



CENTERIS - International Conference on ENTERprise Information Systems / ProjMAN - International Conference on Project MANagement / HCist - International Conference on Health and Social Care Information Systems and Technologies, CENTERIS / ProjMAN / HCist 2017, 8-10 November 2017, Barcelona, Spain

Potential Stakeholders and Perceived Benefits of a Digital Health Innovation Ecosystem for the Namibian Context

Gloria Ejehiohen Iyawa^{a,*}, Marlien Herselman^{b,c}, Adele Botha^{b,c}

^aUniversity of Namibia, Windhoek, 9000, Namibia

^bCSIR, Meiring Naude Road, CSIR Campus, Building 43, Pretoria, 0001, South Africa

^cUniversity of South Africa, Pretoria, 0001, South Africa

Abstract

This paper presents the result of a study which aimed at identifying the potential stakeholders and perceived benefits of a digital health innovation ecosystem for the Namibian context as part of a larger study. Combining semi-structured interviews and qualitative questionnaires, a group of professionals from within the Namibian context and the global context were purposively selected to provide insights about the potential stakeholders and perceived benefits of a digital health innovation ecosystem for the Namibian context. The study adopted a qualitative approach. The main findings of the study suggest that stakeholders of a digital health innovation ecosystem include patients, professionals from various disciplines as well as government institutions, research institutions and innovation companies. The findings suggest that the implementation of a digital health innovation ecosystem for the Namibian context could improve healthcare services as a result of the collaborative and innovative platform. The findings of this study contribute to the emerging body of literature on digital health innovation ecosystems, specifically in developing countries. Furthermore, the findings of the study will inform relevant healthcare policy makers within the Namibian context in planning and implementing a digital health innovation ecosystem.

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Peer-review under responsibility of the scientific committee of the CENTERIS - International Conference on ENTERprise Information Systems / ProjMAN - International Conference on Project MANagement / HCist - International Conference on Health and Social Care Information Systems and Technologies.

* Corresponding author. Tel.: +0-000-000-0000 ; fax: +0-000-000-0000 .
E-mail address: gloria.iyawa@gmail.com

Keywords: Digital health innovation ecosystems; Namibia; Innovation;

1. Introduction

The drive for efficient and effective healthcare delivery have been emphasised in both developed and developing countries¹⁻³. However, developing countries still experience economic and infrastructural challenges which inhibit these countries from reaching their full potentials in terms of healthcare delivery to patients. Iyawa et al.⁴ point out that the implementation of a digital health innovation ecosystem is capable of mitigating healthcare challenges experienced in developing countries and hence, support developing countries in achieving health related Millennium Development Goals.

Past researches on digital health innovation ecosystems have focused on describing the concepts of a digital health innovation ecosystem and what it consists of⁵⁻⁶. Iyawa et al.⁵⁻⁶ emphasize that digital health innovation ecosystems consists of key concepts of digital health, innovation and digital ecosystems. A scoping review by Iyawa et al.⁴ suggest that digital health, innovation and digital ecosystems are evident in both developed and developing countries. Therefore, there is a possibility of implementing a digital health innovation ecosystem in developed and developing countries. To the best of the researchers' knowledge, only two empirical studies have been conducted on digital health innovation ecosystems, South Africa⁷ and Namibia⁸. Herselman et al.⁷ conceptualised a digital health innovation ecosystem for the South African context. Iyawa et al.⁸ revealed the technical components that constitute a digital health innovation ecosystem for the Namibian context, however, there is no empirical study that identifies who constitute digital health innovation ecosystems' stakeholders as well as the perceived benefits for implementing digital health innovation ecosystems in a developing country such as Namibia.

The purpose of this study was to identify the potential stakeholders and perceived benefits of a digital health innovation ecosystem for the Namibian context as part of a larger study. This study attempts to, for the first time, identify the potential stakeholders and perceived benefits of a digital health innovation ecosystem for the Namibian context from a high-level conceptual perspective, thereby contributing to the current literature on digital health innovation ecosystems, specifically in developing countries. The findings of this study contribute to practice as it can assist decision makers in healthcare within the Namibian context in planning and implementing a digital health innovation ecosystem.

The remainder of this paper is structured as follows, Section 2 presents a brief literature review, Section 3 presents the research methodology. The results of the study are presented in Section 4. A discussion of the findings and conclusions are presented in Section 5.

2. Literature Review

According to Herselman et al.⁷, digital health in a developing country context need to be implemented while utilising the concept of *innovation ecosystems*. Iyawa et al.⁵⁻⁶ further expatiated the discussion by suggesting that digital health innovation ecosystems should have elements of digital health, innovation and digital ecosystems.

