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Critical path-dependencies affecting digital government innovation in low-income countries: a case study from Woredas in Ethiopia

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Critical path-dependencies affecting digital government innovation in low-income countries: a case study from Woredas in Ethiopia

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Abstract: The paper aims to identify the path dependencies around existing government digital platforms. The study adopted a qualitative case study strategy using three Woredas (government administrative districts) in Ethiopia around their digital innovation of the WoredaNet (government digital platform). The path dependencies that significantly stifle digital innovation are mainly psychosocial and micro-political, *technophobia*, *fear-based learning barriers* and *power conflicts* which have developed into daily working processes. Another key finding is that a governance model where power is centralised does limit local digital innovation. The research provides insights for policymakers and officials to overcome critical path dependencies that limit digital innovation in government. This paper contributes to the ongoing discourse on how to implement government digital platforms in low-income countries through non-technical solutions but by scrutinising and examining social and political factors as well.

Keywords: government digital platforms; WoredaNet; digital innovation; path dependency; Ethiopia.

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1 Introduction

Many low-income countries have increased their public management efforts by enhancing their national ICT infrastructure, particularly with respect to mobile technology infrastructure (Katz and Callorda, 2018). The enhancement of the infrastructure, mainly mobile technology, has a substantial impact on the economic development of low-income countries, specifically in Africa (Aron and Muellbauer, 2019; Ejemeyovwi et al., 2019; Vokshi et al., 2019; Almaiah and Nasereddin, 2020). The premise for such digital infrastructural investments is that public management efforts will be innovative and become more efficient according to the local and regional contexts (Armeiy and Hosman, 2016; Ramli, 2017; Soni et al., 2017; Sinha, 2018).

Despite the improvements in the digital infrastructure, the e-government development index has remained low in low-income countries, particularly of Africa (Stier, 2015; Das et al., 2017; Kurfal et al., 2017; Zhenmin, 2018; Mensah et al., 2020). The continued low rankings suggest that digital infrastructure alone does not necessarily guarantee digital innovation (Roengtam et al., 2017; Toots, 2019). Other reasons for the low rankings have been attributed to digital illiteracy, the digital divide, difficulty to use the platform, unclear e-government strategy and policy guidelines and a lack of skilled personnel (Waller and Genius, 2015; Danneels et al., 2017; Roengtam et al., 2017; Toots, 2019; Naranjo-zolotov et al., 2019).

Nonetheless, government digital platforms play a considerable role in voting, government-citizen collaboration, decision making and participatory policymaking (Nugroho et al., 2015; Waller and Genius, 2015; Al Nomani et al., 2016; Chauhan et al., 2018; Vijayalakshmi and Karpagam, 2018; Naranjo-zolotov et al., 2019).

In this study, the attention is turned to identify the path dependencies of government organisations in low-income countries that have access to government digital platforms but have not attempted any digital innovation. In particular, the study focuses on some Woredas of Ethiopia. Woreda is Amharic name for government administrative region, the equivalent of a government district with a population of around 100,000.

Ethiopia initiated the WoredaNet infrastructure in 2007, which saw an enormous rollout of fibre and satellite networks across the entire country. The name WoredaNet originates from 'Woreda'. Ethiopia has a population of 112,078,730 making it the second-largest country in Africa in terms of population (Mettler, 2019). It is the tenth-largest in Africa in terms of coverage area with 1,104,300 km². The central and northern parts of the country are mountainous and therefore fed with satellite installations for the WoredaNet. Among the 1,050 Woredas in Ethiopia, 976 (93%) have got access to

the WoredaNet. Yet despite the considerable investments, many of the Woredas have not attempted any digital innovation on the WoredaNet (Miruts and Asfaw, 2014).

The main objective of this study was, therefore, to identify the path dependencies of Woredas in Ethiopia that are unable to digitally innovate based on the WoredaNet digital platform. The choice of path dependency theory was due to its ability to explain how existing organisational choices are results of historical institutional processes that shape the meaning, purpose, and direction of current and future actions (Teece et al., 1997; Tang and Ho, 2019). The path dependence perspective explores the presence of negative influences that impede digital government innovations of Woredas that have access to the WoredaNet digital platform. There is little to no research on the path dependencies affecting digital government innovation particularly in Africa (Tang and Ho, 2019).

The remainder of the paper is presented as follows: Section 2 presents the literature review of digital platforms, digital government and path dependencies. This is followed by a description of the WoredaNet digital platform in Section 3. Next, materials and method in Section 4 is presented followed by data analysis and results in Section 5. Then, the discussion of findings is presented in Section 6 and concluded by Section 7.

