected. This is an indication that the region has not fully tap from industrial revolutions which have transformed many economies across the world. The region needs to maximise its benefits from industrial revolutions by taking advantage of the current technological progress and innovations. The study also found that institutional quality and gross capital formation are crucial to economic growth in sub-Saharan Africa.

Keywords: industrial revolution, economic growth, panel data

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OBSTACLES TOWARDS TRANSLATING A KUWAITI PUBLIC SECTOR STRATEGY INTO ACTION: EVIDENCE FROM KUWAIT

UDK: 005.21:35](536.8)

JEL classification: H83

Abstract

Purpose – The aim of this study is to empirically investigate barriers towards successful strategy formulation and implementation in the public sector strategy of Kuwait. Design/methodology/approach – The article used a questionnaire survey to identify the barriers toward successful strategy formulation and implementation experienced by the public sector organizations. The questionnaires were distributed to 300 public sector employees, from which 200 were valid for analysis. Participants were requested to state the degree of agreement with the items listed in the questionnaire. Regression analysis employed to identify factors impact strategy formulation and implementation. Findings – The study showed that unsuccessful strategies formulation and implementation result from various aspects of government institutions (organization, policies and regulations, human resources and communications). The participants revealed that lack of consensus among decision makers, lack of effective role formulators and lack of choice of real strategy formulators represent major obstacle toward strategies formulation. Incompatible structure with the strategy and insufficient linkage between strategy and goals were the main variables that prevent successful strategies implementation. The regression analysis pointed to policies and regulations, communication and external factors as the most significant determinants of strategy formulation; whereas organizational and communication factors appeared to be the most significant determinant of strategy implementations. Research limitations – Specific governmental departments were targeted by the questionnaire

survey employed in this study. This reflects the staff employed in these departments. To obtain a wide picture about strategy implementation, the Ministry of Planning and the Ministry of Finance should be surveyed since they are responsible of a significant part of the country's strategic planning. Practical implications – This research offers valuable practical insights of decision maker. it might provide the route map for the firm and develop a good information system that help managers for obtaining the highest quality of knowledge through developing processes, systems and managerial mechanisms.

Keywords: Strategic management, strategy formulation, strategy implementation, obstacles, public sector, Kuwait

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THE ROLE OF IDENTITY FOCUSED COMMUNICATIONS IN PERSONNEL MANAGEMENT

UDK: 005.95

JEL classification: M12

Abstract

The report addresses the issue of business communication and its role in organizations in the aspects of personnel management. We study how communication influences the retention and good performance of personnel. Communications are an integral part of the activity of organizations. Communications largely determine the effectiveness of personnel management. Well-designed communications reduce the time of problem solving and of adaptation of employees, help in conflict resolutions etc. In spite of obvious importance of the communications in organization the studies of this problem require new approaches and methods. We explore mechanisms that help to keep the staff in organization and to create a desire to continue its activities in this organization. On base of social identity approach (H. Tajfel, J.C. Turner) and business psychology approach (S Benton, N. Ivanova,) we studied the Identity Focused Communication (IFC). This type of communication realizes, through integrated work of organization, the development of cognitive, value-motivational and behavioural characteristics of social identity. IFC can be considered as a human development technology which helps employers in clear understanding of values, professional and social role and pattern of behaviour in organization. On this theoretical basis and case studies method in different organizations we observed the role of IFC in the development of organizational culture for rising of personnel engagement and loyalty. Results of this research can be useful for business counselling and business management process, development of personnel identity, loyalty, and performance. The results allow us to see new aspects in communication, develop training programs and staff development, and improve internal communication. Our results can develop the understanding of the semantic core of effective communication's strategy of organization which include corporate "picture

of world” and image of the organization. We can add the knowledge of professional values and patterns of behavioural and social roles. The data obtained can be considered as a pilot to build new hypotheses and further research on a broader sample and with the use of experimental procedures.

Keywords: business psychology, identity focused communication (IFC), personnel management, loyalty, adaptation of personnel, social identity, strategy of communication

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CHARACTERISTICS OF ORGANIZATIONAL CULTURE ON FACULTIES OF SOCIAL SCIENCES AND HUMANITIES – case of the University of Mostar

UDK: 005.75

JEL classification: I23, M14

Abstract

Organizational culture, as relatively permanent and specific system of values, beliefs, standards and customs, that determines behaviour and directs employees' activities, is a characteristic of any organization and have impact on its all activities. Conclusions about it can be made based on what people say, do and think within the organization. The main aim of this work is to explore characteristics of organizational culture on faculties of social sciences and humanities at the University of Mostar. The aim is to conclude, based on responses of teaching staff of these faculties, whether we can speak more about dynamic or static organizational culture. For this purpose, we have analysed six groups of factors: (1) development and entrepreneurial orientation factors, (2) decentralization factors, (3) social orientation factors, (4) bureaucracy factors, (5) maintaining status quo factors, (6) formalization factors. Research results have showed that characteristics of static organizational culture are more present at the analysed faculties.

