An Investigation of Management Systems for Sustainable E-government

Sulaiman Aljarallah and Russell Lock

Computer Science Department, Loughborough University, UK

S.Aljarallah@lboro.ac.uk

R.Lock@lboro.ac.uk

Abstract

Sustainable e-government has become an important issue for countries wishing to sustain their e-services and promote integration with smart cities. Such new challenges require policy makers to move toward sustainable e-government and encourage organisations to engage with management systems that promote sustainability; these include systems for environmental sustainability (ISO14001) and social sustainability (ISO 26000). The literature related to sustainable e-government shows a lack of research into the acceptance and adoption of such management systems and their influence on e-government sustainability. A quantitative case study was conducted in the Kingdom of Saudi Arabia (KSA), which investigated the Saudi Ministry of Justice (MoJ), together with private software companies employed by the MoJ. The purpose of the study was to understand the current situation regarding standards that support sustainability in e-government and its affiliates in the private sector. Survey data was gathered from 83 e-government project employees from the public and private sectors; participants reported on their adoption of management systems designed to support sustainable e-government. Social management systems were more highly ranked than other management systems, namely those related to environmental and economic administration. This raises concerns about the low level of awareness of green-ability (environmental considerations). While social management systems were more likely to be adopted, these four management systems, environmental, social, quality and economic, showed a strong positive interrelationship: when organisations agreed on the adoption of one form of system, they tended to respond positively to others. These results will be utilised to support future work in designing a framework for sustainable e-government.

Keywords: Sustainable e-government, management systems, ISO 14001, ISO 26000, sustainability, IMS

1. Introduction

While there are various definitions for sustainability, the UN Brundtland Report definition is considered the most accepted (Garcia-Torres et al., 2019); here, it is defined as *'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'* (World Commission on Environment and Development, 1987, p.41). There are three main dimensions to sustainability: social, environmental and economic (Silvius and de Graaf, 2019). There is no agreed definition for sustainable e-government (Aljarallah and Lock, 2018a), and the issue is insufficiently addressed in research (Nurdin, 2018).

The relationship between sustainability and project management is emerging and sustainable project management is considered a trending field (Silvius and de Graaf, 2019). Melin and Wihlborg (2018) report that in order to achieve successful and sustainable e-government, it is important to maintain a balance between policy processes and project management processes. Dorn et al. (2008) report that software projects must be managed via planning, mentoring, risk management, quality management and other activities that enhance project management. This shows the importance of management systems to software project management, which in turn is important in the implementation of sustainable e-government.

Management systems are defined as *'sets of processes that function harmoniously, using various resources to achieve management objectives'* (Karapetrovic and Willborn, 1998, p.694). In order to facilitate the implementation of management systems, various standards such as the International Organization for Standardization (ISO) and the British Standards Institution (BSI) have been proposed.

In 2005 the kingdom of Saudi Arabia launched an e-government programme called 'Yesser' (Yesser, 2018; Majrashi and Al-Wabil, 2018), which interacts with 232 governmental organisations (Alanssary and Hausawi, 2019). The aim of Yesser is to increase public sector productivity and efficiency; the quality and usability of services is enhanced by providing accurate information in a timely manner (Yesser, 2018). A national government strategy for 2030 has been launched by the KSA government for all branches of government;

ensuring sustainability and developing e-government are objectives of the National Transformation Program, which is part of the 2030 vision (Saudi Vision 2030, 2018).

Ensuring the successful implementation of e-government requires tools, guidelines and standards. Since management systems can contribute to achieving sustainability, this study investigated management systems in the public sector and its affiliates in the private sector to analyse the commitment to and adoption of these systems with respect to the sustainability concept.

2. Literature review

E-government projects in developing countries are witnessing several challenges in providing sustainable e-government services (Joshi and Islam, 2018). Nurdin (2018) warns that the failure to sustain e-government systems stems from resource challenges; this underscores the need to utilise management systems to manage resources.

Since ICT covers diverse software and hardware (Ziemba, 2017) and e-government relies on ICT, this suggests that several dimensions should be included in sustainable e-government. Fuchs (2006) identifies the technological, ecological, economic, cultural and political dimensions, whereas Ziemba (2017) proposes ecological, economic, sociocultural and political. Anderson et al. (2015) rely on the three major dimensions, namely social, economic and environmental, to create sustainable e-government. Arguably, dimensions depend on the context; however, four key dimensions are social, economic, environmental and technical. Ziemba (2017) finds a significant influence of ICT management and ICT quality on sustainability, showing the importance of applying standards, such as ISO 9001, to promote sustainability.

