Master Thesis
MSc Business Administration

EXPLORING DIGITAL SURINAME: THE CURRENT STATE OF DIGITALISATION AND THE CHALLENGES THAT LIE AHEAD

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1. Introduction

1.1   SITUATION

Information systems have advanced society since the mid-1960s. The complexity of Information systems has grown, and so has their impact (Hirschheim & Klein, 2012). A broad definition of an information system is "an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products." (Britannica, 2022). Information systems (digital systems) offer more advantages than manual data collection and analysis. Transitioning towards a digital system is called digitalisation.

Moving to a digital system can significantly improve speed and efficiency in any organisation. Businesses that adopt information systems have a competitive advantage over organizations that work with old-fashioned data management systems (Clemons, 1986). As a result, the world has digitalised, and so has society (Deguchi, et al., 2018). However, the digitalisation of countries goes at different speeds across the globe (Belényesi, 2015). As a result, some countries profit later or not at all from the benefits of digitalisation.

The Republic of Suriname is a country on the northern coast of the South American continent. Economically Suriname scores weak on international indexes such as the ease of doing business (Worldbank, 2022) and inflation (Worldbank, 2022). Furthermore, Suriname has a history of political and economic instability (Ramsoedh, 2018). The government has written a national 'recovery plan' to improve the stability and prosperity of Suriname. The recovery plan, consisting of 185 measures, introduces concrete actions needed to improve the situation in Suriname (Herstelplan, 2021). However, in these plans, information systems are not mentioned once, and digitalisation is not mentioned.

To the best of our knowledge, no national policy focuses entirely on digitalisation and information systems. As a result, the ICT association, an organization representing the IT businesses in Suriname, has written a plan (ICT association, 2022). This plan tries to fill the gap of missing IT policy by the government. However, this plan focuses on IT infrastructure for private individuals, not the entire economy.

Only limited information is available on Suriname's economic composition and development. For example, the most recent economic statistics published by the bureau of statistics date back to 2017. The national recovery plan of Suriname includes a call for more data. However, no documentation explains the cause of this lack of, and the challenges in increasing, data. As a result, there is little information publicly available on Suriname's current quality of digital infrastructure.

1.2   MOTIVATION

Suriname wants to stabilize and improve its economic welfare (Herstelplan, 2021). One way to achieve economic growth is by boosting society's digitalisation and using information systems (Antonio, Manuel, Mari, & Luis, 2021). However, at this moment, there is little information available about the current state of the digital development of Suriname. Moreover, there are no formal plans for digitalisation in the future, information on the current state of digital development in Suriname is limited, and challenges in improving digital infrastructure quality are undocumented.

Therefore, research is needed. To improve the current situation, it is necessary first to understand that situation. Then, based on the current situation, improvement plans could be discussed. Based on these improvement plans, challenges that have withheld the development of digitalisation can be

identified. Knowing these challenges could help legislators and businesses develop policies that support the economic goals of Suriname.

1.3 RESEARCH GOAL

This report is one of the first to research the broader state of digital development in Suriname and the first to present an overview of the challenges in future digitalisation. This research is not limited to identifying the current situation but also aims to identify the challenges holding digital development back. This results in a report that can be directly used by organisations in Suriname to create policies to improve the existing situation. At the end of this report, the reader is presented with a comprehensive overview of challenges ready to be adapted into policy in Suriname. These challenges can consequently be researched in more detail in future research, making this report the foundation for future research on the digital development of Suriname.

1.4 RESEARCH QUESTIONS

This report aims to answer the following research questions as a central question:

"What are the challenges in improving the digitalisation of society in Suriname?"

The word digitalisation holds many definitions and applications. Later in this report, we define it as the development of infrastructure for and societal adoption of connected digital technologies. The research question aims to identify the challenges that negatively impact digitalisation on a national scale in Suriname. The goal of identifying these challenges is to offer a foundation on which future research and policies can be drafted. The central research question has been divided into sub-questions to structure the report. These questions aim to build toward answering the main question and are as follows:

1. *"What is the current state of digitalisation of society in Suriname?"*

As a result of the unavailability of data on the digital development of Suriname and a lack of policy plans for the digital development of Suriname, information on the current level of digitalisation of Suriname needs to be gathered. Using the theoretical framework introduced in the next chapter, the current state of digitalisation is presented.