Keywords: *organizational culture, faculties of social sciences and humanities, teaching staff*

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IMPACT OF BALANCED ORGANIZATIONAL VALUES ON ORGANIZATIONAL EFFECTIVENESS: EVIDENCE FROM BUSINESS PRACTICE

UDK: 005.7

JEL classification: M10, M14

Abstract

Organizational values are a part of the core ideology of any organization; therefore, managing organizational values is one of the preconditions for achieving business success. However, the question arises of how to manage organizational values to increase overall business success. The main research question asked in this paper is whether organizations with balanced values, i.e., those with an equal representation of values from different categories with a common focus, are more effective than those with imbalanced values. To test the research question, a study of 24 Croatian companies was conducted. The level of balanced values was measured with the Mission-based model of organizational values, distinguishing between four basic value categories-business values, relational values, development values, and contribution values. In addition to researching the impact of balanced organizational values on the overall level of organizational effectiveness, the impact of that balance was also investigated for the five different perspectives of organizational effectiveness based on the Balanced Scorecard approach. The findings indicate that organizations with balanced organizational values are, in general, more effective than organizations with imbalanced values. This paper therefore contributes to a better understanding of the role of organizational values in modern business and particularly to an understanding of the importance and role of balanced organizational values.

Keywords: *organizational values, balanced values, organizational effectiveness*

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**STRATEGIC PRICING PRACTICES: RYANAIR
EXAMPLE**

UDK: 338.5:656.7](4)

JEL classification: L83, M31, N74, O18

Abstract

This paper aims to evaluate the profitability of Ryanair, a leading low-cost carrier in the European airline industry, while analyzing its value-based strategic pricing approaches. Ryanair, a “no-frills” airline company that was established in Ireland in 1984, still operates as one of the most important market players in Europe. Ryanair’s “lowest fare/lowest cost” model attracted a high number of customers in years. However, Ryanair’s success to achieve the profitability goal lays beneath linking price with value, by charging passengers in accordance with the value they receive. Besides, unbundling the passenger air travel elements and charging those separately increased Ryanair’s profits tremendously and the company gained a substantial market share. So, the success of Ryanair in the highly competitive airline industry is correlated with the effective implementation and control of value-based strategic pricing. Thus, Ryanair’s strategic pricing attempts that boosted the profits and expanded its market share would be dealt through the paper. Ryanair’s value communication with the customers will be explained. A brief comparison with Ryanair’s competitors will be provided and the profitability in the low-cost airline industry would be discussed in light of recent data.

Keywords: Ryanair, value-based strategic pricing, low-cost carriers

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MINING BIG DATA FOR SUSTAINABLE WATER MANAGEMENT

UDK: 626/628:004.6

JEL classification: Q55

Abstract

The power of advanced analytics is substantial. Massive scales of big, structured and unstructured data relieve unthinkable patterns and help us redefine economic models, solve operational inefficiencies and optimize costs. The water utilities could substantially benefit from the data available from new digital assets and smart technologies. Many are facing damaged and failing infrastructure and lack of financial resources for makeovers. However, Industry 4.0 and Digitalization open new fronts and bring new assets such as real-time monitoring of critical systems via IoT and sensors, advanced metering and predictive analytics to improve customer billing, remote data collection systems at pumping stations and water storage facilities and many more. The power of “digital twin”, as a virtual replica of a physical asset, and ways of enriching the traditional data sources with open source data increase considerably the available intelligence for more sophisticated correlation, linkages and insights. This study reviews the core values of big data, advanced analytics, smart technologies and its application in water resources management and it gives concrete recommendation how to accelerate the adoption of use of Big Data by leveraging on technology and innovation.

Keywords: *Big Data Analytics, Water Resources, Smart technologies*

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MANAGING EMPLOYEE MOTIVATION WITH THE JOB CHARACTERISTICS MODEL

UDK: 658.3:331.101.32]-057.16
JEL classification: M12, M14, M52

Abstract

In modern business circumstances it is imperative to have motivated employees and to use their full potential for the benefit of the organization, which largely depends on the way in which a job is organized. Previous research suggests that the way in which a job is organized significantly affects the key variables of organizational behavior. The aim of this paper is to explain the role and importance of the Job Characteristics Model (JCM) in contemporary business environments and to show the impact of its basic dimensions on employee motivation, with particular emphasis on the level of job satisfaction. The paper also presents research findings that show how employees perceive the JCM dimensions and to what extent the dimensions actually affect their motivation and job satisfaction. The research results confirm the importance of this connection; by increasing the presence of positive job characteristics, such as feedback, autonomy and the performance of varied and important tasks, organizations can increase employee motivation and job satisfaction.

