

# Digital Ecosystems for Public Enterprises: Prospects and Challenges

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**Abstract:** A Digital Ecosystem is a digital platform that connects stakeholders and institutions with similar interests. Digital Ecosystems have been applied in different contexts, including health and business. This paper investigated the prospects and challenges of implementing a Digital Ecosystem to support public enterprises. Semi-structured interviews were conducted with 20 participants. The findings suggest that the current infrastructure is suitable for implementing a Digital Ecosystem, however, more resources and tools such as high-speed Internet, high-end computers as well as security features are needed to facilitate the efficient functioning of a Digital Ecosystem for public enterprises. The benefits of implementing a Digital Ecosystem to support public enterprises include improved access to information and improved communication between public enterprises. The findings also revealed that a Digital Ecosystem could support teamwork, monitoring, evaluation and effective decision-making processes as the information required for decision making would be readily available. The potential challenges of implementing a Digital Ecosystem for public enterprises include lack of skills, lack of funds, organisational resistance to change and lack of awareness of the benefits of a Digital Ecosystem for public enterprises. In order to overcome these challenges, it is recommended that institutions of higher learning incorporate Digital Ecosystems into their curriculum, create awareness of the benefits of Digital Ecosystems to support public enterprises through social media platforms and government websites as well as provide specialised training to current employees in public enterprises. The findings of this study will inform key stakeholders in public enterprises on the prospects of implementing a Digital Ecosystem.

**Keywords:** Digital Ecosystems, public enterprises, prospects, challenges, benefits.

## 1. Introduction and Background

According to Basu [1], a public enterprise is “any commercial, financial, industrial, agricultural or promotional undertaking – owned by public authority, either wholly or through majority shareholding – which is engaged in the sale of goods and services and whose affairs are capable of being recorded in balance sheets and profit and loss accounts.” Schmitz [2] further explains that public enterprises are businesses owned by the government with the aim of making profit. One of the main reasons for establishing public enterprises is to promote economic development [3].

The Ministry of Public Enterprises (MPE) in Namibia was established in March 2015 with the primary mandate “to position Namibia’s key public enterprises, to play their meaningful role in the country’s developmental agenda and to ensure that public enterprises

are well managed and not presenting a financial burden to the state” [4], as huge costs are incurred with the running of public enterprises in terms of management of board members, chief executive officers, managing directors and senior managers.

In the current system, public enterprises are split into three categories: commercial, non-commercial and extra budgetary funds or financial institutions public enterprises [5]. The first category is monitored by the MPE, while line ministries and the Ministry of Finance are responsible for non-commercial and financial institutions respectively, although they still follow the guidelines set by the MPE [5]. Although the purpose of splitting the public enterprises into different categories was to improve the whole process [5], currently, there is a dearth of systems in place for the MPE to monitor the performance of public enterprises. There is a lack of efficiency in the current process and it is time consuming. Accessing information and data of public enterprises has been a difficult activity, leading to poor service delivery, poor decision-making and poor organisational performance. Furthermore, manual monitoring of corporate governance enforcement has been failing, which makes it difficult for the MPE to access information related to public enterprises. In order to facilitate effective decision-making processes, it is important to possess adequate information in order to make informed decisions. There is, therefore, a need for a platform that allows all key stakeholders to connect and share information to facilitate monitoring, evaluation and decision-making in public enterprise governance in a digital platform.

### *1.1 Digital Ecosystems*

A Digital Ecosystem is defined as “interacting organisations that are digitally connected and enabled by modularity and are not managed by a hierarchical authority” [6]. A Digital Ecosystem is also defined as a “network of digital communities consisting of interconnected, interrelated and interdependent digital species, including stakeholders, institutions and digital devices situated in a digital environment, that interact as a functional unit and are linked together through actions, information and transaction flows” [7]. These definitions suggest that it is a platform that consists of key stakeholders and institutions that perform similar actions and are relevant to the ecosystem and connected. In other words, a Digital Ecosystem can facilitate a digitally connected platform to support interaction among key stakeholders and institutions relevant within public enterprises. Digital Ecosystems have been studied in different domains [8] [9]. Digital Ecosystems consist of several components such as species, digital environment, digital content, interoperability, trust, and technology [8]. Species can be categorised as either biological, economic or digital species [9]. Biological species refer to people in the ecosystem, economic species refer to institutions in the ecosystem and digital species refer to technologies used in the ecosystem [9]. In the business world, Digital Ecosystems provide small to medium enterprises an integrated system that helps them monitor their performance [10].