2. *"What are the current plans for improving the digitalisation of society in Suriname?"*

The purpose of this sub-question is to investigate the current plans that are written and published in Suriname regarding the digitalisation of society. By analysing both policies by the government and goals set by the private sector, we get an understanding of the plans that lie ahead. Based on these plans, challenges can be identified that slow down the realisation. These plans will help answer the main question: the challenges of improving digitalisation in Suriname.

1.5 REPORT STRUCTURE

This report consists of multiple segments. Chapter 2 explains the research with a theoretical framework, describing the problem in more detail and identifying frameworks that can be used to process the results. Chapter 3 introduces the methodology used for this research, including data analysis methods. Chapter 4 discusses the execution of the methodology and the results that have resulted from the methodology. Finally, Chapter 5 processes the results to formulate a conclusion that answers the three research questions. The bibliography and appendices can be found at the end of the report.

2. Theoretical Background

This chapter introduces the theoretical background of this report. To fully understand this report, we first introduce the country of Suriname in more detail. Afterwards, this chapter introduces the theoretical framework. We will do so by discussing key concepts which will then be linked to academic research. These discussed concepts offer a different perspective to describe Suriname's current degree of digitalisation. Finally, based on these concepts, a framework will be developed, which will be used later in the analysis of the results.

2.1 SURINAME

The Republic of Suriname is a country on the northern coast of the South American continent. Suriname became fully independent from the kingdom of the Netherlands on November 25th 1975 (Geschiedenis Suriname, 2022). Since the appointment of the new government, political stability has increased. In 2020 a level of stability was reached as it was in 2003, showing improvement (Political Stability in Suriname, 2022).

Suriname has 602.500 citizens (ABS, 2022) and a GDP per capita of 15.845 (PPP) (IMF, 2022) dollars annually, ranking it 90th on the world rank of GDPs and average for the south American continent (The Global Economy, 2022). The GDP per capita has declined in the past year, lowering it to levels of 8 years ago (Worldbank, 2022). In addition, Suriname has a state deficit of 1.4 billion dollars (Bureau voor de staatschuld, 2022), and the economic stability is rated as a B (Verloop Credit Ratings, 2022). Therefore, Suriname is classified as a developing country with weak economic strength.

2.1.1 Business Registration

Suriname counted 12.475 (non-agricultural) businesses in 2016, with 80.699 employees total (Sno I. A., 2017). Analysis of the employment rates in Suriname shows that 143.096 of potentially 160.614 citizens in the Paramaribo and Wanica regions are employed (ABS, 2022).

Statistical data in Suriname is scarce as the bureau of statistics offers a limited number of statistics. Suriname organises counts to gather information on the economic composition of the country. Six of these counts have occurred in the past, the most recent being in 2016. These counts make a statistical approximation of the total number of businesses in the country (Sno I. A., 2016). This measurement type causes the unavailability of the exact number of citizens.

The largest registered business sector is in "wholesale and retail trade; repair of motor vehicles and motorcycle", with 52% of the registered business being a part of this sector. The second-largest business sector is "accommodation and food service activities", comprising 12% of the registered businesses (Sno I. A., 2016). Businesses in Suriname often combine multiple products and services, making it difficult to categorize them. Over half of the population, and a large part of registered enterprises, are geographically situated in the Paramaribo region (ABS, 2022).

2.1.2 Governance

The Inter-American Development bank conducted the most recent large-scale research on the governance culture of Suriname dated to 2001. This paper concludes that bad policy and governance have significantly impacted economic and societal development (Martin, 2001).

Suriname heavily depends on patronage networks (Martin, 2001) & (Apapoe, 2020). Patronage networks offer support for financial and physical needs. Depending on the scale of support, a country can become dependent on the network. As a result, these networks can disrupt local economies and influence politicians. As a result, the availability of collective goods is low, and policymakers are urged to look at specific administrative decisions instead of focussing on general policies.

Besides the unclear political-economic situation, Suriname is challenged by drug trafficking and organised crime (Den Held, 2020). Due to the geographic positioning of Suriname and sparsely populated outer regions, Suriname is an attractive route for the shipment of illegal substances. It is reported that ill-equipped government agencies, a lack of legal opportunities and underpaid civil servants are the greatest influence in causing and maintaining this culture (Martin, 2001).