Keywords: *job characteristics model, job design, motivating employees*

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HOW MILLENNIALS ARE CHANGING ORGANIZATIONS AND BUSINESS MODELS – NEW VALUES, NEW PRINCIPLES, NEW CULTURE

UDK: 658.3:005.96

JEL classification: L26, M12, M51

Abstract

The largest diversity of generations is represented in today's workplace than at any other time in history. With this diversity comes new challenges for organizations. Therefore, intergenerational diversity is a timely issue, gathering increasing interest amongst academics, organizations and business executives. We aim to identify and examine existing empirical research on generational differences in organizations and their characteristics in leadership and management; as well as to synthesize how new generation of employees are participating in organizational growth and development. Organizations should incorporate mentoring, strategic leadership, social media, and knowledge sharing into their talent management strategy for new generations of workforce. The purpose of this article is to analyze the specific challenges, and also opportunities working with multigenerational workforce. By focusing on existing research about the character traits of workers in each generation, and identifying the types of conflict that can result, owners and managers can better understand these characteristics and work styles, and can leverage them organizational success and company's growth. These Millennials expressed interest in having work/life flexibility in an engaging work environment that fosters professional skills growth. Because they've lived through a huge economic crash, millennials are less concerned with possessions than they are with experiences. Millennials are more likely to be entrepreneurs, and they're more likely to value independence and freedom over a steady paying job. A wide range of studies and research was reviewed to recognize the key motivators for each generation and their relation with organizational growth. There are rare studies or researches that describe the new

generation of employees and their impact on the organizational growth and development. Understanding and appreciating each age group's work style and personality traits, existing friction between old management and new generations can be minimized.

Keywords: Millennials, New Generation Workforce, Organization Growth

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FACTORS INFLUENCING STRATEGIC DEVELOPMENT OF INSURANCE BROKERS MARKET IN THE CZECH REPUBLIC

UDK: 368+330.34(438)

JEL classification: M11, O16, P17

Abstract

The aim of the paper is to recognise the relationship among Gross Premiums Written and Average Gross Nominal Wage (Average Wage) in the Czech Republic. The literature review has characterised insurance market in the Czech Republic. Based on the secondary data of Czech Insurance Association, Czech Statistical Office and Czech National Bank has been created PESTEL analysis, determined the rate of influence of the factors influencing the insurance brokers, evaluated by scale from 1 to 5.

The secondary data for regression analysis has been obtained from annual reports of CNB and CSO in period 1996 to 2015. The method of regression analysis has tested the relationship among average gross nominal wage as one of the macroeconomic factor and the “premiums written” which is used for measurement of the overall insurance market level in the Czech Republic. The model was verified through the economic, statistical and econometric verification. The statistical data has been elaborated in software Gretl. Part discussion and conclusion have been focused to the comparison of obtained results and reaction recommendation on upcoming predicted situations on the market.

Keywords: Strategic development, insurance market, brokers

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DEVELOPMENT OF PUBLIC MANAGEMENT IN BOSNIA AND HERZEGOVINA

UDK: 35:005](497.6)
JEL classification: H83

Abstract

Public management continues to change at least in Bosnia and Herzegovina, even though it hovers at the door of the European Union. The interest in the concept of governance in public administration in Bosnia and Herzegovina is of recent date, which is why there is a lack of relevant research in this area. And certainly the specificities of the country's own organization contribute to the diversity of research and possible solutions and changes. The public sector in Bosnia and Herzegovina simply means public companies, public institutions and public administration (state, federal and county government and local self-government). This research, from the point of view of users of public administration services, also established a medium level of development of public management with regard to its functions and sought to obtain a more realistic picture from the point of view of citizens as users of its services.

Keywords: public management, newpublic management, public sector, development, Bosnia and Herzegovina

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CONNECTION OF EMOTIONAL INTELLIGENCE AND EMPLOYEES MOTIVATION: THE CASE OF BOSNIA AND HERZEGOVINA

UDK: 005.32:331.101.3]:159.942

JEL classification: M54

Abstract

In recent years, emotional intelligence has become an important topic of research in the field of management, organization and leadership. Many studies have shown that emotional intelligence has an important role in carrying out managerial jobs in a way that helps the managers to understand the emotions and abilities of their employees as well as their driving forces. Productivity is directly dependent on the degree of motivation of employees, and it is of utmost importance that a business manager recognizes the needs and motives of people they manage to ensure their satisfaction. The main goal of this paper is to theoretically and empirically determine the relationship between the emotional intelligence of the manager and the motivation of the employee. Empirical research was conducted on a sample of small and medium enterprises in the Bosnia and Herzegovina area. Primary data were collected using the survey technique, ie by using the questionnaire as a research tool. The manager's emotional intelligence was tested with "Emotional Intelligence Appraisal" containing 28 items (TalentSmart, 2006). Research findings have shown that there is a significant link between emotional intelligence of managers and motivation of employees.