Castka and Corbett (2015) affirm that some management systems such as ISO 9000 and ISO 14000 are criticised; however, this criticism is seldom based on empirical evidence. Since sustainable e-government is insufficiently investigated (Aljarallah and Lock, 2018a) and management systems also ignore empirical evidence, this study established a new base to investigate these management systems in terms of their relation to sustainability performance within e-government projects in KSA.

Ikram et al. (2019) report that due to global competition between organisations, achieving sustainability has become a priority, hence the adoption of management systems such as ISO 9001, ISO 14001, ISO 26000 and OHSAS 18001. According to Toniolo et al. (2019), however, the majority of standards cover only one dimension of sustainability, and it is notable that there is insufficient consensus on which it should be.

Tsai and Chou (2009) have stated that in order to achieve the goal of sustainable development, small and medium enterprises should adopt sustainable management through four management systems, namely ISO 9001, ISO 14001, OHSAS 18001 and SA 8000. Reis Alves et al. (2013) argue that since ISO has put much attention on meeting sustainability standards such as ISO 9001, ISO 14001 and ISO 26000, these have become a source of technological knowledge on economic, environment and social pillars of sustainability, respectively. Calero and Piattini (2015) argue that while ISO 26000 promotes corporate social responsibility, it also makes businesses take precautionary steps to protect the environment. The adoption of management systems to maintain sustainability within the public and private sectors, as well in e-government programmes, should be encouraged; 'Yesser' is one example.

3. Methodology

This ground-breaking study sheds light on management systems that support sustainability within e-government (public and private sectors) in KSA. This empirical study is exploratory in nature and forms part of a larger ongoing PhD study aimed at developing a sustainable e-government framework. The adopted method in this investigation is quantitative, using a case study of the Saudi Ministry of Justice and its private-sector affiliates due to the access the author has to those organisations.

A quantitative instrument was designed and non-random sampling was utilised as a hard copy since the sample was determined deliberately (Vanderstoep and Johnston, 2009). Convenience and purposive sampling (Swanson and Holton, 2005) were both used in this study. The majority of the 151 items on the survey were closed questions utilising a five-point Likert scale; open questions were also used in some places to extract opinions beyond the limits of closed questions. A subset of the survey results are presented in this paper due to space constraints. Reliability and internal consistency were ensured via two methods, namely face validity by experts and applying Cronbach's alpha internal consistency. The alpha value is 0.854, which is considered

high since anything below 0.7 is considered unsatisfactory (Hair et al., 2010). There were 83 responses in total and the response rate was 62%, collected in two phases during 2018 namely for public sector (MOJ) 1 month (May) and for private sector during one month (Oct). The research findings show that 66% of the participants are from public sector and other findings can be seen Table 1.

Table 1: Questionnaire independent variables

Variable	Classification	N
Nationality	Saudi	27
	Other	56
Age	20-30	32
	31-40	39
	41-50	11
	Over 50	1
Experience	Less than a year	8
	1-2	5
	3-5	14
	6-10	32
	Over 10 years	24
Qualification	Diploma or below	7
	Bachelor	62
	Higher degree	14

4. Findings

In this study, participants were investigated with regard to their adoption of standards that could influence the sustainability of processes and products on an organisational level. Four questions were asked regarding the existence of various standards or management systems to ensure economic sustainability such as BS 8001, quality management such as ISO 9000, environmental management such as ISO 14001, and social responsibility such as ISO 26000. The results, as seen in Figure 1 and Table 2, show that compliance with quality management systems such as ISO 9000 is considered the highest among management systems, followed by social responsibility management systems such as ISO 26000. Environmental management systems such as ISO 14001 came in third place with marginal differences between it and the systems in fourth place, namely economic management systems such as BS 8001.

Figure 1: compliance results of adopting various management systems or standards

The results show low levels of adoption among all these management systems, as well as a high level of uncertainty. Either participants did not know the meaning of management systems, or they had not been informed by their management about the adoption of such systems.