Comparing the inter-American development bank statements with statistical data shows that many statements still applied in 2020. Suriname's challenges have become a part of day-to-day life. Apapoe (2020) states that changing this system is challenging.

2.1.3   IT Infrastructure

In 2020, 62 percent of Surinam citizens were registered using the internet, accumulating to 360.000 citizens. The access to the internet is increasing steadily, as around 250.000 to 340.000 citizens had access to the internet in 2018 (Waterkant, 2018). Over half of the web traffic is generated via mobile phones, with traffic declining on conventional computers (Digital Suriname, 2022). Most digital interaction by Surinam nationals is conducted via their mobile phone. Social media platforms are an essential source of official information, with Facebook being the most used, with around 330.000 users registered users in Suriname. The internet connection in Suriname is one of the slowest in the Caribbean, with a mean internet download speed of 18.40mbs (Speedtest, 2022). And significantly behind international standards. As a reference, in the Netherlands, this speed is 102mbps (Speedtest, 2022). Suriname is ranked 81st internationally for mobile network speeds and 158th for fixed broadband speeds in 2021 (Lancaster, 2021), the large difference in network speed shows the country's focus on developing its mobile networks.

Suriname has a state-owned telecom provider, the sole provider of fixed-line and fixed broadband services (Lancaster, 2021). The network connection is "reasonably reliable" in the coastal area, yet the mainland has unstable connections. IT businesses have created a vision and strategy document for developing the ICT services of Suriname until 2030. The document states goals regarding internet access and speeds. These goals are broken up into performance indicators with individual deadlines. Together, these points form a timeline for ICT development in Suriname (ICT association, 2022).

A part of this strategy document is transitioning government services to partially digital versions of their services. The government is enforcing their policy, as the ministry of social affairs and public housing released its first online system in October 2021 (De Boodschap, 2021). However, there is no information on the digital connections and systems used by businesses in Suriname, with the ministry of economic affairs and the media reporting no data on this matter. Therefore, making plans for adopting these systems or the steps that need to be taken to speed up the implementation is complex.

The existing strategy and vision documents regarding digitalisation in Suriname do not specifically discuss IT systems implementation for businesses. Instead, goals are set for civilians. Furthermore, the ICT vision 2030 only sets goals. It does not mention the current situation. It does discuss the challenges that might be involved with implementation; however, these are limited to eight risks. No information is available on the choices that have been made to select these eight risks and whether these cover "all" risks.

We can therefore conclude that there is little information available regarding IT infrastructure. There are plans for the development, however, these focus on citizens. Furthermore, there is no complete overview of the risks involved with IT infrastructure development.
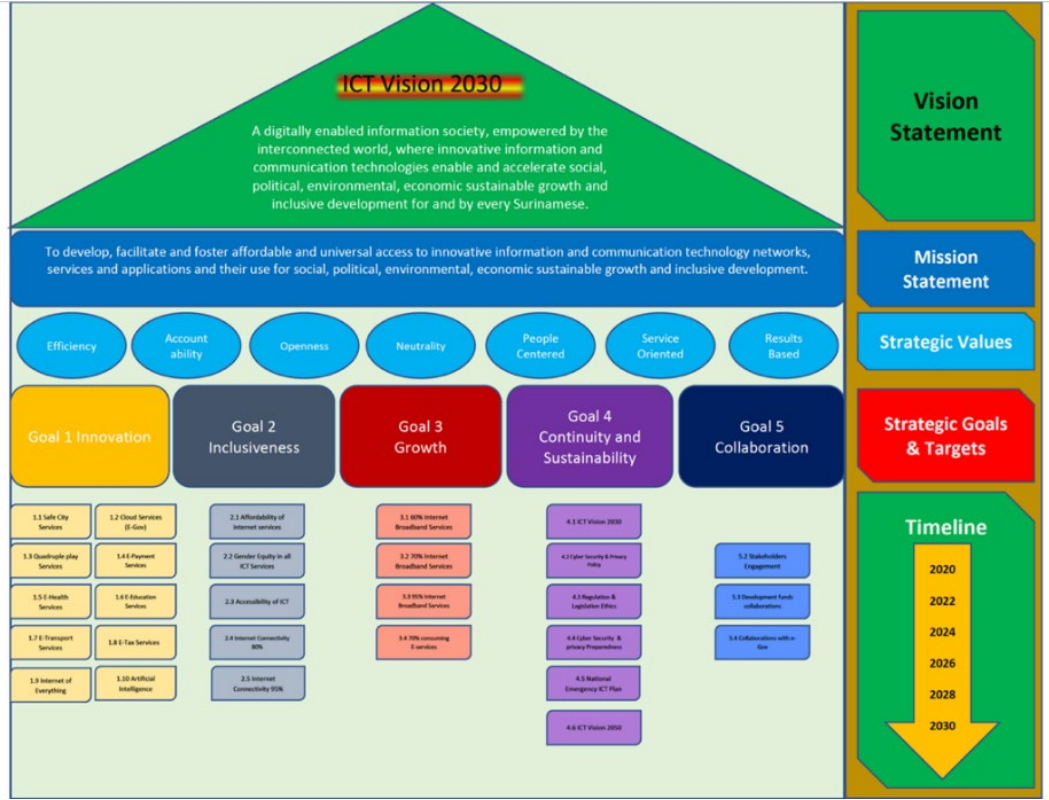
Figure 1 – ICT Vision 2030 (ICT association, 2022)