2 Literature review

2.1 Digital platforms

The definition of digital platforms is multifaced depending on the context (Constantinides et al., 2018; Pereira et al., 2018; Ejemeyovwi et al., 2019). In this study, digital platforms are described as digital systems that assist online citizen engagement as a major aspect of a co-creation process (Constantinides et al., 2018; Miranda et al., 2018; Lember et al., 2019; Eze et al., 2020). They are socio-technical systems that are used to take action to achieve changing societal interests by bringing together data, services, technologies and people (Berto et al., 2016; Gawer, 2020).

Digital platforms vary fundamentally in their market capitalisation, the sector they are associated with, and their governance models (Koskinen et al., 2018). The governance model sets the context of the choices about the structure and form of the platform. The sector in which the platform is associated also impacts how the platform is formed and how it runs. The financial structure and whether the platform should target profit-making or welfare maximisation are dependent on the shareholders.

Digital platforms are appealing as they diminish transaction costs, including distribution, search, contracting and supervising costs (Waller and Genius, 2015; Ariana et al., 2020; Eze et al., 2020). For instance, aggregation platforms such as TripAdvisor and Expedia gather travel data from a few sources into one platform, thereby reducing the cost of looking for data. Digital platforms likewise offer the technical development environment in which the environment gives the limits on what is feasible (Parker et al., 2016; Salge, 2017; De Reuver et al., 2018).

Other aspects of digital platforms are their generativity (Sedera et al., 2016; De Reuver et al., 2018) and cross-side network effects (Janowski, 2015; Kenney et al., 2019). Generativity is the ability of a platform to make new results spurred by enormous and heterogeneous clients (Fielt and Gregor, 2016; Hein et al., 2019). For instance, the generativity of crowd sourcing assists in making better approaches to solve challenging issues based on the contributions of countless participants. In government, this could be

demonstrated as the use of digital technologies to better leverage the collection of knowledge and experiences of its people by tapping their ability to recognise issues and organise actions (Mergel, 2018). A good example is the use of digital technologies for public drafting of bills and constitutions. Cross-side network effects exhibit how the value for a participant on one side increases if the number of participants on the other side increases. For instance, on account of eBay or Amazon, the value of the digital platform for a seller rises when there are more buyers on the opposite side and the other way round. In terms of government, cross-side effects could be explained in the use of a regular platform by a large number of government agencies to provide/consume digital data, as a result of which the platform is likely to become a standard for all data exchanges. An appropriate example for this incidence is the case of X-Road in Estonia that is used as the country's e-service database both in public and private sectors (Van Gansen et al., 2018).

2.2 *Digital government*

Digital government is a government approach to solving public, societal, economic, and other pressures through the use of digital technologies (Janowski, 2015; Pedersen, 2017; Gil-Garcia et al., 2018; Janssen et al., 2018). Digital government services are a fundamental component of more extensive social innovation ecosystems where governments are the key actors for creating these ecosystems, acting through strategies and policies that facilitate innovation for economic, social and cultural development (Sorn-in et al., 2014; Nugroho et al., 2015; Mirchandani et al., 2018; Almukhlifi et al., 2019; Choi and Chandler, 2020). Digital government can be utilised by a legislative, executive, and interpretive body of a government to enhance the viability and productivity of public service delivery (Janowski, 2015; Mainka et al., 2015; Janssen and Van der Voort, 2016; Setya Nusa and Jamaludin, 2019; Gong et al., 2020; Pérez-Morote et al., 2020).

Digital government is expected to improve public sector performance by reducing expenditure, improving revenue and minimising transaction costs (Siddiquee, 2008; Irani and Kamal, 2016; Mawela et al., 2017; Wirtz and Kurtz, 2018; Mensah et al., 2020; Lukman et al., 2021). It is viewed as a means to improve the performance of government, and as an essential component of economic and social development. Social and economic development is increasingly applicable for low-income countries where public administration is frequently characterised by wastefulness, restricted limit and inadequately prepared personnel (Schuppan, 2009; Janowski, 2015; Abu-shanab and Shehabat, 2018; Twizeyimana and Andersson, 2019).