Table 2: Mean of management system compliance among organisations

No	Question/ hypotheses	Mean
1	My organisation complies with a standard to ensure quality management, such as ISO 9001.	3.46
2	My organisation follows a standard for social responsibility, such as ISO 26000.	3.30
3	My organisation follows a standard for environmental management, such as ISO 14001.	3.05
4	My organisation complies with a standard to ensure economic sustainability such as BS 8001.	3.02

These management systems are useful for applying sustainability; however, integration between them in the form of an integrated management system (IMS) that supports sustainability can be efficient and can help to promote compliance with each dimension of sustainability.

Mustapha et al. (2017) report that ISO 9001 is a guideline or tool for organisations who want to promote sustainability of their products and services to meet the desired quality. Darnall et al. (2008) affirm that adopting more than one management system may help to enhance sustainability in organisations; Mustapha et al. (2017) suggest that the most integrated management systems are ISO 9001 and ISO 14001; Jørgensen (2008) adds OHSAS 18001, while Mustapha et al. (2017) indicate that ISO 9001 participates in economic and social sustainability. Boiral and Gendron (2011) agree that sustainability can be met within the organisations by adopting various management systems related to environmental issues (e.g. ISO 14001), social issues (e.g. ISO 26000) and economic issues (e.g. ISO 9001). This shows the importance of ISO 9001 to sustainability in an organisational context.

However, the private sector in KSA is still struggling to implement ISO 9000. Globally, according to an ISO (2017) survey, the conformity and certification for ISO 9001 has decreased by 4% compared to 2016; the situation is the same within KSA for all sectors, including IT, where conformity has declined from 2015. Figure 2 shows the conformity and certification of ISO 9001 in the information technology sector which is decreasing. This raises the question of whether orientation has shifted to another concept which covers quality and beyond, supported by societal stress and regulators such as sustainability. Whatever the reason, the question is asked in general about quality management systems and, given the example for ISO 9001, a serious problem is indicated if quality is not considered within an organisation.

Figure 2: ISO 9001 conformity based in Information Technology Sector globally and in Saudi Arabia, generated from (ISO, 2017)

Figure 2 shows the conformity and certification of ISO 9001 in the information technology sector which is decreasing; however, the situation is the same within KSA for IT, which confirms our result. Moreover, Figure 2 shows the situation within KSA for all sectors, where it can be seen that conformity has declined from 2015.

This result also aligns with our findings. This shows the uncertainty (nearly 40%) among participants which could indicate non-conformity by the companies since the ISO survey aligns with our result.

Even if the ISO 9000 is helpful to promote sustainability, especially social and economic sustainability, the compliance rate is falling in the IT sector in KSA and our results show a shortage of understanding of and compliance with the benefit of a quality management system and its benefit to sustainability. The lack of compliance of this standard can occur due to a lack of experience in configuring such a management system, as Albadran (2015) indicated before.

Social responsibility management systems place second compared to quality management systems. This reflects the importance of social dimensions over environmental concerns and reflects other studies with similar results (Aljarallah and Lock, 2018b; Aljarallah and Lock, 2018c). In these studies, the participants were end-users rather than experts; Aljarallah and Lock (2018a) report that end-users ranked social impact as a characteristic of sustainable e-government as higher than environmental and economic influence which shows importance of social dimension than others.

One of the best-known standards for social responsibility is ISO 26000. Many authors have argued the relationship between social responsibility, or its standard ISO 26000, and sustainability (Rodriguez-Navas et al., 2015; Penzenstadler et al., 2014).

On an organisational level, a study conducted by Mandurah et al. (2012) shows that the awareness of corporate social responsibility (CSR) within KSA firms is rational, whereas the attitude toward this concept is mild. They stress that managers are well aware of this notion. In the same vein, Alhazmi (2017) in his study in KSA shows that corporate leaders show a concern and awareness regarding CSR issues in society. Moreover, a study of 94 companies conducted by Mahjoub (2018) shows an interest in ISO 26000 as a new standard that supports social responsibility practices.

Alsaif (2015) conducted a qualitative study for KSA within various sectors. His study stressed that the highest integration method for strategic quality management (SQM) and CSR is sustainability, which encompasses all these approaches; however, the findings also refer to ISO 26000 as another approach for integration. It is clear that sustainability has a relation with CRS and its standard ISO 26000, and it indicates that at an organisational level in KSA, sustainability has just started to be considered as an important approach for firms since three out of 12 participants highlighted this issue. Within the software industry (public and private) social sustainability, internal and external, has witnessed increased attention in strategy, policy and goals and in practice.