2.2   LITERATURE REVIEW

This report focuses on the digital development of a country in general. Researching on a national scale requires a broad, exploratory scope. In this research, multiple research concepts have been combined for completeness. In this segment, we will choose a definition of digitalisation, followed by five concepts which will be combined into the theoretical framework in segment 2.3. The literature review gradually moves from introducing digitalisation as a definition and international literature trends to more specific subjects such as IT governance and infrastructure maturity.

2.2.1   Digitalisation, Digitisation and Digital Transformation

Different terminologies are used in academic literature when discussing digitalisation, such as digitisation and digital transformation. However, no unified definition is available that identifies the difference and similarities of these terms (Gong & Ribiere, 2021). In this segment, we will discuss these terms in detail to identify which definition fits the scope of this research best.

We start with a similarity in all terms. All the earlier terms contain a variation of the word 'digital'. The Cambridge dictionary defines 'digital' as: "recording or storing information as a series of the numbers 1 and 0, to show that a signal is present or absent" and refers to the underlying digital technology (Cambridge Dictionary, 2022). Debate on the definition starts when 'digital' is discussed in an organisational context. McKinsey (Dörner & Edelman, 2015) argues that 'digital' should not be seen as a thing yet more as a way of working within a business.

Digitisation refers to the "mass adoption of connected digital technologies" (Sabbagh, et al., 2012). This definition is supported by Haefner and Sternberg (2020). Using this definition, digitization refers to the degree of adoption of digital technologies, which makes it measurable. Sabbagh (2012) splits digitalisation into six key attributes; Ubiquity, Affordability, Reliability, Speed, Usability and Skill to

measure the degree of digitization of a country. However, Digitisation has another definition. Digitization also refers to the process of transforming an analogue source into a digital source. This can be the case with transforming a real-life model into a 3D model (Barberoa & Ureta, 2011), as well as making paper documents digital (Bingham, 2010). For this research, however, we will focus on the first definition.

Gong and Ribiere (2021) have extensively researched the definition of digital transformation. Gong and Ribiere have defined digital transformation as: "A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key re- sources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders." This definition shows that digital transformation focuses on the change process, not the underlying technology. Others define it as: "The process that is used to restructure economies, institutions and societies on a system level." (Bouwman, Nikou, & De Reuver, 2019).

Digitalisation is closely related to digitisation. The two terms are often used interchangeably (Brennen & Kreiss, 2016). Digitalisation also matches the definition of digital transformation, focussing not only on the set of digital data but also on the process of analysing data (Gray & Rumpe, 2015). Brennen and Kreiss (2016) define digitalisation as "the way many domains of social life are restructured around digital communication and media infrastructures."

We conclude that there is debate on using terms such as digitization, digitalization, and digital transformation. Definitions of the terms cover a variety of interpretations, which often rely on the situation they apply to. At this moment, there is no singular term applicable to the scope of this research, which requires an explication of the terminologies for this report. This report presents deepening research into the current digital developments of Suriname. We will focus on both infrastructural development as well as societal development. We will therefore combine earlier definitions into the following: "Digitalisation concerns the development of infrastructure for, as well as the societal adoption of, connected digital technologies."