Iyawa et al.⁵ defined a digital health innovation ecosystem as:

“a network of digital health communities consisting of interconnected, interrelated and interdependent digital health species, including healthcare stakeholders, healthcare institutions and digital healthcare devices situated in a digital health environment, who adopt the best-demonstrated practices that have been proven to be successful, and implementation of those practices through the use of information and communication technologies to monitor and improve the wellbeing and health of patients, to empower patients in the management of their health and that of their families”.

The definition of a digital health innovation ecosystem by Iyawa et al.⁵ suggest that a digital health innovation ecosystem should include healthcare stakeholders, but it is not clear as to which specific stakeholders should be included in a digital health innovation ecosystem for the Namibian context. The discussion around digital health innovation ecosystems suggest that patients and relevant healthcare stakeholders can incorporate innovative practices in delivering and receiving healthcare services⁶. The concept of digital health innovation ecosystems also includes providing digital health services through the use of digital health technologies⁵⁻⁶ while incorporating the elements of

innovation in a digital ecosystem platform where participants of the digital health innovation ecosystem remain connected⁶. These technologies include m-health, e-health, telemedicine, health 2.0/medicine 2.0 and health and wellness app⁶. The benefit of implementing a digital health innovation ecosystem was generally stated in the definition by Iyawa et al.⁵. Iyawa et al.⁴ emphasize the importance of implementing digital health innovation ecosystems. They indicate that a digital health innovation ecosystem would be beneficial to both developed and developing countries. However, the specific benefit of implementing a digital health innovation ecosystem for the Namibian context was not stated.

The concept of ecosystems has been described in different fields, such as marine¹² and innovation ecosystems¹³. In the healthcare context, different ecosystems have been identified such as digital health ecosystems¹⁴ and electronic health (eHealth) Ecosystems¹⁵. Ireland established an eHealth Ecosystem that connects different health institutions together¹⁵. The purpose of the ecosystem was to connect stakeholders within the Irish healthcare sector¹⁵. The existing ecosystems are limited in meeting the healthcare needs of a developing country such as Namibia as Herselman et al.⁷ suggest that digital health can meet its full potential in a developing country when it is implemented with the principles of innovation.

Namibia is located in Southern Africa. Namibia is bordered by Botswana, Zambia, Angola and South Africa⁹. Iyawa et al.⁸ suggest that “digital health innovation ecosystems hold for the Namibian context”. Iyawa et al.⁸ further indicated that Namibia is a developing country with a need to explore the concept of digital health, as such implementing a digital health innovation ecosystem will help facilitate digital health in Namibia. However, with few academic literature on digital health and digital health innovation ecosystems in Namibia, it is important to investigate what benefit a digital health innovation ecosystem would be to the Namibian context as well as who should constitute a digital health innovation ecosystem stakeholder for the Namibian context from a high-level conceptual perspective. Investigating who the stakeholders in a digital health innovation ecosystem are, is important when planning a digital health innovation ecosystem. Presenting the specific benefits the digital health innovation ecosystem would bring to the Namibian healthcare system will be an important source of information to healthcare decision makers in Namibia to motivate the need for implementing a digital health innovation ecosystem.

3. Methodology

This study aims to answer the following research questions:

- Who are the potential stakeholders of a digital health innovation ecosystem for the Namibian context?
- What are the perceived benefits of implementing a digital health innovation ecosystem for the Namibian context?

This study adopted a qualitative approach which employed interviews and qualitative questionnaires in meeting the objectives of the study. The interviews were recorded and later transcribed. The target population for this study consisted of professionals in the field of digital health, innovation and digital ecosystems in both Namibian and global contexts. Professionals from digital health, innovation and digital ecosystems domains were selected because Iyawa et al.⁵ indicated that a digital health innovation ecosystem should include concepts from digital health, innovation and digital ecosystems, hence, including stakeholders from these domains would provide relevance in determining the potential stakeholders and perceived benefits of a digital health innovation ecosystem. The participants of the study are described in table 1.

Table 1. Description of participants who took part in the study.

