International Journal of Applied Science; Vol. 2, No. 3; 2019
ISSN 2576-7240 E-ISSN 2576-7259
https://doi.org/10.30560/ijas.v2n3p51

Complexity Perception Among Stakeholders of Blockchain Implementations: Can We Use a Measuring Instrument for this?

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Received: October 20, 2019; Accepted: December 24, 2019; Published: December 30, 2019

Abstract

Blockchain is a (basic) technology that has made its mark in recent years. Blockchain is viewed just like the internet as a basic technique. One reason for implementing a blockchain is that it can make the purchase of a number of applications superfluous, because it can also offer the most important functionalities of these applications. Complexity perception is a concept that can be the subject of much debate. It is not easy to define, and yet people want to get a grip on it. This grip can be that people want to measure it. From research in 2017, a model (prototype) of a measuring instrument was designed in which complexity perception among stakeholders of an ERP implementation is measured (Tesselhof, 2018). Further research into what is already known about blockchain implementations in order to gain more control and understanding as well as research into the use of the measuring instrument in a blockchain implementation is necessary.

Keywords: blockchain, complex, perception, complexity perception, measuring instrument, ERP

1. Introduction

Blockchain technology is a technology that wants to make processes run more efficiently. The exchange of data can be more efficient. This idea was and is also applicable to Enterprise Resource Planning (ERP) systems. Research shows that implementing ERP systems is faced with a delay. It is also known that the stakeholders involved in the implementation are often the cause of this. This may be because they are not involved in the start of the implementation process, or the old system is still experienced as good. Sometimes consciously or sometimes unconsciously. The stakeholders all have their own perception during implementation. That perception is influenced by the complexity of an implementation. Implementation has consequences for the entire organization. These can be easily understood, but more often not all the consequences can be foreseen. With the help of the blockchain technique, the idea is that processes will be easier. However, we must improve how we all work together on a blockchain. Because for a blockchain to succeed, all stakeholders (parties) must participate. Because stakeholders are involved in the implementation of the 'blockchain', and their perception can have consequences for this process, the model that has been developed to measure complexity perception of ERP implementations may be applicable to make complexity perception transparent when implementing a blockchain.

Below is first explained what a blockchain is, then the implementation process follows, after which the stakeholders are discussed with their complexity perception. Finally, the measuring instrument and its academic and social relevance follow. We conclude with two possible questions: what is already known about the implementation process at blockchain and the start of further research into the use of a measuring instrument when implementing blockchain.

Blockchain

Blockchain is a technique whereby transactions between parties are facilitated that do not know each other (and do not trust each other), without the intervention of an intermediary. The blockchain functions as an online, decentral ledger. All parties that have access to a blockchain have access to this ledger and can update and save it. The blockchain is intended to record transactions or transactions. The blockchain ensures that a transaction is validated by means of predetermined rules of the game. If approved, they are immediately distributed to all

participants so that each party always has the same information. The blockchain is not really suitable for storing large amounts of information, which is the case with an ERP system.

2. Implement

Research (Tesselhof, 2018; Veuger, 2019) shows that the implementation of new technologies, such as a blockchain, and information systems is faced with delays. It is also known that the stakeholders involved in the implementation are often the cause of this. This may be because they are not involved in the start of the implementation process, or the old technology or the old system is still experienced as a good system. Sometimes consciously and sometimes unconsciously. The stakeholders all have their own perception of implementation. That perception is influenced by the complexity of an implementation. Implementing a technology or a system has consequences for the entire organization. These can be easily understood, but more often not all the consequences can be foreseen.

Enterprise Resource Planning (ERP) systems are information systems that integrate business information from organizations. Organizations that want to implement an ERP can choose from ERP as a software package and then adjust the business process accordingly or adapt the software to the current business process (Boonstra, 2006; Fontana & Iarozinski, 2009). Because these systems influence the internal and external operations of an organization, an implementation is critical for the performance and survival of the organization (Boonstra, 2006). An ERP system is expected to provide support to management for taking decisions and also help improve the organizational process. ERP systems seamlessly integrate organizational functions by giving them access to information they need (Ghosh and Skibniewski, 2010). To guarantee good performance, the implementation of a system requires the use of a precise framework of (desired) requirements and the use of common organizational processes (Mankins, 2010). Otherwise there is a chance that an implementation will not achieve the objectives that were agreed in advance. It is also possible that an implementation is not implemented within the previously agreed time or the budget (Marnewick & Lauschnage, 2005). During the implementation there are also risk factors that determine the success of the implementation (Mankins, 2005). Organizations that use ERP have achieved savings by eliminating many different and many incompatible legacy systems and streamlining organizational processes (Jenson, 2002; Levine, 1995). As a result, the success of ERP projects is also measured by financial, efficiency gains and productivity gains when the implementation is adopted (Ghosh & Skibniewski, 2010).