2.2.2 Digital Developments

Having defined digitalisation for this report, we will discuss some of the latest developments in digitalisation within the scope of this research. Since the introduction of the computer, many digital innovations have been introduced. As the technology evolved, its impact grew. Ritter and Pedersen (2020) show in table 1 how the focus of research on digitisation has changed in multiple phases.

The table by Ritter and Pedersen (2020) shows that the main focus in digitisation research has reached a point where 'digital' is seen as the new normal, and systems are getting more integrated. According to Schwerner (2017) (supported by recent papers), actively researched technologies are Cloud computing (Han & Trimi, 2022), The Internet of Things (Riedel, 2022), and Big data Analysis (Wang, Xu, Zhang, & Zhong, 2022). Based on the results of this report, we can identify the phase that the digital development of Suriname is currently in. Based on this categorisation, a period of digitalisation research can be selected as most fitting to the current situation in Suriname.

Table 1 - Phases in digitisation research (Ritter & Pedersen, 2020)

	Phase 1	Phase 2	Phase 3	Phase 4
Time	Pre-1990	1990–2000	2000–2010	After 2010
Phenomena	Digital data	Digital platforms and communication	Digital efficiency increases	Digital as the new normal
Main focus	Experimentation	Disintermediation	Exploitation	Integration
Dominant activities	Digital technologies are explored as a new way of working and developing businesses	Digital technologies are used to connect with customers, either directly in a costefficient digital way or via platforms (Dot Com wave)	Digital technologies are used to optimize business flows—mainly to increase efficiency of known business processes	Digital technologies are wide-spread and become an accepted fact of business rather than being special or extraordinary

Digitalisation disrupts existing business processes. As a result, businesses that do not adapt to the new technology can collapse (Caputo, Pizzi, Pellegrini, & Dabić, 2021). Allocating resources to developing and adapting business models towards digitalisation positively impacts overall firm performance (Bouwman, Nikou, & De Reuver, 2019). Businesses are 26 percent more profitable when digital-transformed (Schwerner, 2017). This shows the benefit for businesses of investing in the digital transformation

However, not every business can easily take part in the digital transformation. Joining the digital transformation as an enterprise is difficult due to the complexity of IT management and the scarcity of research on systematic approaches for enterprises (Ikegami & Iijima, 2020). Not only do enterprises have difficulty with adopting digital transformation. Entire countries are confronted with their own challenges in developing digital systems.

In a case study focussing on the developing country Ghana, Effah and Nuhu (2017) identify three institutional barriers that withhold digital transformation; "(1) failure to adopt an integrated process approach; (2) failure to completely deinstitutionalize the existing paper-based process flow and physical signatures, and (3) failure to update outdated laws and procedures." Adopting modern technologies such as Artificial Intelligence involves additional challenges, such as educating a generation to work with the technology and allocating the proper funds (Aly, 2020). Both sources underline the opportunities the digital transformation and technologies such as artificial intelligence have to offer developing countries.

Besides the paper by Effah and Nuhu (2017), limited research on digitalisation in developing countries is available. The research that is available on the topic primarily focuses on developments in Africa and Asia (Banga & te Velde, 2018), (Aghimien & Aigbavboa, 2020), (Joewono, Tarigan, & Rizki, 2019), yet countries in southern America are underrepresented. Furthermore, there appears to be no research on digitalisation in two neighbouring countries: Guyana and French Guyana.

We can conclude that the global research focusing on developing digital technologies does not meet the needs of developing countries such as Suriname. There is minimal research on digitalisation in developing countries and South America. The technologies that are being developed can positively impact developing countries, yet to adopt these technologies, multiple fundamental challenges need to be overcome, and there is currently limited research into what challenges these might be for Suriname. The institutional barriers by Effah and Nuhu (2017) could be compared with the outcome of this report.

2.2.3 Industry maturity

Globally, multiple models are used to indicate the maturity of industries. These models represent a part of the advancement of societies. An often-cited model is that of industry 4.0 (Lasi, Kemper, Feld, & Hoffmann, 2014). Until 2014, industries were thought to exist in the third industrial revolution, also known as Industry 3.0. This theory describes that after the first industrial revolution with the introduction of steam power and the second revolution with the introduction of electricity, businesses were now in an industrial revolution with the availability of digital systems. In 2014, a new industrial revolution was identified, Industry 4.0, which describes a revolution toward "smart" objects in the production industry (Lasi, Kemper, Feld, & Hoffmann, 2014). On an international level, Industry 4.0 is now seen as a reference model for business developments, aiming to implement automation and machine learning within organisations.