Field	Number of experts from Namibia	Number of experts from the global context	Total
Digital health	4	5	9
Innovation	4	4	8
Digital Ecosystems	2	3	5

In total, 10 participants from within the Namibian context participated in the interviews and 12 participants from the global context (Portugal, Germany, Finland, Ireland, Nigeria, Italy, Taiwan, Australia and United Kingdom)

participated in answering the qualitative questionnaires. There is a difference between the research instruments used for both groups as one of the researchers is located in Namibia and had the opportunity of interviewing the participants on an individual basis, however, majority of the participants from the global context agreed to participate through the use of qualitative questionnaires which was sent through their email as a result of distance issues. Participants from within the Namibian context were medical doctors, Information Technology (IT) professionals in healthcare, professors and lecturers, researchers from innovation organisations and networking professionals. Although participants were from different fields, they had an understanding of the principles of innovation. Identifying participants in the field of digital ecosystems was challenging as the concept of digital ecosystems had not yet been implemented in Namibia, as a result, the researcher who conducted the interview in Namibia explained the concept of digital ecosystems to networking professionals as Chang and West¹⁰ indicated that digital ecosystems and networking share similar background. The researcher also ensured that the networking professionals were conversant with the concept of digital ecosystems before they were allowed to participate. The same questions presented to the participants in Namibia were also used for the qualitative questionnaires presented to the global participants. Participants were purposefully selected to include participants who were knowledgeable in the field of digital health, innovation and digital ecosystems. The description of participants who took part in the study from the Namibian context is highlighted in table 2 and the description of participants who took part in the study from the global context is highlighted in table 3.

Table 2. Description of participants who took part in the study from the Namibian context.

Participant	Occupation	Domain	Age range	Gender	Expertise level in domain	Work setting	Years of experience
P1	Medical doctor	E-health (digital health)	46-60	Male	Intermediate	Private hospital	7-10 years
P2	Lecturer	E-health, health information systems research (digital health)	46-60	Female	Intermediate	University	4-6 years
P3	Medical doctor	Health information systems (digital health)	36-45	Male	Intermediate	Public hospital	7-10 years
P4	Systems analyst	E-health, health information systems (digital health)	26-35	Male	Intermediate	Public hospital	4-6 years
P5	Associate professor	Innovation research (innovation)	46-60	Male	Intermediate	University	4-6 years
P6	Researcher	Innovation	26-35	Male	Intermediate	Innovation Organisation	4-6 years
P7	Project manager	Innovation	26-35	Male	Intermediate	Innovation Organisation	4-6 years
P8	Lecturer	Innovation research (innovation)	26-36	Female	Intermediate	University	1-3 years
P9	Systems administrator	Computer networks (digital ecosystems)	36-45	Male	Intermediate	Public hospital	4-6 years
P10	Systems administrator	Computer networks (digital ecosystems)	26-35	Male	Intermediate	Public hospital	4-6 years

Table 3. Description of participants who took part in the study from the global context.

Participant	Occupation	Domain	Age range	Gender	Country	Expertise level in domain	Work setting	Years of experience
P11	Deputy Professor/ Research Fellow	Digital health	Over 60 years	Female	Germany	Intermediate	University	4-6 years
P12	Lecturer	Digital health	36-45	Female	Portugal	Beginner	University	1-3 years
P13	Project manager	Digital health	36-45	Male	Finland	Expert	University	4-6 years
P14	Lecturer	Digital health	46-60	Male	Ireland	Intermediate	University	4-6 years
P15	Lecturer	Digital health	26-35	Male	Nigeria	Intermediate	University	4-6 years
P16	Professor	Innovation	Over 60 years	Male	Germany	Intermediate	University	4-6 years
P17	Researcher	Innovation	36-45	Male	Nigeria	Expert	Research institution	More than 10 years
P18	Professor and consultant	Innovation	Over 60 years	Male	Taiwan	Expert	University	More than 10 years
P19	Researcher	Innovation	26-35	Male	United Kingdom	Intermediate	University	4-6 years
P20	Professor	Digital ecosystems	46-60	Female	Australia	Intermediate	University	4-6 years
P21	Associate Professor	Digital ecosystems	Over 60 years	Female	Germany	Intermediate	University	4-6 years
P22	Professor	Digital ecosystems	46-60 years	Male	Italy	Intermediate	University	4-6 years

4. Findings

The findings are categorised under two headings: Potential stakeholders of a digital health innovation ecosystem for the Namibian context and perceived benefits of a digital health innovation ecosystem for the Namibian context. Under each category, the presentation of the findings for both the Namibian and global contexts are provided.