It is essential to consider the institutional, cultural, and administrative settings of low-income countries to actualise digital government successfully (Twizeyimana and Andersson, 2019; Alshaher, 2020; Gil-Garcia and Flores-Zúñiga, 2020) as a mere transfer of digital government technology is not effective. A research conducted in Zambia, one of low-income countries in Africa indicated that non-technical factors such as culture significantly contribute to the failure of digital government implementation (Yavwa and Twinomurinzi, 2018, 2019). The solutions maybe implemented in existing organisational structures and even misused by bureaucratic elites for their advantages resulting in corruption, centralism, and wastefulness in government services (Joseph, 2015; Khan et al., 2021). In other words, a context-appropriate strategy that allows for local innovation is a more encouraging approach to implement digital government successfully

in low-income countries (Schuppan, 2009; Abu-shanab and Shehabat, 2018; Visvizi et al., 2018; Twizeyimana and Andersson, 2019). This study draws on the path dependency literature to understand contextual innovation within low-income governments. Innovation is constrained by path dependencies as there is active resistance against to reconfiguring existing resources within the organisation. In other words, innovation in an organisation is significantly influenced by the previous capabilities that the organisation has built-up over time (Calik et al., 2013; Piening, 2013).

2.3 Path dependency

The concept of path dependency has a significant impact on organisational innovation (Teece et al., 1997; Wang and Ahmed, 2007). Path dependencies represent capabilities that have been built-up within an organisation in the past and have become a way of working (Teece, 2007; De Bruijn and Janssen, 2017; Tang and Ho, 2019). The influence of these path dependencies on digital government services has been shown to influence digital innovation to the extent of the failure of digital government initiatives (Teece, 2007; Tang and Ho, 2019). Piening (2013) identified three factors that influence how path dependencies shape dynamic capabilities: through development routines, learning barriers and micro-politics. Development routines are developed through learning by doing and through the repetitive implementation of similar tasks. These routines can only be built by an organisation's operational or technical areas where experience is built-up from the past (Amui et al., 2017; De Bruijn and Janssen, 2017; Tang and Ho, 2019).

Organisations primarily learn in the locality of their existing routines (Teece et al., 1997) and once the routines are built-up, they tend to endure and become cumulative, resulting in either learning accelerators or barriers.

Micro-politics are situations where political entities of individuals and groups clash over differing interests. In the context of government, path dependencies are probably the reason that certain processes endure longer than necessary (Modell et al., 2007).

This paper, therefore, sought to answer the following research question:

RQ What are the path dependencies of Woredas that have not attempted any digital innovation on the WoredaNet?

3 The WoredaNet digital platform in Ethiopia

The WoredaNet is an ICT infrastructure that is Woreda-oriented. It incorporates broadband terrestrial and satellite-based networks with the main objective to provide digital connectivity to the lowest levels of government administration, the Woredas (Hare, 2007; Lessa et al., 2011, 2015). The purpose of the WoredaNet is to provide a digital platform through which digital services like video conferencing, mail services, directory services, and internet connectivity to federal, regional, and Woreda level government agencies can be provided (Lessa et al., 2011; Madebo, 2019).

The WoredaNet is supervised and controlled by the former Ethiopian ICT Development Agency (EICTDA), presently called the Ministry of Science, Technology, and Information Communication Commission (STICC). Its responsibility is to formulate rules and guidelines on how Woredas utilise the WoredaNet platform. The WoredaNet has a three-tier architecture; the national data centre (NDC), the regional data centre, and

the Woreda data centre (Belachew, 2010). The NDC is viewed as the core of the WoredaNet that centrally offers government services across all the regional and Woreda data centres. It is accountable for overseeing, inspecting, supporting, and organising activities of the regional and Woreda data centres. It additionally gives maintenance and training support.

There are 11 regional data centres placed in the regional capital cities of Ethiopia. These centres have two responsibilities (Miruts and Asfaw, 2014): they offer digital services to regional government departments and assist the Woreda centres in their respective regions. The Woreda data centres give services to the lowest level of government agencies in their Woreda.

4 Materials and method

The study adopted a qualitative-interpretive research paradigm as it enabled the researchers to examine the path dependencies of the selected Woredas in their natural setting (Dubé and Paré, 2003; Yin, 2005; Owoseni and Twinomurizi, 2018). Interpretivism offered a degree of flexibility to undertake exhaustive investigation into local and contextual patterns (Thanh and Le Than, 2015). The justification for using a qualitative-interpretive approach came from both the main research objective and research question.

4.1 Role of the researcher

In qualitative analysis, it is important to recognise researcher bias as it assists readers to be aware of the perspectives that led to a research outcome (Owoseni and Twinomurizi, 2018). The principal researcher of the study resides in Bahir Dar, Ethiopia, and has ten years' hands-on experience as a university graduate assistant, assistant lecturer, and lecturer in a computing faculty at a leading Ethiopian university.