The concept of Industry 4.0 was developed in Germany and is a reference based on developments within German Businesses and is an internationally accepted. Industry 4.0 is also known as smart
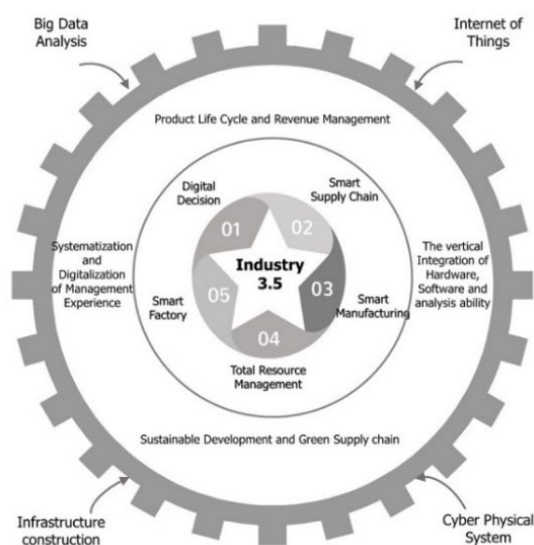
industry 4.0 in European literature. However, not all countries have economies developing in the same way as Germany. While businesses might compete internationally, they might not reach the same levels of automation and machine learning at the same time. Especially emerging markets can have difficulty reaching these levels. Therefore, for emerging markets, an intermediate step is proposed; Industry 3.5 (Chien, Hong, & Guo, 2017). Industry 3.5 tries to balance the automation of industry 3.0 with the technologies used in industry 4.0. The model consists of 5 features, as shown in figure 5: Digital decision, Smart supply chain, Smart manufacturing, Total resource management and smart factory.

Figure 2 - Conceptual framework Industry 3.5 (Chien, Hong, & Guo, 2017)

Chien, Hong & Guo (2017) show that industry developments occur with different speeds and routes than most business papers suggest. Countries respond differently to implementing industry development plans, such as industry 4.0. Some governments actively mention Industry 4.0 in their policy, whereas in other countries, it is implicitly processed in plans. However, there are also countries where there appears to be no discussion of the matter (Bogoviz, Osipov, Chistyakova, & Borisov, 2018).

This shows that industry maturity is difficult to compare internationally. Countries develop at different speeds, have different priorities, and might not implement terminologies worldwide. A large-scale literature review has presented an ICT development indicator based on available information and Industry 4.0 requirements. These show that Suriname is ranked 110th globally, close to the world average (Nhamo, Nhemachena, & Nhamo, 2020). Not meeting the standards developed in western Europe does not mean a country is underdeveloped.

We conclude that no single model can reliably measure industry development globally. When Suriname is compared to other countries, the industry of Suriname is ranked at a medium level. However, that is based on currently prevalent models. Whilst these models show room for improvement, the exact amount is unclear due to the limited availability of data. Based on the

outcome of this report, we can make a more precise categorisation of Suriname. For example, is the industry of Suriname comparable to the current developments in Industry 4.0, or are parts lagging, categorising it as Industry 3.5 or lower?

2.2.4   Innovation Strategy

Strategy is an actively discussed subject in business management. However, "strategy" can have multiple definitions and executions. The foundation of modern business strategy studies lies in the 5 P model by Mintzberg (1987), which identifies five definitions of strategy; Plan, Ploy, Pattern, Position and Perspective. Each definition specifies a part of strategy. By analysing each definition independently and interrelating these definitions, models can be created that represent an organisation's strategy as a whole. In the following table, we have summarised the definitions in short.

Approach	Definition
Plan	Strategy is consciously and purposefully made in advance; intentional
Ploy	Strategy is dependent on the actions of others; competition
Pattern	Strategy is a pattern in a stream of actions; consistency in behaviour
Position	Strategy is the positioning of a business, both physically and product differentiation
Perspective	Strategy relies on culture and organisational values; vision, and direction

At this moment, it is unclear whether Suriname has a dominant strategy model. However, this research can collect data on the strategic approach of businesses and make an assumption. At the end of this report, we can fill in the model by Mintzberg to create an overview of each strategic approach.