4.1. Potential stakeholders of a digital health innovation ecosystem for the Namibian context

During the interviews with participants from the Namibian context, they were asked whether they would like to participate in such an ecosystem, and if so, in which capacity, the majority indicated that they would like to be part of such an ecosystem. All participants indicated that they would like to participate in such an ecosystem. P2 indicated "...in the capacity of research and innovation, I would like to share my innovative ideas in this ecosystem and build knowledge that can lead to healthcare innovation. I would be willing to participate in research activities in which the findings can be shared and incorporated by professionals in the ecosystem." Information sharing was considered as

an area in which stakeholders would like to serve. P3 stated “I can serve in the capacity of sharing relevant information with other professionals, like myself, as well as other organisations. Knowing that patients will take part in managing their health, I will be willing to give all the support I can, assisted by digital technologies.” P1 commented “I would like to be able to connect with other hospitals and clinics or even pharmacies. I also see the concept of open innovation is included in the ecosystem, that means I can share ideas with other doctors and vice versa. I would also use digital technologies to provide better care to my patients.” P6 indicated that “I would like to take part by being part of the innovation development process in the digital health innovation ecosystem. I believe innovation organisations will be able to apply innovative concepts such open innovation, intellectual property rights. I feel innovation organisations should be involved in the digital health innovation ecosystem to facilitate the innovation process. P4 added “...providing technical support within the platform will be necessary; I think I can contribute in that regard.” P7 indicated that “government institutions, innovation firms, research institutions, healthcare institutions need to collaborate in order to create the digital health innovation ecosystem”

Majority of the participants from the global context admitted that they would like to be part of such an ecosystem as they had outlined in the qualitative questionnaire. P16 explained that participation would be in the form of research and innovation where the expert would “contribute towards developing innovative research to improve the digital health innovation ecosystem.” P11 indicated that participation would be in the form of “mathematical modelling and ICT4D for optimising the health system using the one health approach. I am especially interested in the interface to the user (patient) and how to really reach a patient to be able to create risk/health awareness.” P12 explained that participation would be in the form of “bioinformatics and molecular biology towards personalised medicine.”

Participants were asked to identify who they believed would be potential stakeholders of a digital health innovation ecosystem for Namibia. In summary, participants from the Namibian and global contexts indicated that potential stakeholders of the digital health innovation ecosystem for Namibia would include, patients, medical practitioners, researchers, IT professionals in health information systems. P22 indicated “patients are definitely going to be part of the digital health innovation ecosystem because they are the main users, the focus is to provide healthcare services for them and it would be of no use if they are not involved. Patients would play a significant role as they would be involved in user innovation”. P20 indicated that “doctors, pharmacists, and every medical practitioner should be involved as it is a connected system and everybody in the practice of health care giving should be involved.” P17 explained “since innovation is added it will require a lot of researchers which will be involved in innovation researcher for the benefit of the digital health innovation ecosystem”.

4.2. Perceived benefits of a digital health innovation ecosystem for the Namibian context

Participants were asked to explain the perceived benefits of implementing such an ecosystem to the Namibian context. All participants were certain that the ecosystem will be of value to the Namibian context. Information sharing was regarded as a benefit of implementing such an ecosystem within the Namibian context. P1 commented that “...when this ecosystem is implemented, it will be a common platform for all health practitioners to share information and seek advice from professionals.” P17 believes that such an ecosystem will facilitate innovation because “users will have the opportunity to keep the intellectual property right, I like the concept of user innovation, where innovative ideas are not only left in the hands of the professionals. Users, in this case patients, can also share their ideas regarding what they want and this might bring about improved processes as well.” P21 explained that “...Namibia will have an advantage to have that kind of ecosystem, it will have an effect on service delivery for sure.” P15 stated “...this ecosystem will create better and efficient ways of providing healthcare services and improvement in the way healthcare is delivered, especially for patients.” In addition, P13 indicated “...doctors can interact, share information and even patients can be part of the ecosystem when they participate in this kind of ecosystem.” P22 explained that “there will be a difference in the way information is transferred from one point to another. I see this as a value because it will have an impact on the care of patients.” P21 noted that “it will be of value, this kind of structure is what the health sector needs, the idea of information sharing will be helpful in terms of how patients are provided with healthcare service.” P3 indicated that “I see so much potential in the implementation of a digital health innovation ecosystem and of benefit, especially for patients.” P6 indicated that “the implementation of a digital ecosystem would mean that health institutions would collaborate with innovation companies, the practical benefit would lead to the process of health care delivery as it introduces important elements that will improve the healthcare delivery process”

P7 explained that the benefit of a digital health innovation ecosystem would be “the flexibility of including patients in the healthcare delivery process through the use of digital health technologies”.

P3 further explained that “as a developing country, digital health can improve healthcare processes and overall life of patients in Namibia, taking into consideration that digital health innovation ecosystems will enable connections between different people, it will improve connection with experts in the medical field as experts will be part of the ecosystem.” P19 explained “Yes, definitely. I think especially the implementation of such a structured concept can help to optimise the health system. Furthermore, to use the digital devices and communication channels the population uses, can lead to a huge impact.” P14 indicated that a digital health innovation ecosystem would help save resources and provide efficient and effective health services.