Digital Ecosystems have been described in the healthcare context [11] [12]. A Digital Health Ecosystem allows the interaction of stakeholders, such as patients, doctors and healthcare providers in a digital platform [13]. Innovation is a principle has been discussed in the context of Digital Health Ecosystems to support healthcare systems [14] [15].

One of the main benefits of a Digital Ecosystem is information sharing in a digital platform [16]. Rather than operating in silos, the use of Digital Ecosystems can thus be used as a platform to share information between the different stakeholders and institutions. This could also facilitate information sharing in digital platforms. Digital Ecosystems facilitate collaboration among entities as well as improve service delivery [17].

Studies from the current literature describe the benefits of technological ecosystems for public governance [18] [19]. Some of the benefits include improved information sharing and collaboration.

While Digital Ecosystems have been applied in different domains such as health [14] [15], business [10] and public affairs [20], there is a dearth of studies on Digital Ecosystems for public enterprises. This study contributes to the existing body of knowledge on Digital Ecosystems. The findings of this paper will provide useful information about the potential benefits and challenges of implementing such an ecosystem to support public enterprises.

This paper is structured as follows: The paper objectives are outlined in section 2. The methodology is described in section 3. The results are presented and discussed in Section 4 and Section 5 respectively. Conclusions and future work are described in Section 6.

## 2. Objectives

The main aim of this paper was to investigate the prospects and challenges of a Digital Ecosystem to support public enterprises in Namibia. Specifically, the objectives of this paper were:

1. To investigate existing IT infrastructure within the Ministry of Public Enterprises in Namibia
2. To investigate the potential benefits of establishing a Digital Ecosystem to support public enterprises in Namibia.
3. To investigate the potential challenges of establishing a Digital Ecosystem to support public enterprises in Namibia.

## 3. Methodology

This study adopted the qualitative method. Semi-structured interviews were conducted with 20 participants from MPE comprising of 3 Directors, 2 Software Developers, 5 ICT Managers, 5 Consultants and 5 Network Analysts. The participants were purposefully selected and individual interviews were conducted; each interview lasted approximately 20 minutes. Interviews were recorded and later transcribed with the permission of the participants. Before the interviews were conducted, participants were briefed on the concept of Digital Ecosystems.

Data was analysed using thematic analysis and the findings were grouped into themes. Following the guidelines provided by Braun and Clarke's [21] framework for doing a thematic analysis, the data was read several times and initial codes were generated. Based on the initial codes, themes were generated.

## 4. Results

The results are summarised and presented in line with the objectives of this paper.

***Objective 1: To investigate existing IT infrastructure within the Ministry of Public Enterprises in Namibia***

### ***Technology and the need for more resources***

The majority of the participants indicated that an existing IT infrastructure was in place. It was also indicated that various technologies exist and these include computers, laptops, printers, Wi-Fi, telephones and computer servers. However, more resources and facilities need to be put in place to support the establishment of a Digital Ecosystem for public enterprises in Namibia. Some of the participants highlighted components such as high-speed Internet, high-end computer systems, tablets and security elements. One Network Analyst explained:

*We still need more resources to facilitate the implementation of a Digital Ecosystem to support public enterprises. Upgrading current services like introducing stable Internet connection, high-speed Internet, buying high-end computer systems and tablets as well as improving security of these systems will be useful.*

Another Network Analyst explained:

*We have IT systems available; I think it is necessary to start a Digital Ecosystem to support public enterprises, however, we need other systems in place like fast computers and fast Internet.*

**Objective 2: To investigate the potential benefits of establishing a Digital Ecosystem to support public enterprises in Namibia**