4.2 Data collection

A case study research strategy was adopted and a structured interview protocol was used for data collection.

4.3 Case design

There are presently 1,050 Woredas in Ethiopia, 976 of which (93%) have access to the WoredaNet. Due to cost and time restrictions, only three Woredas that have access to the WoredaNet but have hardly attempted any digital innovation using the existing digital platform, the WoredaNet were purposively sampled. The Woredas were Bahir Dar town, Bahir Dar Zuria district and Farta district. These Woredas were not selected by the researcher but by the ICT management of the Amhara Regional State STICC.

4.4 Interview selection

Three managers (those who manage similar tasks or processes in the government agencies), one from each government agency, one IT support, and a district administrator

(or a representative) from each of the three Woredas, were selected. This made up a total of 15 interviewees. Table 1 presents the respondent demographics.

Table 1 Respondents' demographic data

	<i>Variable</i>	<i>Frequency</i>	<i>Percent</i>
Gender	Male	9	60
	Female	6	40
Job experience	6–10 years	4	26.7
	11–15	6	40
	16–20	5	33.3
Age	31–35	7	46.7
	36–40	5	33.3
	41 and above	3	20
Education	Bachelor	12	80
	Masters	3	20

4.5 Interview design

The interview questions were structured based on literature about identifying path dependencies (Teece, 2007; Tang and Ho, 2019). The theoretical concepts of path dependencies were operationalised into interview questions (Table 3 in Appendix).

4.6 Reliability and validity

The reliability and validity of qualitative research are communicated in terms of trustworthiness, rigor and quality (Golafshani, 2003; Owoseni and Twinomurizi, 2018). The quality of qualitative research depends on its credibility, dependability, confirmability, transferability and authenticity (Connelly, 2016). Credibility indicates the confidence in the genuineness of the study and therefore the results of the study. For credibility, the researcher carried out in-depth interviews based on open-ended questions. This interview strategy facilitated an understanding of the lived experiences of respondents. The interview protocol was administered consistently for all interviews in similar circumstances. Dependability refers to the stability of the data throughout the study. The researcher conducted the data collection process in similar situations for all interviews. The interviews were audio-recorded and supported by field notes during the interview process. Confirmability refers to the extent to which the findings are consistent and could be repeated. For this study, the recorded interviews were transcribed into text and presented back to the respondents to confirm what was transcribed was what they actually said. Atlas.ti8 was used to keep detailed notes during the analysis process. Transferability is the extent to which findings are valuable to other settings. The research was done in three Woredas with similar socio-economic and political situations. Authenticity refers to the degree to which researchers reasonably and entirely show a range of different realities and appropriate participants of the study. The three sample Woredas were selected by the ICT management of appropriate government organisation

in the Amhara regional state. The respondents represented a cross-section of civil servants at different levels of management, users and ICT personnel.

5 Data analysis and results

The interview data were transcribed and analysed using thematic analysis in Atlas.ti8. The thematic analysis sought to reveal how path dependencies of Woredas in Ethiopia affect the usage of WoredaNet.

5.1 Content analysis strategy

Thematic analysis is the process of creating themes in qualitative data. The process of a thematic analysis of unstructured data considers a sequence of steps (Braun and Clarke, 2012). These are: capture the interview data, transcribe the recorded interview data into text, apply process coding techniques, create low-level codes, and create categories or themes. This research followed an inductive approach where interview data was collected and analysed to understand the path dependencies of government agencies that use WoredaNet. Thematic analysis was adopted to draw out the codes and create categories (themes) from the content of the data (see Figures A1 and A2). Process coding was implemented in this research as the main intention of this study was to identify the path dependencies of government agencies in Woredas that use WoredaNet in Ethiopia. In other words, process coding aligns with the interpretive nature of this study as it allows the researcher to identify the path dependencies of Woredas that are unable to digitally innovate with the WoredaNet.

5.2 Result

This section presents the results of the analysis.

5.2.1 Path dependencies

Eleven unique codes were elicited with a total count of 82, and four themes were further elicited to represent the underlying associations with the codes (Table 2). The themes suggest that technophobia, followed by power conflict, fear of being exposed to wrongdoing (such as corruption and making forged files), the influence of existing manual working conditions, and lack of training are the significant negative influences.

