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Leonard Barolli *Editor*

Complex, Intelligent and Software Intensive Systems

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Editor

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Welcome Message of CISIS-2022 International Conference Organizers

Welcome to the 16th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2022), which will be held from June 29 to July 1, 2022, in conjunction with the 16th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2022).

The aim of the conference is to deliver a platform of scientific interaction between the three interwoven challenging areas of research and development of future ICT-enabled applications: software-intensive systems, complex systems and intelligent systems.

Software-intensive systems are systems, which heavily interact with other systems, sensors, actuators, devices, other software systems and users. More and more domains are involved with software-intensive systems, e.g., automotive, telecommunication systems, embedded systems in general, industrial automation systems and business applications. Moreover, the outcome of web services delivers a new platform for enabling software-intensive systems. The conference is thus focused on tools, practically relevant and theoretical foundations for engineering software-intensive systems.

Complex systems research is focused on the overall understanding of systems rather than its components. Complex systems are very much characterized by the changing environments in which they act by their multiple internal and external interactions. They evolve and adapt through internal and external dynamic interactions.

The development of intelligent systems and agents, which is each time more characterized by the use of ontologies and their logical foundations, build a fruitful impulse for both software-intensive systems and complex systems. Recent research in the field of intelligent systems, robotics, neuroscience, artificial intelligence and cognitive sciences is very important factor for the future development and innovation of software-intensive and complex systems.

This conference is aiming at delivering a forum for in-depth scientific discussions among the three communities. The papers included in the proceedings cover all aspects of theory, design and application of complex systems, intelligent systems and software-intensive systems.

We are very proud and honored to have two distinguished keynote talks by Prof. Keita Matsuo, Fukuoka Institute of Technology, Japan, and Dr. Anne Kayem, Hasso Plattner Institute, University of Potsdam, Germany, who will present their recent work and will give new insights and ideas to the conference participants.

The organization of an international conference requires the support and help of many people. A lot of people have helped and worked hard to produce a successful technical program and conference proceedings. First, we would like to thank all authors for submitting their papers, the program committee members, and the reviewers who carried out the most difficult work by carefully evaluating the submitted papers. We are grateful to Honorary Chair Prof. Makoto Takizawa, Hosei University, Japan, for his guidance and support.

Finally, we would like to thank Web Administrator Co-chairs for their excellent and timely work.

We hope you will enjoy the conference proceedings.

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CISIS-2022 Keynote Talks

Design and Implementation Issues of Omnidirectional Robots and Their Applications for Different Environments

Keita Matsuo

Fukuoka Institute of Technology, Fukuoka, Japan

Abstract. Intelligent robotic systems are becoming essential for increasing Quality of Life (QoL) and keeping health for growing population of elderly people. In our research, in order to solve human health problems and support elderly people, we consider the design and implementation of omnidirectional robots. In this talk, I will introduce our results to show how omnidirectional wheelchair robots can support people with disabilities at home and at workplace. In our work, we also consider the use of the omnidirectional wheelchair robots for playing tennis and badminton. I also will present the application of omnidirectional robot as a mesh router in Wireless Mesh Networks (WMNs) in order to provide a good communication environment.

Is Privacy the Same as Security, or Are They Just Two Sides of the Aame Coin?

Anne Kayem

Hasso-Plattner-Institute, University of Potsdam, Potsdam, Germany

Abstract. Almost every digital device either generates or consumes data in some form. The result is that the volumes of data collected grow exponentially each day. Data analytics proponents have mooted that it is now possible in some cases to actually predict future human behaviors based on data collected through tracking and various other means. On the other parallel, the question of privacy has become ever more important as users increasingly seek ways of guarding their personal data from exposure. This as such raises the question of what the distinction between privacy and security (data protection) is, and what the boundary between the two should be. For instance, the 2014 incident of a hacker faking the German minister of defense's fingerprints was considered to be a security breach. However, a closer look at this issue highlights the fact that distinguishing between whether or not this was a privacy breach that enabled a security breach, or vice versa, does not have a straightforward answer. In this talk, I aim to explain why in my view privacy is different from security and, while though both privacy and security are mutually interdependent, why it is important to make the distinction. The talk will be supported by various examples to characterize privacy and distinguish it from security. At the same time, I will also explain why the two concepts are in fact two sides of the same coin.