Keywords: *Emotional intelligence (EI), Emotional quotient (EQ), Employee Motivation*

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IMPORTANCE AND OPPORTUNITIES OF SENTIMENT ANALYSIS IN DEVELOPING E-LEARNING SYSTEMS THROUGH SOCIAL MEDIA

UDK: 37.018.43:004

JEL classification: O35, I20

Abstract

The means of communication and interaction have benefited from incredible changes over the past decade, Social Media increasingly replacing traditional environments. Considering the collaborative nature of the learning sector and consequently the importance of communication and interaction within it, we intuitively realize that Social Media represents the future of educational systems, the research in this field pointing towards the integration of e-Learning with Social Media. However, in order to deliver efficient educational systems, it is not enough to identify the technological means that are conducive to their development, but is also important to shape these means depending on the needs of the target group. When we discuss about Social Media and learning, it is noticed that individuals are the direct beneficiaries and the main force of these environments. Therefore, it is important to understand their behaviour, their needs and wants. Analysing students' attitudes, identifying their positive or negative reactions, or even the refined emotions they have towards learning, can be an extremely difficult task due to their diversity in countless ways. In this regard, an increasingly used tool whose accuracy cannot be challenged is the Sentiment Analysis. The inherent nature of Social Media tools offers multiple areas of application of Sentiment Analysis. Therefore, this paper will discuss the importance of Sentiment Analysis towards e-Learning

development through Social Media, considering current evidence. Secondly, the paper aims to identify the opportunities offered by Social Media with regards to Sentiment Analysis implementation and how feedback on educational data can be collected via such online environments to help improve educational processes in an e-Learning context.

Keywords: Sentiment Analysis, e-Learning, Social Media

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MARKETING AUTOMATION REACH WITHIN THE EU

UDK: 339.138:004.7

JEL classification: L86, M31

Abstract

Marketing automation is a relatively new area within the online marketing landscape. Marketing automation systems are a type of management information systems (MIS) from the customer relationship management (CRM) area. These systems have gained popularity with large clients who are looking to develop their online strategy. There are several large vendors of marketing automation software. We are going to focus on one specific software tool and its largest EU customers by database size. The core feature of such a tool is sending emails, thus this will be our prime indicator of reach, which we will present in correlation to database size, email open and email click rates. The aim of the paper is to showcase the usage evolution of one of the top software tools in this area. We are looking for correlations between database sizes and sending volumes, as well as identifying sending volume patterns depending on the calendar. Data interpretations and research implications will be included in the conclusion.

Keywords: marketing, automation

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PERCEIVED CUSTOMER VALUE AND PERCEIVED RELATIONSHIP QUALITY IN RETAIL

UDK: 659.127.6:658.87

JEL classification: L81, M31

Abstract

Quality relationships with customers are the very essence of relationship marketing. It is necessary to create and deliver customer value to develop relationship marketing successfully, and to gain sustainable customer loyalty. Having in mind contemporary customers who look for higher customer value the question arises as to whether delivery of higher value is a key to creation of long-term profitable relationships with customers on the retail market. In this paper influence of perceived customer value on perceived relationship quality in retail will be researched. Perceived value has been determined as two-dimensional, as emotional and economic value. Relationship quality in retail will be measured by satisfaction and trust dimensions. The obtained research results will enable better understanding of relationship between the two concepts in retail. It will also provide presumptions for successful management of relationship quality according to perceived customer value dimensions.

Keywords: *perceived customer value, perceived relationship quality, retail*

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CHILDREN AS A TARGET MARKET IN THE BRANDING PROCESS WITH EMPHASIS ON ETHICAL ASPECTS

UDK: 659.1-053.2:174

JEL classification: J13, M37

Abstract

Technological innovations in communication and distribution of information have changed the way in which a relationship with clients is nurtured. Expectations of customers have grown considerably over time so companies have to work hard to attract them and build a brand. In process of building strong relationship with clients firms use media and send messages to the end – users, and more often – kids. That is happening because children and teenagers have a major impact on family purchases. Brands become a part of their personality, and building loyalties is growing rapidly in teenage years. Firms engage psychologists, sociologists, psychiatrists to get deeper into their heads and achieve as tight a relationship with children. The desire for profit can be attributed to unethical behaviour, hence the existence of numerous legal and ethic restrictions for children does not guarantee protection. But, some countries have completely banned advertising to children under the age of 12. In the short term, it may also make sense, but in long run when children have unlimited Internet access where advertising can hardly be controlled, these children have no one who can protect them. In this paper the influence of brands on the behaviour of children will be explored and it will examine the ethical aspects of advertising to children.

Keywords: *children as target market, branding for children, advertising for children*

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DIGITISATION, TRENDS AND FUTURE OF MARKETING

UDK: 339.138:004.7

JEL classification: M31, M37

Abstract

One of the ways to succeed in the competitive environment is more effective communication with target customers. The rapid development of technologies offers ever greater opportunities to explore behavior, perception and emotional engagement of customers. The development of communication technologies coupled with the use of direct advertising targeting offers the possibility of adapting marketing communication to both the target segment and the media that communicates to consumers. The paper describes selected marketing trends and marketing methods in a digital age and a future.