**Access to information**

The majority of the participants explained that the establishment and implementation of a Digital Ecosystem at the MPE would improve access to information. One Consultant added:

*The implementation of an ecosystem will improve access to information as the different actors will be connected and ready to share information on the platform.*

One Director stated:

*Information about public enterprises will be easily accessed by the ministry, this means we can easily access the relevant information that we need to make decisions.*

**Communication**

Some participants believed that the proposed Digital Ecosystem would improve communication between the MPE and public enterprises. The majority of the participants also believed that the implementation of a Digital Ecosystem to support public enterprises will lead to timely reporting, timely intervention, and constant monitoring of public enterprises and it will speed up the sharing of information as well as facilitate easier retrieval of information. One Director advised:

*With a connected Digital Ecosystem, it becomes easy to directly interact with public enterprises.*

Some participants explained that there is currently no system for directly sharing information between the MPE and public enterprises, as such, a Digital Ecosystem will facilitate the link between the MPE and public enterprises.

**Decision making**

The majority of the participants believed that the implementation of a Digital Ecosystem would improve decision-making processes within the MPE. One ICT Manager explained:

*The Digital Ecosystem platform will facilitate many things. For example, data can be easily shared which can be used by top managers to make decisions in a timely manner.*

**Improved service delivery, accountability, monitoring and evaluation**

The majority of the participants believed that the implementation of a Digital Ecosystem would improve service delivery and accountability. One Software Developer explained:

*When data is available and all members of the ecosystem including members from MPE and the public enterprises are connected, it will not only improve the way services are provided, decision are made but it ensure that activities that led to certain decisions are transparent leading to accountability.*

One Network Analyst explained:

*It will be easy to monitor public enterprises and evaluate their performances and also detect risks such as overspending*

**Teamwork**

Some participants believed that establishing a Digital Ecosystem would promote teamwork, as the establishment of a Digital Ecosystem platform will connect relevant stakeholders.

**Objective 3: To investigate the potential challenges of establishing a Digital Ecosystem to support public enterprises in Namibia**

**Lack of skills**

A majority of the participants indicated that factors such as lack of skills in the area of Digital Ecosystems could be a challenge as there are few professionals with such skills in Namibia and as a result providing training to IT personnel within the MPE would be needed. One ICT Manager stated:

*Without an experienced team, it could be a challenge [to implement Digital Ecosystems within MPE].*

One Software Developer stated:

*We will need skilled personnel in the area of Digital Ecosystems to support the implementation.*

One Network Analyst stated:

*Shortage of resources such as human capacity in the area of Digital Ecosystems will hinder the implementation of Digital Ecosystem at the Ministry of Public Enterprises.*

**Organisational resistance to change**

Organisational resistance to change was highlighted as a potential challenge to the implementation of Digital Ecosystems for public enterprises as employees might be resistant to new innovations such as Digital Ecosystems. One Software Developer stated:

*Digital Ecosystems will improve the performance of Public Enterprises as the Ministry of Public Enterprises will have access to their data whenever they need them, but resistance of staff in using technology platforms will make it difficult.*

**Lack of awareness of the importance of Digital Ecosystems**

Lack of awareness of the importance of Digital Ecosystems might be a challenge in adopting Digital Ecosystems as one Consultant stated:

*Many people may not really understand the concept of Digital Ecosystems and the benefit it brings to organisations. As a result, it might hamper its initial adoption. Really, it is better to do training and conduct awareness programs of Digital Ecosystems.*

**Lack of funds**

Lack of funds was highlighted as a potential challenge to implementing Digital Ecosystems to support public enterprises in Namibia. Some of the participants explained that funding is needed to acquire the resources, train employees and create awareness needed for Digital Ecosystems.

**5. Discussion**

The main purpose of this paper was to investigate the prospects and challenges of a Digital Ecosystem to support public enterprises in Namibia. This paper contributes to the current literature on Digital Ecosystems. This paper explored the IT infrastructure at the MPE, the benefits and challenges of implementing a Digital Ecosystem to support public enterprises in Namibia. To the best of the researchers' knowledge, this is the first time the concept of a Digital Ecosystem to support public enterprises is being investigated.