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Knowledge Absorptive Capacity Toward Sustainable Organizational Reputation in Digital Era

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Abstract. Business relationships by leveraging digital platforms can make it easier for organizations to communicate, share information and absorb knowledge. This paper will try to integrate the relationship between variables that affect the creation of sustainable organizational reputation. Relational capability and information communication technology (ICT) can help organizations to share information and knowledge. Likewise, knowledge absorptive capacity from external sources is seen as being able to encourage the speed of organizational innovation that has the potential to improve organizational performance. Furthermore, the better the performance of the organization, it will create a sustainable organizational reputation. This paper still requires further empirical studies, especially applied to the object of SMEs in order to obtain the truth of the concept developed.

Keywords: ICT · Organizational innovation · Knowledge absorptive capacity · Sustainable organizational reputation

1 Introduction

The business environment is changing so dynamically that organizations need speed in adopting knowledge from external sources. The speed and ability to adapt knowledge are very important to support innovation and company performance [1]. Knowledge absorptive capacity is the ability to utilize knowledge from external sources, through acquisition, assimilation, transformation, and exploitation [2]. Organizations that have knowledge absorptive capacity will be able to create a competitive advantage [3, 4].

Absorptive capacity is part of the company's decision to allocate resources for innovative activities [5]. Knowledge absorptive capacity is needed to support organizational innovation which is considered capable of improving organizational performance [5]. Organizational innovation to realize sustainable organizational reputation needs ICT support and relational capability. The integration of ICT, relational capability, and knowledge absorptive capacity is seen as capable of supporting the realization of organizational innovation and having an impact on sustainable organizational reputation. Previous researchers have examined absorptive capacity with the main focus on information technology [6] and knowledge creation [7].

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Studies on digitization show that there are still obstacles when implementing digitization in business practices, namely lack of digital capabilities [8, 9], and sometimes the benefits of digitizing performance are less clear [10], so accuracy in utilizing digital platforms in business practice is very important to create a competitive advantage. This study tries to build the concept of the relationship between ICT, relational capability and knowledge absorptive capacity to support organizational innovation and create sustainable organizational reputation. The conceptual model developed still requires further empirical evidence.

2 Literature Review

2.1 Sustainable Organizational Reputation

There is diversity in the definition of the concept of organizational reputation and its measurement. Corporate reputation as a collective assessment of the company's ability to provide valuable results to a group of stakeholders [10]. Furthermore, the company's reputation is measured through indicators of ability to attract, develop & retain top talent, ability to cope with changing economic environment, financial soundness, long-term investment value/potential for future profit, quality of management, quality of products & services, innovativeness, and social responsibility. Company reputation is the overall evaluation of stakeholders of the company overtimes [11]. Organizational reputation is the overall evaluation by customers of the company based on their reactions to goods, services, communication activities and interactions with the company [12]. Organizational reputation includes five dimensions: customer orientation, good employer, reliable and financially strong company, product and service quality, social and environmental responsibility. Therefore, sustainable organizational reputation is a collective assessment of the company's ability to deliver the results achieved to stakeholders in a sustainable manner, which is measured through indicators of the ability to cope with changes in the economic, financial environment, future profit potential, and management quality.

2.2 Relational Capability and Knowledge Absorptive Capacity

Relational capability can be developed through relational capacity, namely the speed of access to knowledge, innovation, organizational support, and the ability to coordinate and communicate [18]. Knowledge absorptive capability is built to achieve superior organizational performance [14]. Absorptive capacity supports organizational innovation as an effort to create organizational value [5]. Exploitation capacity as a dimension of knowledge absorptive capacity shows the use of knowledge for commercial purposes that allows the creation of new organizational capabilities [2]. Therefore, if the relational capability with partners is getting better, it will be easy to increase knowledge absorptive capacity.

2.3 ICT and Knowledge Absorptive Capacity

Information Communication Technology (ICT) is considered by organizations as a means of creating added value, especially increasing productivity and growth [24]. The use of telephone, internet, cellular technology in business practice as a form of face-to-face with business partners [25, 26], and the use of digital platforms that are in accordance with organizational needs are very important in order to improve their performance. Knowledge absorptive capability is built to achieve superior organizational performance [14]. Absorptive capacity supports organizational innovation as an effort to create organizational value [5]. Furthermore, knowledge absorptive capacity is grouped into four dimensions: acquisition, assimilation, transformation and exploitation [2]. Acquisition capacity is the identification and acquisition of external knowledge through the intensity, speed and direction of the organization's efforts. Assimilation capacity consists of understanding external knowledge gained by turning it into organizational routines. Transformation capacity is a combination of assimilation and exploitation dimensions to transform external knowledge into organizational routines with the aim of applying knowledge through adaptation and organizational needs. Exploitation capacity is the use of knowledge for commercial purposes that allows the creation of new organizational capabilities. Organizations that master ICT will easily increase their knowledge absorptive capacity.