Keywords: marketing, digitisation, trends

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THE RELATIONSHIP OF CIVIL IDENTITY AND CONSUMER PREFERENCES OF DOMESTIC GOODS

UDK: 659.113.25(470+571)

JEL classification: D12, E27, N34, O1

Abstract

The article presents the results of an empirical study of the relationship between indicators of civil identity and consumer preferences of domestic goods. The process of globalization and unstable economic and political events create conditions for a more thorough analysis of the characteristics of consumer preferences and the study of the relationship between the preferences of domestic goods by consumers and indicators of civil identity. The study consisted of three parts: a study of the attitudes of respondents towards a producing country (Patosha, Volkova), a study of indicators of civil identity (Tatarko A.N., modification of Trefilova O.), the determination of consumer preferences for goods from different countries (Patosha, Volkova). The sample of the study was 125 residents of Russia.

As a result of the empirical research, the hypothesis about the relationship of indicators of civil identity and consumer preferences of domestic goods was proved. A consumer who feels that he belongs to the state is more likely to prefer domestically produced goods. In addition, the results of the study show the presence of ethnocentrism among Russian consumers. The results of the study may be useful to representatives of domestic business for better promotion of their product on the market. In addition, a new methodology for studying consumer preferences has been designed, which may be useful for the future study of consumer preferences.

Keywords: *civil identity, consumer-behavior, country-of-origin, business psychology, organizations*

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DIGITAL TRANSFORMATION IN MARKETING AND BUSINESS – IMPLICATIONS ON RETAIL TECHNOLOGIES AND CUSTOMER ENGAGEMENT

UDK: 339.138:004.7]:658.87

JEL classification: L 81, L 86, M31

Abstract

Digital transformation of the global society and economy causes tectonic movements in doing business worldwide. Business marketing has become an arena where disruptive technologies literally change the marketing environment landscape, transforming the contemporary marketing into digital marketing, and thus implying newly emerged ground-breaking concepts in scientific thought in these fields. This paper discusses the phenomenon of digital marketing transformation, particularly on its impact on contemporary retail technologies, with emphasis on Russian economy. In addition to the theoretical analysis, selected relevant statistics and data are presented. Furthermore, the respective impact of marketing transformation on customer behaviour in retail is elaborated. Marketing transformation implies substantial changes in retail environment of companies, because in an era of marketing digitalisation, customers are gaining enormous empowerment by development of new technologies; they are becoming more demanding, and their expectations are increasing. Consequently, companies are literally forced to constantly reevaluate and reshape their marketing strategies, especially sub-strategies that are directly influenced by development of disruptive technologies that are applied in business. Omni-channel retailing strategy is discussed as one of possible newly emerged solutions for meeting the increased customers' expectations and responding

to modified behavioural patterns, as well as for attaining the required level of digital customer engagement in retail businesses.

Keywords: digital marketing transformation, retail technologies, omni-channel retailing, customer engagement

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BALTIC CONSUMER AND ALCOHOL CHOICE

UDK: 659.113.25:663.5](261.249)

JEL classification: D12, H20, H31

Abstract

The paper considers the relationship between socio-economic factors and alcoholic beverage preferences in the Baltic countries. The consumer groups are structured by the main types of alcoholic product – beer, wine and strong ethyl alcohol. Certain common features are identified, which characterize those different alcohol consumer groups. Understanding the relationship between preferences by alcohol type and socio-economic characteristics is an important when designing public alcohol related policies and regulations. The analyses are based on a consumer survey (IARD, Washington DC) held simultaneously in all three Baltic countries in 2016. A multinomial logistic regression model is used to predict the relationship between preferred alcoholic beverage and socio-economic characteristics.

Keywords: alcohol, alcohol consumption, consumer choice

TOURISM

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APPLICATION OF AHP MODEL FOR EVALUATING EXISTING FORMS OF SELECTIVE TOURISM IN CROATIA

UDK: 338.48-6

JEL classification: M10, Z32

Abstract

In recent years there is a rise of novel forms of selective tourism such as adventure tourism, health tourism, excursion tourism etc. All these different kinds of touristic offers have different impacts on development of this most important branch of Croatian economy. The paper investigates different kinds of selective tourism forms available in Croatia and defines criteria for their ranking in respect to tourism development. The paper demonstrates application of multicriteria decision making technique, Analytical Hierarchy Process (AHP) in ranking importance of different sorts of selective tourism in respect to development of tourist offer in Croatia. AHP utilizes a multi-level hierarchical structure consisting of objective, criteria, sub criteria, and alternatives, is applied in selection of an appropriate sort of many selective tourism forms available. The input from the experts has been used in pairwise comparison matrix in order to rank the selective tourism forms. The data collected by AHP-structured pairwise comparisons were constructed into a computer-based program called Expert Choice. The paper shows that AHP is a viable tool for rank ordering of selective tourism forms following various weighting schemes.