Environmental management systems come in third place, with a small fraction between third and fourth place. This supports the study by Aljarallah and Lock (2018a), which investigates the end-user perspective in KSA with regard to sustainable e-government characteristics. It also aligns with Aljarallah and Lock's (2018b) study of KSA end-users' perspectives on software sustainability. This shows a lack of information regarding environmental concerns compared to other dimensions; this is also affirmed by Aljarallah and Lock (2018c) in the KSA context.

Rodriguez-Navas et al. (2015), Mustapha et al. (2017) and Penzenstadler et al. (2014) refer to ISO 14001 as a standard related to sustainability by covering the environmental dimension. An ISO survey (2017) shows that the conformity and certification for ISO 14001 increased by 5% compared to 2016, and ISO 14001 is considered the second highest after ISO 9001 in terms of conformity and certification. Figure 3 shows the conformity and certification for ISO 4001 in the IT field globally and in KSA. The result shows an increase over the years for adopting this standard in the IT industry. KSA ranks in fifth place out of 14 countries in the Middle East for 2017 in conformity and certification for ISO 14001 (ISO, 2017). Figure 3 shows the conformity for ISO 14001 in KSA, which witnessed a drop in 2017.

Mandurah et al. (2012, p.1055) report in their empirical study of KSA firms that employers '*lack any tangible policies regarding environmental preservation beyond those required by the law*'. The study found that the assessment of business impact on the environment comes at the bottom of the list according to the environmental attitude and activity scale. This shows a lack of organisational responsibility towards the environment; however, the individual usually acts according to their personal beliefs towards the environment motivated by religion, not by policies or law, which indicates a huge lack of policies and regulations organising the responsibility towards the environment. Mariotti et al. (2014) confirm that the low level of concern for the environment by firms in KSA is caused by ineffective regulations and weak enforcement; firms – including IT firms – may ignore environmental concerns because the national regulator relies on firms' good intentions towards the environment. Kadasah (2013) in his study of managers' attitudes towards ISO 14001 in private

manufacturing, private service and public firms in KSA, suggests the reason for this ignorance is the absence of pressure from regulators, together with a lack of environmental NGOs that can bring pressure against unethical behaviour towards the environment.

Figure 3: ISO 4001 conformity based in Information Technology Sector globally and in Saudi Arabia, generated from (ISO, 2017)

The software industry has not considered environmental sustainability (Roher and Richardson, 2013). Chitchyan et al. (2016) report one of the reasons for this lack of consideration of software sustainability within the software development industry is a lack of regulations and investors' pressure regarding sustainability: there is no pressure to adopt it. Penzenstadler (2014) and Penzenstadler et al. (2014) state that without enforcing policies based on a '*compliance-driven economy*', environmental sustainability is not a priority. Anthony et al. (2018) affirm that without pressure from governments, NGOs, management and end-users to apply sustainable practices, organisations will lack motivation to apply such practices; they will only consider environmental concerns as a result of regulations or customer pressure (Amsel et al., 2011).

Overall, the previous argument confirms our finding that attention towards environmental management systems within the software industry including e-government in the public and private sector is low, which could be caused by absence of policies and goals within companies, absence of rules and regulation that bring pressure on companies, and finally absence of environmental NGOs.

Ensuring economic sustainability by utilising a standard such as BS 8001 comes at the bottom of this list. Making a profit is essential for companies to stay in business. Adopting a standard that supports sustainability which focuses on the economic dimension is essential if sustainability is to be considered. According to Niero and Rivera (2018, p.793), circular economic standards such as BS 8001 provide guidelines for organisations regardless of their location, size, sector and type (Pauliuk, 2018) to move from traditional practices toward a '*more circular and sustainable mode of operation*'. However, since the software industry in KSA is not familiar with sustainability, the adoption of such standards – or even the concept itself – is ignored. Kiron et al. (2013) found that the majority of organisations are as yet unable to connect sustainability to profit.