2.4 Relational Capability and Organizational Innovation

Relational capability can be built through two approaches: 1) relational capacity includes speed of access to knowledge, innovation and organizational support, 2) coordination and communication capabilities with partners [18]. Relational capability is the ability to coordinate and communicate with partners business in order to create long-term relationships that have the potential to improve business performance [19]. Relational capability affects the quality of relationships with partners and has an impact on business performance [20]. Relational capability is demonstrated through the organization's ability to interact, create trust and commitment relationship with clients [21]. Organizations that are able to build good relationships with partners will share knowledge and information to support organizational innovation.

2.5 ICT and Organizational Innovation

The development of ICT has changed business patterns [6]. Utilization of ICT has been recognized to be the key to corporate growth [22], and ICT applications can help to track the role of organizational functions [23]. ICT is seen as capable of creating added value at various levels of the company which leads to increased productivity and growth [24]. Business practices by utilizing telephone, internet, cellular technology to change face-to-face with business partners [25, 26], so that accuracy in choosing and using digital platforms for business activities is very important in order to improve company performance. On the other hand, companies that have the ability to develop technology will tend to have superior performance [27]. Furthermore, technological capability is needed when organizations develop new products using new technologies

to meet dynamic market needs [28]. Innovation is understood as a means of changing organizations to respond to environmental changes [15]. Innovation is a process that starts from ideas and results development in the form of new products, processes and services [16]. Innovation involves the adoption of new products or processes to increase competitiveness and overall profitability. Organizations that are good at ICT will easily get new knowledge to support strengthening innovation.

2.6 Knowledge Absorptive Capacity and Organizational Innovation

Absorptive capacity is the organization's ability to acquire, absorb, transform, and utilize external knowledge [2]. In addition, absorptive capacity is an important factor that contributes positively to the knowledge transfer process [29]. Absorptive capacity allows the use of a large external network and has an effect on improving innovation performance [30]. Absorptive capacity as the company's ability to acquire, transform and utilize knowledge from outside [31]. Furthermore, knowledge absorptive capacity and organizational innovation can improve organizational performance [6]. Therefore, knowledge absorptive capacity that is built through acquisition, assimilation, transformation and exploitation can increase the organization's ability to absorb new knowledge from outside and potentially increase organizational innovation.

2.7 Organizational Innovation and Sustainable Organizational Reputation

Innovation is defined as an organization's ability to generate, accept and implement new ideas, processes, products or services [32]. Organizational innovation occurs due to pressure from the external environment, such as competition, deregulation, resource scarcity, and customer demand [33]. Organizations adopt innovations to ensure that the organization is adaptive and makes changes to maintain or improve its performance [34]. Companies facing environmental challenges and uncertainties can achieve superior performance when synergizing technical and managerial innovation in their organizational structure [35]. Organizational reputation is a collective assessment of the company's ability to provide valuable results to a group of stakeholders [36]. Furthermore, the company's reputation measurement can use indicators of ability to attract, develop & retain top talent, ability to cope with changing economic environment, financial soundness, long-term investment value/potential for future profit, quality of management, quality of products & services, innovativeness, social responsibility. Therefore, organizational innovation that is carried out continuously and directed in accordance with the dynamics of the environment will be able to create a sustainable organizational reputation.

2.8 Relational Capability, Knowledge Absorptive Capability and Sustainable Organizational Reputation

Focus on customers is very important for companies in facing business competition [37], and ensuring the creation of customer loyalty [38, 39]. The company's ability to provide the best value for customers is the main key to product performance [40]. Therefore, companies must be able to develop long-term relationships with customers on the basis of

shared satisfaction [41]. The ability to build harmonious relationships with partners has an important role for knowledge absorptive capacity. Knowledge from external sources is a driving force for the creation of absorptive capability [42]. Absorptive capability includes the way to exploit, integrate and implement new ideas within the organization [43]. Likewise, customer orientation is a driving force for product innovation and harmonious relationships with customers enable companies to provide the best value for customers and contribute to company performance [44]. Therefore, the company's success in building good relationships with partners will be the driving force for the creation of knowledge absorptive capability and organizational innovation that allows the realization of a sustainable organizational reputation.