Keywords: *tourism development, selective forms of tourism, Analytical Hierarchy Process (AHP)*

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STRATEGIC NETWORKING: THE CASE STUDY IN DUBROVNIK HOTEL INDUSTRY

UDK: 640.4:005]:338.48](497.5 Dubrovnik)

JEL classification: C10; P13; Z32

Abstract

Hotel industry is considered one of the most important activities in the economy because of its impact on the development of tourism. One of the development strategy is strategic networking. The most common reasons for strategic networking in hotel industry are financial, motivation to acquire and exchange knowledge and technology, competitive position and farmers motives. Forms of strategic networking are clusters, strategic partnerships, strategic alliances, cooperatives and associations. The purpose of this paper is to examine whether the hotel enterprises in Dubrovnik using a strategy of networking either vertically or horizontally. The aim is to examine which forms of networking hotel companies use as a development strategy in the area of Dubrovnik and which form of networks is most represented. Research results have shown that the most commonly used forms of strategic networks in hotel enterprises in Dubrovnik cooperatives and associations.

Keywords: *forms of strategic networking, hotel industry, case of Dubrovnik*

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**THE POSSIBILITY OF USING ONLINE TOOLS TO
INCREASE THE ATTRACTIVENESS OF A NAUTICAL
TOURISM PRODUCT**

UDK: 004.738:338.48-44(26)

JEL classification: Z32, O10

Abstract

The article focuses on yacht cruises treated as complex tourist products. For the purposes of the article, it was assumed that the measure of attractiveness of such products is the satisfaction of the tourist after the end of the consumption process. It is influenced by the ability to choose from among a wide range of individual products that are best suited to the needs of a given tourist. The main purpose of the article was to indicate the possibility of using online tools that facilitate the access to information on individual tourist products and support the subsequent stages of consumption of the tourist product. The article presents a typical process of consumption of a nautical tourism product, research on the activity of sailors and their purchase preferences regarding goods and services purchased in the visited ports. It also presents the possibilities of making nautical tourism products more attractive by Internet tools, for example by facilitating the finding of up-to-date information, its consolidation or increasing the safety of navigation. At the end, recommendations regarding the widespread use of online tools by entities offering goods and services purchased by sailors are presented. The article uses such research methods as: critical literature analysis, participant observation and questionnaire surveys.

Keywords: nautical tourism, tourist product management, attractiveness of a tourist product, IT tools in tourism

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THE CIRCULATION OF INFORMATION IN YACHT PORTS

UDK: 338.48-44(26):005.62

JEL classification: D83, M15, Z32

Abstract

The main aim of the article is to present the results of the analysis concerning the selected aspects of the circulation of information in yacht ports. It is very important issue for people who plan sailing cruises and also for yacht port operators. A particular attention has been paid to the problems in this field. In addition, it presents an overview of possible approaches to solving these difficulties. Completion of the goal determines research procedure and structure of the article. The tabular and graphical methods have been used in the presentation of the research results.

Keywords: nautical tourism, information, management

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AN ANALYSIS OF THE DYNAMIC OF CRUISE TRAFFIC IN THE PORT OF DUBROVNIK

UDK: 338.48-52:656.615](497.5 Dubrovnik)

JEL classification: C22, L92, R40, Z32

Abstract

Cruise tourism is the most dynamic part of the tourism economy. Despite the fastest growing market of cruise tourism, this sector is forced to continuous innovations in order to stay competitive. Innovative approach requires new port destinations, new concepts of cruise ships services and entertainments, out of ship activities, new thematic products. This paper presents an analysis of the dynamics of cruise traffic in the port of Dubrovnik in the period from 2011. to 2018. The results of the analysis show variations in the total number of cruise passengers, with a slight downward trend in the total number of passengers in recent years. Because of this, it is difficult to determine the future movements of the total number of cruise passengers. An extremely large number of passengers, sail to the Port of Dubrovnik during the summer months, which is a big problem for both residents and tourists. Besides positive and negative effects incurred by cruise tourism on the natural and social environment, economic effect incurs as well and is shown as an increase of different types of consumption in homeports as well as in ports of call. Because of that, it is necessary to find a solution to the congestion of the port and the city. According to the results of the monthly traffic analysis, it is evident that the Port of Dubrovnik has extended its season. Nevertheless, steps can be taken in the pre and postseason to stop the negative trend of total number of passengers and to solve problem of congestion. In this paper, the traffic dynamics of cruise passengers in the

port of Dubrovnik is also compared with the traffic in the ports of Naples and La Goulette and it is the basis for estimating the trend of traffic dynamics in the future.