Spearman's rank-order correlation coefficient (r_s) was calculated to determine the relationship between these management systems. There is a strong positive correlation between these management systems where the P value ranged between 0.000 and 0.002, which is below the cut-off of 0.05. Moreover, a strong positive correlation was shown between the respondents, who believed that sustainability qualities have an impact on e-government project management, which is a five-point Likert scale question, compliance of organisation for social responsibility management system, such as ISO 26000. This leads to the conclusion that whenever awareness of the impact of sustainability on e-government projects increases, organisations tend to adopt social management systems. Further, due to the high ranking of social responsibility management systems by respondents and their tangibility within the workplace, respondents tended to agree on their implementation in their organisations.

5. Discussion

Other management systems which have a relation to sustainability need to be empirically investigated such as OHSAS 18000 – Occupational Health and Safety Management, since there is little evidence in literature in some sectors and in some countries with regard to its effects and benefits (Castka and Corbett, 2015).

An empirical study regarding sustainable e-governance in China show there is no significant relationship between environmental performance and the environmental e-governance level affirming the current environmental performance, in some local governments, stems from environmental policies (Yu, 2015). Similarly, the existence of a sustainability policy is an important way to increase sustainability performance and reflects the usefulness of adopting management systems. Melin and Wihlborg (2018) emphasise the need for balance between policies on information management and project management when implementing sustainable e-government.

If sustainability is set as a high-level goal for the 2030 vision in KSA, detailed policy for sustainable e-government systems is needed in order to guide the efforts toward sustainable e-government implementation, which should take place as a result of improving administrative efficiency as indicated by Twizeyimana and Andersson (2019). One its indicators is '*better management of public resources and economy*'. This shows the importance of management systems for organisations, which increases the public value of e-government. One of the proposed solutions is utilising an integrated management system (IMS). Jørgensen et al. (2006) state that for an organisation to engage with sustainable development, an IMS should be applied and expanded to cover the entire chain of production and should be accepted by all stakeholders. Applying an IMS can be beneficial for organisations, as it saves time and resources, eliminates bureaucracy and eliminates the complexity and confusion of applying various management systems (Jørgensen et al., 2006); it also reduces the costs of application and certification. Toniolo et al. (2019) are in favour of integrating the three dimensions; however, they warn of the difficulties of integration in terms of balancing the various dimensions.

6. Conclusion

This study investigated the situation of management systems with sustainable e-government in KSA. The results showed a lack of adoption of these management systems, which can stem from a lack of understanding of such standards or a lack of policy. Awareness of the importance of environmental and social management systems should be increased to enhance both social and environmental sustainability. Specifically, management systems should be enhanced in the public and private sector software industry. While interesting it is not yet possible to generalise from these results to the wider world, further studies are needed to investigate the impact of such management systems on sustainable e-government as well as the software industry.

References

- Alannasary, M.O., Hausawi, Y.M., 2019. Adopting and Implementing a Government Cloud in Saudi Arabia, An Integral Part of Vision 2030. *Epic Ser. Comput.* 58, 387–396.
- Albadran, A.Q., 2015. An Investigation of ISO 9000 Implementation Issues In Saudi Arabia Manufacturing Industry. Northumbria University.
- Alhazmi, A., 2017. Exploring the Factors and Effects of Corporate Social Responsibility Disclosure in Saudi Arabia. Nottingham Trent University.
- Aljarallah, S., Lock, R., 2018a. An Empirical Study of Sustainable e-Government Characteristics in Saudi Arabia, 18th European Conference on Digital Government ECDG 2018. Academic Conferences and Publishing International Limited, Santiago de Compostela, Spain, pp. 8–15.
- Aljarallah, S., Lock, R., 2018b. Software Sustainability from a User Perspective A case study of a developing country (Kingdom of Saudi Arabia). In: *IEEE International Conference on Computing, Electronics & Communications Engineering 2018 (ICCECE '18)*. IEEE, Southend-on-Sea, UK, pp. 83–88.
- Aljarallah, S., Lock, R., 2018c. An exploratory study of software sustainability dimensions and characteristics. In: *Proceedings of the 12th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement - ESEM '18*. ACM Press, Oulu, Finland, pp. 1–10.
- Alsaif, T., 2015. An Investigation into the Relationship and Integration between Strategic Quality Management and Corporate Social Responsibility: the case of some Saudi Arabian Organisations. University of Portsmouth.