The findings suggest that basic IT infrastructure is available at the MPE to support Digital Ecosystems for public enterprises in Namibia. However, provision should be made to support transactions within the Digital Ecosystem. As such, before the implementation of a Digital Ecosystem, it is important for implementers to ensure that current services support high-speed Internet connection, mobile devices and security features. This is in line

with the findings from the literature, which suggests that a Digital Ecosystem consists of core components such as trust, digital environment and technology [8].

Various benefits were highlighted as relevant to the implementation of a Digital Ecosystem to support public enterprises in Namibia. These benefits include improved access to information. This is in line with the findings from the literature [8], which suggest that information sharing is facilitated through a Digital Ecosystem.

Improved communication was also highlighted as one of the key benefits of a Digital Ecosystem to support public enterprises. Timely decisions would be made and as a result, lead to improved service delivery. As such, a Digital Ecosystem can improve work processes in public enterprises because information can be shared on a digital platform where key stakeholders are connected.

The findings also suggest that connecting key stakeholders in public enterprises could improve decision-making and also lead to teamwork.

Lack of skilled personnel with skills in the development of Digital Ecosystems within the Namibian context was highlighted as a major challenge. This is in line with the findings of Iyawa, Herselman and Botha [15], which suggest that there is a dearth of skilled personnel in the area of Digital Ecosystems within the Namibian context. As a result of this challenge, it is important to run training workshops on Digital Ecosystems and create awareness of the benefits of Digital Ecosystems in the Namibian context through social media platforms and government websites. Specialised training of staff members would be relevant. This could also lead to job creation within the Namibian context. Another recommendation would be to incorporate the concept of Digital Ecosystems into the curriculum of higher institutions in Namibia. A Digital Ecosystem could also serve as a support system for the MPE. All stakeholders will be able to connect on one platform.

The findings indicate that organisational resistance to change as a potential challenge to implementing a Digital Ecosystem to support public enterprises. This can be improved through creating awareness of the benefits of Digital Ecosystem.

The limitation of this study is based on the data collection methods. Data was gathered from one organisation in one city. As such, may be difficult to generalise the findings. However, for future work, we recommend gathering data from different public enterprises in Namibia.

## **6. Conclusions**

This paper investigated the prospects and challenges of a Digital Ecosystem to support public enterprises in Namibia. To the best of the researchers' knowledge, this is the first time such a study is being conducted.

Although participants highlighted potential challenges in implementing such an ecosystem, they also discussed potential benefits such an ecosystem could bring to the MPE and public enterprises in Namibia, when implemented. Information sharing and access to information are some of the benefits. Potential challenges such as lack of skills, organisational resistance to change and lack of awareness of the benefits of the Digital Ecosystems could be mitigated by workshops, training, incorporating Digital Ecosystems training in higher institutions' curriculums and creating awareness of the benefits of Digital Ecosystems through social media and government websites.

This paper highlighted what needs to be put in place if Digital Ecosystems is to be established to support public enterprises. This paper also proposed ways in which the identified challenges can be mitigated.

A Digital Ecosystem could improve service delivery and performance of public enterprises. Future work should investigate the activities to be carried out in a Digital Ecosystem to support public enterprises and work towards developing an implementation framework.

The findings of this paper establish the building block towards establishing a Digital Ecosystem for public enterprises in Namibia. The findings will inform key stakeholders in public enterprises on the prospects of implementing a Digital Ecosystem.