Keywords: cruise traffic, analysis of the dynamic, trends

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ANALYSIS OF THE WORLD CRUISE INDUSTRY

UDK: 338.48-52:797.14](100)

JEL classification: L83,L91, O10

Abstract

The paper explores the causes and consequences of dynamic growth on global cruise market. Research objectives are to determine the new trends in cruising and to identify challenges and opportunities facing the cruise industry in the future. The findings show that there is a growing demand from all the world source markets, especially from the Asian market; cruising to all the regions is present, an increasing number of ships are located in the Asia-Pacific region, developing new cruise destinations; cruise ships are getting bigger; all creating a positive impact on the global economy. The increased demand, environmental, social and cultural impacts on visited destinations present many challenges to cruise lines and to destination communities.

Keywords: *cruise industry, trends, cruise destination, challenges*

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**THE CONCEPT OF THE INTERNET PLATFORM
BUSINESS MODEL FOR COOPERATION
FOR THE MARITIME CULTURE IN SZCZECIN**

UDK: 338.48-(26):004.738](438)

JEL classification: L83, L86, M14, M15

Abstract

The purpose of this article is to present the concept of the internet platform business model designed for cooperation for maritime and sailing culture. The task of this platform will be the integration of different groups of stakeholders involved in the creating and sustaining maritime and sailing culture. It'll be also a place of cooperation between the cultural and business sector for the implementation of the objectives of Corporate Social Responsibility (CSR) in the area of promotion and dissemination broadly understood maritime culture in this region. The internet platform for cooperation for the maritime and sailing culture would enable undertaking activities in the area of creating and cultivating the city's tradition, as well as activating and integrating the local society around the broadly understood maritime and sailing culture. While conducting the research, the survey method and the Business Model Canvas method were used.

Keywords: *internet platform, maritime and sailing culture, corporate social responsibility*

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SYSTEMATIC APPROACH TOWARDS IMPLEMENTATION OF SOCIAL MEDIA MARKETING STRATEGIES ON THE EXAMPLE OF CHOSEN TOURISTIC BOARDS IN THE REPUBLIC OF CROATIA

UDK: 338.48: 061.2:339.138](497.5)

JEL classification: M31, M38, O35, Z32, Z33

Abstract

Social media marketing does not undermine the value of traditional marketing approach; instead, it enhances it and brings it up to a new level. Touristic boards, as destination management organisations, have to constantly aim creation of sustainable tourism in order to preserve and evaluate destination as a whole. Previously is not possible without systematic appliance of social media marketing strategies. Touristic boards have to strategically access social media platforms usage. It is crucial to pick the proper metrics which will ensure long-term success. The goal of the paper is to emphasise the importance of sustainable approach and the power of social media marketing strategies in a modern business environment.

***Keywords:* Social Media Marketing Strategies, Touristic Boards, Systematic Approach**

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UNDERSTANDING THE ROLE OF CONSUMER BEHAVIOR IN FORECASTING THE IMPACT OF INDUSTRY 4.0 AND THE WAVE OF DIGITAL DISRUPTION DRIVING INNOVATION IN RETAILING

UDK: 658.87:004]:336.1

JEL classification: D10, M31, L81, O33

Abstract

Industry 4.0 technologies and business practices are expected to radically transform the competitive landscape and society. Retail industries which make up approximately one third of global GDP will be particularly affected by these changes. This paper, guided by the literature concerning the wave of digital disruption brought about by new technology, changes in consumer demand and new forms of business competition are discussed. The drivers of innovation in marketing and the critical role of understanding the consumer value chain. A model of consumer value and the impact of digital disruption and how retail impact can be better understood is discussed. Implications for industry and macroeconomic policy makers and calls for further research based on this research are discussed.

Keywords: Industry 4.0, Digital Disruption, Macroeconomics, Retailing, Trends in Consumer Behaviour

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PERCEPTION OF LEAN MANUFACTURING - ANALYSIS OF PRODUCTION ENTERPRISES BEFORE AND AFTER LM IMPLEMENTATION

UDK: 005.22:338.45

JEL classification: D20, L60, M11

Abstract

Lean Manufacturing (LM) is a concept that is comprehensive in nature and includes a set of many useful methods and tools. Despite the fact that a number of publications highlight measurable benefits related to the implementation of lean, plenty of companies still fail to implement or take any action with respect of LM. For the above reasons, based on existing research described in subject literature, a cognitive gap in the form of a time factor, which significantly affects the perception of barriers connected to the implementation of lean tools, has been identified. Thus, the purpose of this article is an analysis of perception of LM by companies that are before and after implementation of lean tools with reference to four selected cognitive areas. In order to achieve the scientific objective, a CATI survey has been conducted in Polish manufacturing companies, operating in Zachodniopomorskie Province. The research questionnaire has been divided into four parts and included: identification of internal and external barriers, knowledge of lean tools, awareness of expected benefits resulting from the implementation of Lean Manufacturing and plans to implement lean in companies in the near future. Selected methods of multidimensional comparative analysis have been applied. The results have been summarized, compared and discussed.