Strategy is important for this research as the digital transformation is not driven by technology but instead by strategy, according to Kane et al. (2015). Their findings present a relationship between digitalisation and strategy. Some of these findings are: "Having a digital strategy drives digital maturity" and "Taking risks becomes a cultural norm" (Kane, Palmer, Philips, Kiron, & Buckley, 2015). We can compare the results of this report with the findings of Kane et al. to estimate the strategic potential for the digital transformation.

Adopting a digital strategy requires a change of opinion regarding information systems. The "old way" of thinking described information systems as a necessary evil, whereas successful managers now see information systems as a competitive asset (Valacich & Schneider, 2018). Based on the outcomes of this report, we can identify the current perception of information systems.

2.2.5   IT governance

There are many definitions for Information Technology governance. Some of the possible definitions are "an organizational ability of great importance for IT strategic alignment and the delivery of business through IT" (Tonelli, de Souza Bermejo, & Aparecida dos Santos, 2017) as well as "the decision rights and accountability framework for encouraging desirable behaviours in the use of IT" (Weill & Ross, 2004). In most cases, the definitions focus on the capacity of control over the execution of the IT strategy of an organisation, which will be the definition used in this report.

IT governance plays a significant role in value delivery from IT (Tonelli, de Souza Bermejo, & Aparecida dos Santos, 2017). IT governance is one of the variables that could help obtain a competitive advantage over others (Selig, 2018). However, IT governance is not a standardised set of actions. Selig (2018) presents IT governance as a journey instead of an end state. The success of IT governance depends on multiple pillars. The literature shows no consensus on what these pillars might be. An overview in the table below supports this.

Source	Pillars
(Selig, 2018)	Leadership, organization and decision rights, flexible and scalable processes and the use of enabling technology
(Olutoyin & Flowerday, 2016)	Technology context of the enterprise, organisational context, Environmental context
(Weill & Ross, 2004)	Structure, processes and relationships
(Gërvalla, Preniqi, & Kopacek, 2018)	Strategy Alignment, Value creation, Performance evaluation, Information asset management and Risk management

One of the reasons for the wide variety of definitions, pillars and formulas in IT governance is the broad applicability of IT governance (Weill & Ross, 2004). We can therefore say that the execution of IT governance depends on the organisation it is applied to. Because of the variety in IT Governance, frameworks have been developed for specific application types. Seventeen governance tools have been reviewed by Larsen, Pedersen and Andersen (2006). Their results can be found in the table below.

Table 3 - Classification of IT governance models (Larsen, Pedersen, & Andersen, 2006)

Process Type / Organisational Entity	Procedure	Activity	Business Unit	Business System
Decision-making Processes	• SAS70	• COBIT		• IT Governance Review • IT Governance Assessment • IT Governance Checklist • IT Governance Assessment Process Model
Core Business Processes	• ITIL / BS15000	• CMM / CMMI • IT Audit • IT Due Diligence	• Six Sigma	• IT Service CMM
Support Processes	• ISO 17799 / BS7799 • SysTrust	• ASL • PRINCE2		• SOX

Based on the results of this report, a dominant governance tool could be identified. Furthermore, a recommendation for a new tool can be made to overcome the identified challenges in digitalising Suriname.

2.2.6 IT infrastructure maturity

To identify the current developments of digitalisation and identify challenges in improving that situation, one needs to understand how the maturity of digitalisation can be measured. To make such a measurement, we need to split up the subject of digitalisation into measurable indicators. Therefore, this chapter introduces models that can be used to perform these measurements.

At the foundation of digitalisation lies the availability of a physical IT infrastructure. Digitalisation will become a challenge without a computer, so more requirements exist. There is not a generally accepted maturity model for the infrastructure of IT. Furthermore, finding a maturity model that fits the development of Suriname is difficult, as most models revolve around infrastructure advancements on top of an already existing basic infrastructure or do not match the situation in Suriname.

For example, a maturity model on the digital maturity of retail in Ukraine identifies a basic requirement for businesses to be a 100 Mbit internet connection and the usage of computers and an intranet (Proskurnina, Karpinski, Rayevnyeva, & Kochan, 2021). However, sources mentioned in the introduction show that 100mbit speed is five times the average in Suriname and that computer adoption is low.