- Amsel, N., Ibrahim, Z., Malik, A., Tomlinson, B., 2011. Toward sustainable software engineering. In: 33rd International Conference on Software Engineering. ACM, New York, pp. 976–979.
- Anderson, D., Wu, R., Cho, J.-S., Schroeder, K., 2015. Introduction: Global Challenges in Turbulent Times: Road to Sustainable E-government. In: E-Government Strategy, ICT and Innovation for Citizen Engagement. Springer, New York, pp. 1–10.
- Anthony, B., Majid, M.A., Romli, A., 2018. An empirical study on predictors of green sustainable software practices in Malaysian electronic industries. *J. ICT* 18, 347–391.
- Boiral, O., Gendron, Y., 2011. Sustainable Development and Certification Practices: Lessons Learned and Prospects. *Bus. Strateg. Environ.* 20, 331–347.
- Calero, C., Piattini, M., 2015. Introduction to Green in Software Engineering, *Green in Software Engineering*. Springer, Cham, pp. 3–27.
- Castka, P., Corbett, C.J., 2015. Management Systems Standards: Diffusion, Impact and Governance of ISO 9000, ISO 14000, and Other Management Standards. *Found. Trends® Technol. Inf. Oper. Manag.* 7, 161–379.
- Chitchyan, R., Becker, C., Betz, S., Duboc, L., Penzenstadler, B., Seyff, N., Venters, C.C., 2016. Sustainability design in requirements engineering: state of practice. In: 38th International Conference on Software Engineering Companion. ACM, New York, pp. 533–542.
- Darnall, N., Jolley, G.J., Handfield, R., 2008. Environmental Management Systems and Green Supply Chain Management: Complements for Sustainability? *Bus. Strateg. Environ.* 17, 30–45.
- Dorn, J., Pichlmair, M., Schimper, K., Tellioglu, H., 2008. Supporting Competence Management in Software Projects. In: 2008 IEEE International Technology Management Conference. IEEE, Lisbon, pp. 1–8.
- Fuchs, C., 2006. Sustainability and the Information Society. In: *Social Informatics: An Information Society for All? In Remembrance of Rob Kling*. Springer, Boston, pp. 219–230.
- Garcia-Torres, S., Albareda, L., Rey-Garcia, M., Seuring, S., 2019. Traceability for sustainability – literature review and conceptual framework. *Supply Chain Manag. An Int. J.* 24, 85–106.
- Hair, J., Wolfinbarger, M., Ortinau, D., Bush, R., 2010. *Essentials of Marketing Research*, 2nd ed. McGraw-Hill/Irwin, New York.
- Ikram, M., Zhou, P., Shah, S.A.A., Liu, G.Q., 2019. Do environmental management systems help improve corporate sustainable development? Evidence from manufacturing companies in Pakistan. *J. Clean. Prod.*
- ISO, 2017. ISO Survey 2017 [WWW Document]. <https://www.iso.org/the-iso-survey.html> (accessed 12.6.18).
- Jørgensen, T.H., 2008. Towards more sustainable management systems: through life cycle management and integration. *J. Clean. Prod.* 16, 1071–1080.
- Jørgensen, T.H., Remmen, A., Mellado, M.D., 2006. Integrated management systems – three different levels of integration. *J. Clean. Prod.* 14, 713–722.
- Joshi, P., Islam, S., 2018. E-Government Maturity Model for Sustainable E-Government Services from the Perspective of Developing Countries. *Sustainability* 10, 1882.
- Kadasah, N.A., 2013. Attitudes of Managers towards the Potential Effects of ISO 14001 in Saudi Arabia: Factor Analysis. *Int. Bus. Res.* 6, 91–101.
- Karapetrovic, S., Willborn, W., 1998. Integrated audit of management systems. *Int. J. Qual. Reliab. Manag.* 15, 694–711.
- Kiron, D., Kruschwitz, N., Rubel, H., Reeves, M., Fuisz-Kehrbach, S.-K., 2013. Sustainability's Next Frontier.
- Mahjoub, L. Ben, 2018. Sustainability Reporting and Income Smoothing: Evidence from Saudi-Listed Companies. In: *Sustainability Assessment and Reporting*. InTech, London, p. 24.
- Majrashi, K., Al-Wabil, A., 2018. HCI Practices in Software-Development Environments in Saudi Arabia. In: *Cross-Cultural Design Methods, Tools, and Users*. Springer, pp. 58–77.
- Mandurah, S., Khatib, J., Al-Sabaan, S., 2012. Corporate Social Responsibility Among Saudi Arabian Firms. *J. Appl. Bus. Res.* 28, 1049.
- Mariotti, F., Kadasah, N., Abdulghaffar, N., 2014. Motivations and barriers affecting the implementation of ISO 14001 in Saudi Arabia: an empirical investigation. *Total Qual. Manag. Bus. Excell.* 25, 1352–1364.
- Melin, U., Wihlborg, E., 2018. Balanced and integrated e-government implementation – exploring the crossroad of public policy-making and information systems project management processes. *Transform. Gov. People, Process Policy* 12, 191–208.
- Mustapha, M.A., Manan, Z.A., Wan Alwi, S.R., 2017. Sustainable Green Management System – An integrated approach towards organisational sustainability. *J. Clean. Prod.* 146, 158–172.
- Niero, M., Rivera, X.C.S., 2018. The Role of Life Cycle Sustainability Assessment in the Implementation of Circular Economy Principles in Organizations. *Procedia CIRP* 69, 793–798.
- Nurdin, N., 2018. Resource Endowments Strategy for Sustainable E-Government. In: 4th International Conference on Science and Technology. IEEE, pp. 1–6.