2.9 ICT, Knowledge Absorptive Capability and Sustainable Organizational Reputation

ICT is one of the determinants for the sustainability of the company's growth [22], and is able to create added value that leads to increased productivity and company growth [24]. Likewise, the right use of e-commerce can expand market reach, access new customers and create cost efficiency for the company [45]. Digital marketing has an important role to create harmonious relationships and respond quickly to customer needs that have an impact on company performance [46]. E-business can be used to share information and knowledge efficiently without any distance limitations and is positively related to organizational innovation [47].

Knowledge absorptive capacity includes four dimensions: acquisition, assimilation, transformation and exploitation [48]. Knowledge absorptive capacity and organizational innovation are able to drive organizational performance [17]. Furthermore, exploratory and exploitative learning skills can help companies identify, evaluate and select information and technology to be adopted [49]. The higher the ability of information technology, the higher the possibility of the company to be involved in the exploration of innovation [50]. Organizational reputation is the overall evaluation by customers of the company on the basis of their reactions to goods, services, communication activities and interactions with the company [12]. Therefore, the proper use of ICT and relational capability will be the driving force for knowledge absorptive capability and organizational innovation. Furthermore, the increase in innovation performance will have an impact on organizational performance which allows the creation of a sustainable organizational reputation. The conceptual model developed is presented in Fig. 1 as follows:

The organization's ability to build harmonious relationships with business partners will create trust and relationship commitment, thereby facilitating access to knowledge to support innovation and absorb knowledge. Likewise, ICT makes it easier for organizations to communicate and interact with business partners to share the knowledge needed for innovation. Organizations that are able to have strong ICT and are able to build relationships with business partners will be able to absorb knowledge well and will encourage organizational innovation activities. The success of organizational innovation will create competitive advantage and superior performance and have an impact on sustainable organization reputation.

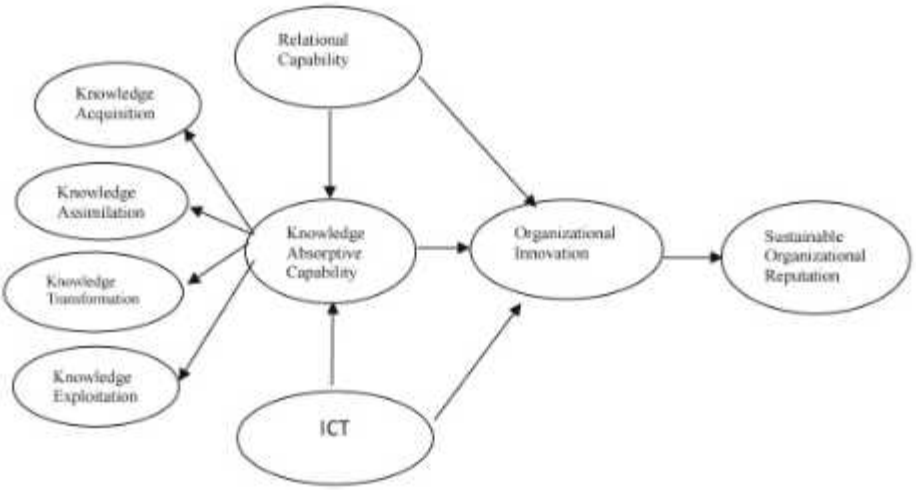

Fig. 1. Conceptual model

3 Conclusion

Relational capability and ICT have an important role to encourage knowledge absorptive capacity and organizational innovation. Furthermore, knowledge absorptive capacity includes the dimensions of knowledge acquisition, knowledge assimilation, knowledge transformation and knowledge exploitation. Knowledge absorptive capacity that is effective and efficient will be a driving force for the growth of organizational innovation and the potential for the creation of sustainable organizational reputation. Furthermore, empirical testing requires a more detailed approach. Researchers still need to explore the indicators of the research variables proposed in the conceptual model. After exploring all the indicators, a factor analysis test was conducted to find groups of indicators forming the variables. The last, it needs testing the relationship among variables by using the Structural Equation Modelling (SEM) as for determining the significance of the relationship among the variables.

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