The following selected quotes from the interviews illustrate some of the three main path dependencies:

“There are few individuals who resist using computers; they tell us that they may come across loss of important data and files due to a computer crash and virus.” (Male, IT support)

“Some elderly experts prefer manual paper works instead of compiling and processing data using computers.” (Male, finance manager)

“Some senior experts and team leaders show the tendency to move across the Woredas instead of conducting video conferencing sessions to pass their information.” (Male, human resource management manager)

Table 2 Path dependency findings (from interviews)

<i>Path dependency themes</i>	<i>Path dependency codes</i>	<i>Frequency</i>
Technophobia (29)	Phobia of using computers	8
	Fear of data loss	11
	Excessive fear of computer viruses	10
Power conflicts (20)	Prefer old traditions and not digital means	9
	Fear of losing power as an expert	11
Fear of being exposed to wrongdoings (19)	Fear of being protected from making forged files	6
	Fear of being exposed to corruption	9
	Difficulty to produce false reports	4
Influence of the manual working conditions and lack of training (14)	Low working culture	3
	Lack of training	6
	Influence of the previous manual working conditions	5
Total		82

6 Discussion of findings

As indicated in Table 2, the results reveal that the negative influences to using the government digital platform, WoredaNet are mainly fear-based. These fear-based path dependencies are of different forms. On one hand, some employees have phobia of using computers (technophobia) because of fear of data loss. A respondent from IT support staff noted that some employees fear the use of computers because of fear of data loss that may result from computer crashes and computer viruses and therefore consider it safer to rather use the traditional manual working system. Additionally, a court manager also indicated that there are employees with limited computer experience and inadequate training who have a phobia of using computers.

On the other hand, the second form of fear-based path dependency is related to power conflict or interest conflict. Some employees resist using computers because of fear of losing their role due to replacement by the digital technology and thus choose the manual working system. A finance manager indicated that unlike young employees who are happy and eager to use the technology, some senior experts resist and are unwilling to use the integrated budget and expenditure (IBEX) system. One of the reasons he mentioned was the fear of losing their expert role and being replaced by digital technologies. This was evident especially at the beginning when the WoredaNet was implemented. This fear represents risk aversion which is counter intuitive to digital innovation. These fear-based learning barriers prevent individual innovativeness to try out any digital innovation. This is consistent with Thatcher and Perrewé (2002) who found that computer anxiety highly affects the personal innovativeness of individuals using computers. Similarly, Khan et al. (2012) found that physicians in hospitals fear being replaced by the health information systems.

The third form of fear-based path dependency is related to fear of being exposed to wrongdoings. Some unethical employees fear using computers recognising that it exposes

their misuse of computers such as making forged files, corruption and false reports due to the duplicative nature of digital documents.

Moreover, the findings reveal that the negative influence to using the government digital platform is related to the familiarity with the existing manual processes and a lack of training using the computers. A Woreda representative mentioned that the main reason that prevents older employees from using computers (avoidance of computers) is not because of fear but lack of interest in learning to use computers. The respondent mentioned that lack of interest in their learning abilities can be resolved by providing appropriate training. Additionally, a finance manager in one of the Woredas also mentioned that the previous manual paperwork influenced employees not to use the finance management application. This is mainly because of the lack of appropriate training in basic IT skills on how to use a computer. This demonstrates the historical development of routines of path dependency that are collections of experiences built-up in the past through learning by doing process (Richardson et al., 2005).

A human resource manager in one of the Woredas noted that digital skills were not considered at the time of hiring employees but were now required. This would require a change in the recruitment policies as well. It is therefore necessary to now provide employees with appropriate digital skills training.

Some employees refused to use the platform since they were not properly introduced and incentivised with the appropriate training. Additionally, a lack of motivation and encouragement was a challenge that was reflected as resistance to change and reluctance to use the digital innovation opportunities provided by the WoredaNet. This can be solved by providing employees with the required training. This is also consistent with the work of Ademola (2009) and Khan et al. (2012) that indicated appropriate digital skills training enhances the ability of individuals to perform tasks in their working area using computers.

6.1 Implications for practice and policy

The findings have practical and policy implications. In terms of practice, the research can guide practitioners to better understand key considerations in designing and implementing digital government. The study reflects that it is essential to provide government employees with appropriate roles, a safe environment and context-based on-the-job digital skills training. Safe environments coupled with on-the-job training, unlike off-the-job training, enhance employee productivity as learning takes place at their actual work place (Timsal et al., 2016).