P18 added “Yes, a digital health innovation ecosystem mind-set is the way of the future as it is meant to be open, collaborative and inclusive. Governments alone in many parts of the world would not be able to cope with the rise of chronic diseases, and the need to improve the quality and efficiency of healthcare delivery. These are challenges which every government is currently facing and as such Namibia would need digital innovative ecosystem that will involve academic, non-profit, and commercial organisations to be able to cope with the spread of these diseases.”

P15 added “for sure there can be value if the system can be operated from a fresh (non-legacy) ground on and builds on interoperability within the country and outside the country's own borders.”

5. Discussion and conclusions

This study investigated the potential stakeholders and perceived benefits of a digital health innovation ecosystem for the Namibian context taking into consideration the perceptions of relevant participants from the Namibian and global contexts. The findings contribute to the growing body of literature on digital health innovation ecosystems by identifying what the specific benefits of implementing a digital health innovation ecosystem would be for Namibia and identifying the potential stakeholders of the digital health innovation ecosystem for Namibia. Although there is a growing number of studies on digital health innovation ecosystems⁴⁻⁸, these studies focused on developing the concept of digital health innovation ecosystems and its components both from the literature⁵⁻⁶ and empirically⁷⁻⁸. However, this study identified the potential stakeholders and benefits of implementing a digital health innovation ecosystem, which can be applied in similar contexts. It was highlighted that the digital health innovation ecosystem for Namibia should involve stakeholders from other countries. This is in contrast with a previous report which indicates that an eHealth Ecosystem consists of stakeholders from a single country¹⁵.

Findings from the study suggest that professionals such as researchers, IT professionals, medical practitioners and patients should actively take part in the digital health innovation ecosystem. The findings also suggest that building a digital health innovation ecosystem for the Namibian context can include professionals from multi-disciplinary fields and not only from the healthcare sector. This is in contrast with previous studies which broadly describe digital health innovation ecosystem stakeholders as healthcare stakeholders⁴. The study also identifies other stakeholders such as government institutions, innovation companies, research institutions, healthcare institutions as potential stakeholders of a digital health innovation ecosystem. Patients were considered relevant to the digital health innovation ecosystem, this is similar to a previous study which indicates that patients should be involved in the activities of the ecosystem⁵.

The results of the study indicate that the implementation of a digital health innovation ecosystem would be beneficial in a developing country like Namibia. This is in line with previous studies which suggest that a digital health innovation ecosystem would help developing countries attain the Millennium Development Goals⁴. In this study, it is evident that implementing such an ecosystem for the Namibian healthcare sector would have a positive impact of healthcare service delivery and would be of benefit to patients. This is consistent with previous studies that suggest that a digital health innovation ecosystem would impact on healthcare service and patients⁵. Information sharing between connected healthcare practitioners was considered a benefit of such an ecosystem in Namibia. This is in line with other studies that suggest that a digital health innovation ecosystem would improve healthcare services⁴⁻⁵. The findings of the study also indicate that users can share their ideas on the platform. This is consistent with other studies that suggest that user participation in healthcare delivery is important¹¹.

This study has therefore pointed out to healthcare policy makers in the Namibian healthcare sector what the benefits of implementing a digital health innovation ecosystem would be for Namibia and who should be involved in carrying out activities in a digital health innovation ecosystem for Namibia. Healthcare policy makers within the Namibian

context should include different stakeholders indicated in this study when implementing the digital health innovation ecosystem. To meet the demands of effectively providing healthcare services, healthcare policy makers and researchers now consider digital health as a tool that be used to improve the health of patients. As a result, innovative practices need to be incorporated in order to ensure that digital health can help meet the needs of a developing country with regards to healthcare⁷, hence, healthcare policy makers need to understand the potential stakeholders and perceived benefits of a digital health innovation ecosystem.

The study provides empirical evidence for the potentials in implementing such an ecosystem for Namibia and who should be involved, taking into considerations perceptions from experts locally and globally. The findings of the study will inform relevant healthcare policy makers within the Namibian context in planning and implementing a digital health innovation ecosystem.

The limitation of the study might be related to the way in which the data was gathered. Interviews were used to gather information from the Namibian participants and qualitative questionnaires were used to gather information from the global experts. So perhaps this might have had an effect in the information provided in the different groups.

Future work would be to evaluate the implementation of a digital health innovation ecosystem and take into consideration the activities of stakeholders identified in this study and evaluate the benefits of a digital health innovation ecosystem indicated in this study.

Acknowledgements

The authors would like to thank the University of South Africa, CSIR Meraka and Department of Science and Technology, South Africa for supporting this research.

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