## References

- [1] Prahlad K. Basu (2005), "Reinventing Public Enterprises and Their Management as the Engine of Development and in Growth Public Enterprises: Unresolved Challenges and New Opportunities, United Nations, p. 10
- [2] Schmitz, J. A. (1996). The Role Played by Public Enterprises: How Much Does It Differ Across Countries?. Federal Reserve Bank of Minneapolis Quarterly Review, 20, 2-15.
- [3] United Nations. (2008). Public Enterprises: Unresolved challenges and new opportunities. New York, USA.
- [4] The Namibian. (2019). MPE plans to restructure, recapitalise public enterprises. Available at: <https://www.namibian.com.na/188027/archive-read/MPE-plans-to-restructure-recapitalise-public-enterprises>
- [5] Weylandt, M. (2017). Public Enterprise Governance in Namibia: An Updated Situation Analysis. Briefing Paper. Institute for Public Policy Research
- [6] Jacobides, M. (2019). Designing Digital Ecosystems. In Jacobides, M. et.al. Platforms and Ecosystems: Enabling the Digital Economy, Briefing Paper, World Economic Forum
- [7] Iyawa, G. E., Herselman, M., & Botha, A. (2016). Digital health innovation ecosystems: From systematic literature review to conceptual framework. *Procedia Computer Science*, 100, 244-252.
- [8] Iyawa, G. E. Botha, A. & Herselman, M. (2016). Identifying and defining elements related to a digital health innovation ecosystem. In: Herselman, M & Botha, A. (Eds.). *Strategies, Approaches and Experiences: Towards building a South African Digital Health Innovation Ecosystem*, Pretoria, South Africa.
- [9] Chang, E. & West, M. (2016). Digital Ecosystems: A Generation of the Collaborative Environment. *In Proceedings of the Eighth International Conference on Information Integration and Web-based Applications*, IIWAS, p.3, Yogyakarta, Java, Indonesia
- [10] F Nachira, A Nicolai, P Dini, M Le Louarn, L R Leon. Digital Business Ecosystems, 2007 European Commission, Publication Office
- [11] Qureshi, B. (2014). Towards a digital ecosystem for predictive healthcare analytics. In *Proceedings of the 6th International Conference on Management of Emergent Digital EcoSystems* (pp. 34-41).
- [12] Serbanati, L. D., Ricci, F. L., Mercurio, G., & Vasilateanu, A. (2011). Steps towards a digital health ecosystem. *Journal of biomedical informatics*, 44(4), 621-636.
- [13] Iyawa, G. E., Herselman, M., & Botha, A. (2017, May). A scoping review of digital health innovation ecosystems in developed and developing countries. In *2017 IST-Africa Week Conference (IST-Africa)* (pp. 1-10), IIMC, IEEE Xplore.
- [14] Iyawa, G. E., Herselman, M., & Botha, A. (2019, September). Building a Digital Health Innovation Ecosystem Framework through Design Science Research. In *2019 Conference on Next Generation Computing Applications (NextComp)* (pp. 1-6). IEEE.
- [15] Iyawa, G. E., Herselman, M., & Botha, A. (2017). Identifying essential components of a digital health innovation ecosystem for the Namibian context: Findings from a Delphi study. *The Electronic Journal of Information Systems in Developing Countries*, 82(1), 1-40.
- [16] Iyawa, G. E., Herselman, M., & Botha, A. (2017). Potential stakeholders and perceived benefits of a Digital Health Innovation Ecosystem for the Namibian context. *Procedia computer science*, 121, 431-438.
- [17] Iyawa, G. E., Herselman, M., & Botha, A. (2019). Digital Health Innovation Ecosystems: Identifying Key Participants, Benefits, Challenges, and Guidelines for the Namibian Context. *International Journal of Reliable and Quality E-Healthcare (IJRQEH)*, 8(2), 1-14.
- [18] Paulin, A. A. (2020). Informating public governance: Towards a basis for a digital ecosystem. In *Open Government: Concepts, Methodologies, Tools, and Applications* (pp. 1534-1555). IGI Global.
- [19] Balnaves, M., & Allen, M. (2009). E-governance As Digital Ecosystem: A New Way to Think About Citizen Engagement and the Internet?. In *Proceedings of 5th International Conference on e-Government* (pp. 9-14). Academic Publishing Limited.
- [20] Matei, A. I., Matei, L., & Savulescu, C. (2013). Digital Ecosystems for Public Affairs. *Global Journal on Technology*, 4, 729-733.
- [21] Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101