For policymakers, the study also reflects on some challenges with centralised governance models around government digital platforms. Such governance models where power is centred in one unit limits local digital innovation (Nambisan et al., 2017; Gomez et al., 2018). The next section concludes with a reflection on the above findings.

7 Conclusions

The objective of this study was to identify, using qualitative-interpretive methods, the path dependencies of Woredas in Ethiopia that have not attempted any digital innovation using the existing government digital platform, the WoredaNet.

The path dependencies of the Woredas were mainly fear-based learning barriers and power conflicts that have developed into daily working processes. The path dependencies represent a vicious cycle that could be very difficult to break.

Some of the causes are inferred as the strict ICT regulations in Ethiopia, the high risk-aversion in government employees and failure to similarly transition government staff into a digital ethos when implementing digital infrastructure.

The sole regulator of the entire ICT sector in Ethiopia is the government agency. This means that user interests may be overlooked in favour of technical efficiency and national security. The WoredaNet digital platform adopts a top-down approach where its main purpose is to address government intentions often with minimal user participation. Government digital platform implementations are socio-technical processes that need to consider technology, people and other settings.

Risk aversion is antithetical to innovation as innovation requires an environment that encourages curiosity. It is recommended that safe environments are created which allow for government staff to test digital innovations with *cyber* assurances that even if there was a loss or corruption of data, there are *cyber* means to recover it and safe guard it.

The older government staffs were also afraid of losing their power to a younger generation. It is therefore recommended that actions are put in place in which the older generation are given adequate roles within digital government. Further, at the time of introducing the new digital platforms, labour regulations need to be adjusted as digital was not in the conditions of employment at the time of hiring. These regulatory matters can present important labour challenges.

This paper contributes to the continuous debate on how non-technical factors influence digital government implementations in low-income countries by examining the context of implementation.

The paper also contributes to digital government literature by presenting empirical evidence on how specific path dependencies (negative influences to digital government implementation) of government agencies affect the digital government innovations in low-income governments.

7.1 Limitations and future research

One limitation of the study was that it focused on the path dependencies of Woredas that have not attempted any digital innovation. Future research should consider and compare the path dependencies of Woredas from other regional states in Ethiopia that have attempted digital innovations.

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Appendix

Table 3 Interview schedule

<i>Research question</i>	<i>Interview questions</i>		
	<i>Manager</i>	<i>ICT support</i>	<i>Woreda Administrator (or a representative)</i>
RQ What are the path dependencies of Woredas that have not attempted any digital innovation on the WoredaNet?	1 From your experience, how do past experiences and accumulated resources influence the use of WoredaNet on the Woreda? 2 From your experience, what are the learning barriers in the established routines that influence to use of WoredaNet in the Woreda? 3 From your experience, how do the micro-politics (self-interests) influence you to use WoredaNet in your Woreda?	1 From your experience, how do past experiences and accumulated resources influence the current use of WoredaNet on the Woreda? 2 From your experience, what are the learning barriers in the established routines that influence to use of WoredaNet in the Woreda? 3 From your experience, how do the micro-politics (self-interests) influence you to use WoredaNet in your Woreda?	1 From your experience, how do past experiences and accumulated resources influence the use of WoredaNet on the Woreda? 2 From your experience, what are the learning barriers in the established routines that influence to use of WoredaNet in the Woreda? 3 From your experience, how do the micro-politics (self-interests) influence you to use WoredaNet in your Woreda?

Figure A1 Path dependency coding regime (see online version for colours)

Code Groups	Name	Grounded	Density	Groups
◇ Technophobia (3)	◇ Difficulty to produce false reports	4	0	[Fear of exposing wrong doings]
◇ Fear of exposing wrong doings (3)	◇ Excessive fear of computer viruses	10	0	[Technophobia]
◇ Influence of the manual working	◇ Fear of being exposed to corruption	9	0	[Fear of exposing wrong doings]
◇ Power conflicts (2)	◇ Fear of being protected from making forged files	6	0	[Fear of exposing wrong doings]
	◇ Fear of data loss	11	0	[Technophobia]
	◇ Fear of losing power as an expert	11	0	[Power conflicts]
	◇ Influence of the previous manual working conditions	5	0	[Influence of the manual working conditions and lack of training]
	◇ Lack of training	6	0	[Influence of the manual working conditions and lack of training]
	◇ Low working culture	3	0	[Influence of the manual working conditions and lack of training]
	◇ Phobia of using computers	8	0	[Technophobia]
	◇ Prefer old traditions and not digital means	9	0	[Power conflicts]

Figure A2 Network diagram for path dependencies (see online version for colours)