An ERP system is an example of a digital database. Of course, it is not the intention that everyone can change this information just like that. This database is managed by an owner. This owner is the only one who can change the database. It is therefore of fundamental importance that we trust the owner and that we believe that what the owner and the database claim is the truth. The ERP system differs from this with the blockchain. There is not one owner on the blockchain. It is managed by many different people. Each party has a copy of all the information in it. It is possible to participate by installing certain software on your computer. The entire network of computers with that software owns and manages the information in the blockchain. This is similar to the internet. It belongs to nobody, but you can decide to cooperate with it.

3. Stakeholders

Stakeholders are an integral part of a blockchain and an Information System (IS) implementation and are part of the "sociology and technology". Blockchain and IS are not simple technical systems and their design, implementation and use mean that in a dynamic social and political process connecting interests, building structures and struggling about them is a challenge (Freeman, 1984; Levine, 1995).

In an ERP implementation, but also in the blockchain, it is the stakeholders who must make this implementation a success (Fontana & Iarozinski 2009, Mitchell, Agle & Wood, 1997; Levin 1995; Maurer, 2002; Urwin, 2001). Different types of entities can be stakeholders, such as people, groups within and outside the organization. Stakeholders can be defined in various ways (Mictchell, Agle & Wood, 1997). Given the impact of stakeholders on an implementation, it is necessary to further define the stakeholders (Boonstra, 2006; Mitchell, Agle & Wood, 1997). The definition of Freeman serves as a starting point for further defining who are stakeholders in an ERP implementation. His definition is: "A stakeholder is any group or individual who can affect or is affected by the achievement of the organization's objectives (Boonstra, 2006; Freeman, 1984). This theory about stakeholders can be used to describe, analyze and interpret stakeholder behavior in relation to organizational change.

4. Complexity (Barrier)

An implementation is perceived by stakeholders as difficult. This is because a large number of factors influence the stakeholder and the implementation (Hussein, 2012). A system will be seen as complex by stakeholders if it is created by groups of "elements" with different functions and behaviors (attitudes). The stakeholders are constantly

adapting and are influenced by circumstances that are certainly not foreseen. The information about the status of the elements cannot be fully known, and the elements are related through a wide range of inter-relationships (Fontana & Iarozinski, 2009). Every definition of complexity can be attributed to the viewer's perception (Edmonds, 1999). Because it is possible to investigate complexity from a system approach / vision, according to Manson complexity research can be divided into three main formats, which provides a more unambiguous understanding of the complexity theory. Algorithmic complexity, deterministic complexity and aggregated complexity. Algorithmic and deterministic complexity rely on simple mathematical comparisons and a number of assumptions about how complex systems work. Aggregated complexity instead attempts to gain admission (access) to holism and synergy as a result for interaction between the system components (Levine, 1995). Systems implementations integrate organization information, ensure process control and ensure a unique flow of information. The relevant adjustments to the organization transform into an integrated organization, generating various complex transformations in behavior and structural aspects (Fontana & Iarozinski, 2009).

5. Measurability

The foregoing shows that stakeholders can experience an implementation as complex. For implementations that want to be successful, it can be useful that complexity can be measured. The measurability of complexity can then provide insight into the thinking process among stakeholders, which offers opportunities to steer it.

A measuring instrument is an instrument for taking measurements with it. Instruments are tools for research purposes (Scholtes & Poolman, 2011). To determine whether a measuring instrument has added value, properties of the variables to be measured must be determined. These characteristics are reliability, validity and responsiveness (Scholtens & Poolman, 2011). In addition to the measuring instrument, the question must be asked (answered) how complexity (perception) can be measured, which takes into account the structure, dynamics and interaction of the elements (Remington, 2008).

A study into a measuring instrument to measure complexity perception among stakeholders of ERP implementations has resulted in an initial design (Tesselhof, 2018). This model could be adjusted to measure complexity perception among stakeholders of a blockchain implementation.

6. Relevance

Implementations sometimes fail (Fontana & Iarozinski 2009, Ravasan & Mansouri 2016, Aloni & Miminno, 2007). Blockchain and ERP implementations have an influence on an organization and how information systems must connect to this. This is perceived by stakeholders as complexity (perception) when implementing (Gosh & Skibniewski, 2010). Social elements at the stakeholders then influence this process. It may be important for researchers and managers to use a model to gain insight into complexity perception. Theoretically, this model could provide a further starting point for further research into behavior and perception in blockchain technology implementations. If the perception of complexity can be measured, then it is possible to better manage the implementation and to deal with or avoid obstacles.