Keywords: *lean manufacturing, implementation of lean, manufacturing industry*

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**EVALUATION OF GREEN SUPPLY CHAIN -
REFERENCE MODELS APPROACH**

UDK: 658.78:502.1

JEL classification: M2, R4

Abstract

Currently, the principles of sustainable development are playing an increasingly important role in running a global business and economy. The development of the concept of a sustainable supply chain is possible with the use of economic, environmental and social aspects in the processes and activities carried out. These aspects are becoming one of the elements of the decision-making process. The presented considerations are aimed at indicating reference models of evaluation of the functioning of the green supply chain in the context of growth the efficiency in the new business strategy. The content analysis of the literature has made it possible to identify common, input and necessary elements, as well as drivers, barriers and correction mechanisms that have served as the basis for building a reference model for the assessment of the functioning the green supply chain. The conceptual model integrates the identified factors, based on the management theories used in literature and practice, which at the same time serve the purpose of clarifying the adoption of indicated practices in a given subject area. The limitation and gaps, which occur in literature, as well as further directions of research were indicated. The value and novelty of the considerations consists in the proposition of model solutions in the scope of evaluation of the functioning of the green supply chain, which may serve as a basis for the construction of the green supply chain model, at the same time indicating the elements that will be taken into account in the evaluation of this strategy, including the scope of implementation of pro-environmental solutions, using management tools and management theories.

Keywords: green supply chain, reference models, measurement

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APPLICATION OF BLOCKCHAIN TECHNOLOGY IN MARITIME LOGISTICS

UDK: 656.61:005.5]:004.65

JEL classification: M15, O31, O32

Abstract

Blockchain technology is mainly implemented in the financial services. However, there are more and more companies from different industries considering the possibility of using this technology. Potential benefits of blockchain are also recognized in logistics management. In sea shipping similar to other transport modes the application of blockchain-based solutions is still a new phenomenon. The paper presents a growing interest in blockchain technology in the area of transport and logistics and in maritime logistics in particular. The main aim of the paper is to classify current and planned applications of blockchain technology in sea shipping. To achieve this goal, two research methods were used: web content analysis and multi-case study. The results show that there are several container shipowners active in the blockchain projects, however, in terms of tonnage, they represent as much as 84% of the world's container fleet. Four main ways of developing blockchain technology in the field of maritime logistics management are distinguished: shipowner's projects, ICT providers' projects, supply chain operators' projects, dedicated consortia projects. The main fields within which blockchain technology is currently tested or already implemented are identified as: contracting and documentation flow (e.g. Bill of Lading), smart contracts, container/cargo track-and-trace, marine insurance, ship register system, bunker tracking system, crew certification system. The results of the paper have some managerial implications. They can help in making strategic decisions by sea shipping companies and maritime logistics operators to decide if it is worth to engage in such projects and choose the best option for themselves.

Keywords: blockchain, sea shipping, maritime logistics, maritime supply chain management

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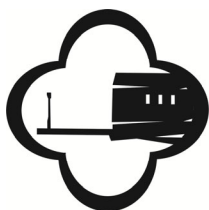
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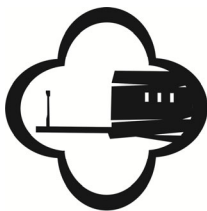
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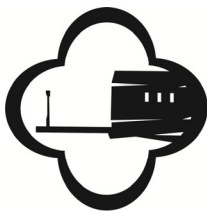
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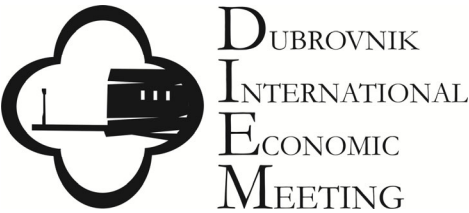
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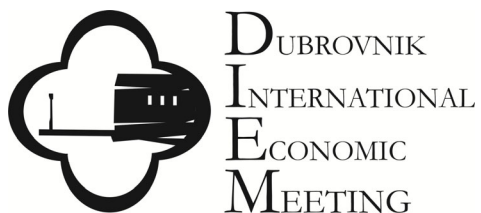
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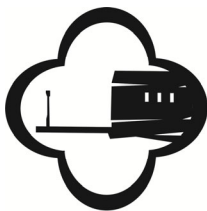
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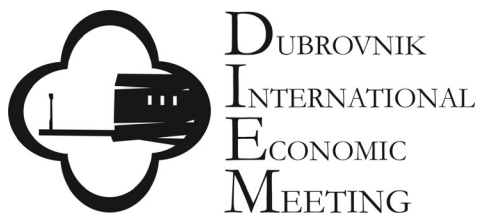
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