- Pauliuk, S., 2018. Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations. *Resour. Conserv. Recycl.* 129, 81–92.
- Penzenstadler, B., 2014. Infusing Green: Requirements Engineering for Green In and Through Software Systems, Third International Workshop on Requirements Engineering for Sustainable Systems. CEUR, Karlskrona, pp. 44–53.
- Penzenstadler, B., Raturi, A., Richardson, D., Tomlinson, B., 2014. Safety, Security, Now Sustainability: The Nonfunctional Requirement for the 21st Century. *IEEE Softw.* 31, 40–47.
- Reis Alves, D.F. dos, de Campos, R., de Souza, F.B., 2013. GERAM: building sustainable enterprises. *IFAC Proc.* Vol. 46, 602–607.
- Rodriguez-Navas, G., Duboc, L., Betz, S., Chitchyan, R., Penzenstadler, B., Venters, C.C., 2015. Safety vs. Sustainability Design: Analogies, Differences and Potential Synergies, Fourth International Workshop on Requirements Engineering for Sustainable Systems. CEUR, Ottawa, pp. 25–34.
- Roher, K., Richardson, D., 2013. Sustainability requirement patterns. In: 3rd International Workshop on Requirements Patterns. IEEE, pp. 8–11.
- Saudi Vision 2030, 2018. National Transformation Program [WWW Document]. <https://vision2030.gov.sa/en/ntp> (accessed 3.31.19).
- Silvius, A.J.G., de Graaf, M., 2019. Exploring the project manager's intention to address sustainability in the project board. *J. Clean. Prod.* 208, 1226–1240.
- Swanson, R.A., Holton, E.F., 2005. Research in organizations foundations and methods of inquiry, 1st ed. Berrett-Koehler Publishers, San Francisco.
- Toniolo, S., Mazzi, A., Mazzarotto, G., Scipioni, A., 2019. International standards with a life cycle perspective: which dimension of sustainability is addressed? *Int. J. Life Cycle Assess.* 1–13.
- Tsai, W.-H., Chou, W.-C., 2009. Selecting management systems for sustainable development in SMEs: A novel hybrid model based on DEMATEL, ANP, and ZOGP. *Expert Syst. Appl.* 36, 1444–1458.
- Twizeyimana, J.D., Andersson, A., 2019. The public value of E-Government – A literature review. *Gov. Inf. Q.* 36, 167–178.
- Vanderstoep, S.W., Johnston, D.D., 2009. Research Methods for Everyday Life: Blending Qualitative and Quantitative Approaches, 1st. ed. Jossey-Bass, San Francisco.
- World Commission on Environment and Development, 1987. Report of the World Commission on Environment and Development: Our Common Future [WWW Document]. <http://www.un-documents.net/our-common-future.pdf> (accessed 3.30.19).
- Yesser, 2018. Overview [WWW Document]. <https://www.yesser.gov.sa/EN/programdefinition/pages/overview.aspx> (accessed 3.30.19).
- Yu, Y., 2015. An empirical analysis of the relationship between environmental performance and sustainable e-governance in China. *Technol. Forecast. Soc. Change* 96, 71–78.
- Ziemba, E., 2017. The Contribution of ICT Adoption to the Sustainable Information Society. *J. Comput. Inf. Syst.* 59, 116–126.