The scientific relevance of this research is to gain insight into the usefulness of a measuring instrument for perception of complexity in the behavior of stakeholders on blockchain implementations. With this result, further research into the behavior of stakeholders and what the perception is of blockchain implementations can take place theoretically and how that develops. The social relevance of this research is that if there is a measuring instrument to measure complexity perception, this instrument can be used to steer implementations. This can contribute to successful blockchain implementations or at least that they will be implemented in a more manageable way. If a measuring instrument is available or a measuring instrument can be created, research into blockchain implementations can be more focused on behavior and perception in a complex environment.

7. Conclusion

More and more is known about blockchain technology. The technology has advantages and disadvantages. However, before this technology can be used, it must be implemented. Stakeholders are needed in this implementation process. Those stakeholders all have their own idea, perception of blockchain technology. This will have to be taken into account. To do that, the model developed for ERP implementations can be converted into blockchain implementations. Blockchain implementations also involve stakeholders who experience this process as complex.

That is why it is necessary to find out what is already known about blockchain implementations and the complexity perceptions of stakeholders. An investigation will also be started into the use of the model in a practical situation to improve the model to blockchain implementations.

References

Aloini, J. U., & Miminno, V. (2007). Risk management in ERP project introduction: Review of the literature. *Information and Management, 44*(6), pp. 21. https://doi.org/10.1016/j.im.2007.05.004

Boonstra, A. (2006). Interpreting an ERP-implementation project from a stakeholder perspective. *International Journal of Project Management, 24,* 15. https://doi.org/10.1016/j.ijproman.2005.06.003

Edmonds, B. (1999). *What is complexity? The philosophy of complexity per se with application to some examples in evolution*.

Fontana, R. M., & Iarozinski, A. N. (2009). ERP systems implementation in complex organizations. *Jouranal of Information Systems and Technology Management, 6*(1), 32. https://doi.org/10.4301/S1807-17752009000100004

Freeman, R. E. (1984). *Strategic management, a stakeholder approach*.

Ghosh, S., & Skibniewski, M. J. (2010). Entrerprise Resource Planning Systems implementation as a complex project: A conceptual framework. *Journal of Business Economics and Management, 11*(4), 17. https://doi.org/10.3846/jbem.2010.26

Hussein, B. A. (2012). *An empirical investigation of project complexity from the perspective of a project practioner.*

Jenson, R. J. R. (2002). *Enterprise Systems Integration*. Taylor & Francis, Inc.

Levine, H. G. R. D. (1995). Politics and the function of power in a case study of IT implementation. *Journal of Management Information Systems, 11*(3), 19. https://doi.org/10.1080/07421222.1994.11518052

Mankins, M. C. S. R. (2005). Turning great strategy into great performance. *Harvard Business Review, 83*(7), 9.

Manson, S. M. (2001). Simplifying complexity: A review of complexity theory. *Geoforum, 32,* 10. https://doi.org/10.1016/S0016-7185(00)00035-X

Marnewick, C., & Lauschagne, L. (2005). A conceptual model for enterprise resource planning. *Information Management & Computer Securtiy, 13*(2), 12. https://doi.org/10.1108/09685220510589325

Maurer, R. (2002). *Plan for the human part of ERP*. Workforce Online(September).

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory af stakeholder identification and salience: defining the principle of who and what really counts. *The Academy of Management Review, 22*(4), 21. https://doi.org/10.2307/259247

Ravasan, A. Z., & Mansouri, T. (2016). A dynamic ERP critical failure factors modelling with FCM throughout project lifecycle phases. *Production Planning & Control, 27*(2), 18. https://doi.org/10.1080/09537287.2015.1064551

Remington, K. P. J. (2008). *Tools for comlex projects*.

Scholtes, V. A. T., & Poolman, R. W. (2011). What makes a measurement instrument valid and reliable? *Injury Int. J. Care Injured, 42,* 5. https://doi.org/10.1016/j.injury.2010.11.042

Tesselhof, K. (2018). *Measurability versus complexity perception.* Heerlen: Open University.

Urwin, G. (2001). *Managing complexity in implementing ERP projects*. Proceedings of the 12th Australasian Conference on Information Systems 2001.

Veuger, J. (2019). *Blockchain Technology and Appliciations*. New York, Nova Publishers. https://doi.org/10.15396/eres2019_35

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