Another recent paper discussing the digital maturity of SMEs in Wales focuses on the benefit of adopting high-speed internet (Henderson, Munday, & Roberts, 2021). In the paper, three measurements for ICT infrastructure are identified: access to broadband internet, download speed and upload speed. However, if we focus on the number of citizens with access to broadband internet, half of the Surinamese society does not meet the basic requirement to measure ICT infrastructure maturity.

These two examples show that modern research focuses on the advancements of existing infrastructure and technologies. As these papers have been written in countries where IT infrastructure has advanced beyond the level of Suriname, we are therefore inclined to look further back. To find maturity models that fit the development phase that Suriname is currently in.

When looking at older models (Haris, 2010). A model where thirteen domains are identified and measured over five levels ranging from basic to innovative levels (figure 4). The same issues arise. While some indicators might be relevant for Suriname, such as "knowledge" and "infrastructure management", many topics such as agility and service management rely on the existence of a system in at least a fundamental way.
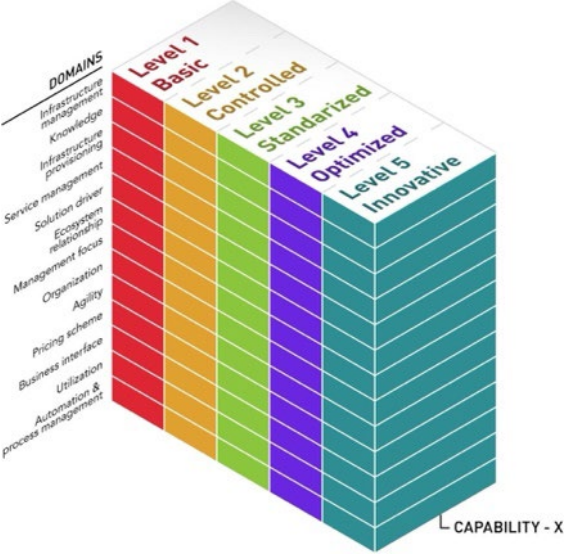
We can conclude that, to our knowledge, there are no maturity models for developing digital infrastructure on a national level that fit the development level of Suriname. Currently, too little is known about Suriname to link it to an existing model or develop a new one. Therefore, research needs to be conducted to identify the current level of digital development in Suriname according to domains suitable to Suriname. Based on the results of this research, we can estimate where Suriname scores on multiple domains of the ITI-MM by Haris (2010)

Figure 3 - ITI-MM Model by Haris (2010)

2.3   THEORETICAL FRAMEWORK

Based on this chapter, we can conclude that many theories and concepts are related to digital development. We have selected the subjects that are seen as the core of identifying the digitalisation of a country. We have combined these theories into a framework to structure the analysis in this report. The selection and categorisation of theories are based on the researcher's judgement. The resulting framework can be found in Figure 5.
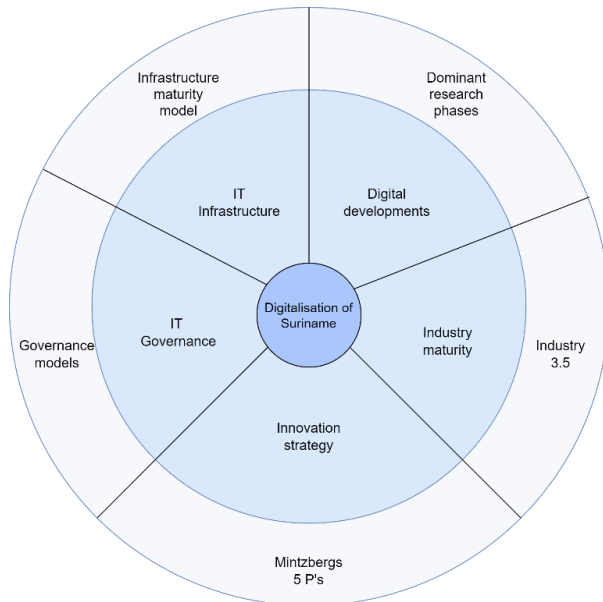
Figure 4 - Theoretical framework to cover digitalisation

The inner circle of the framework represents the subject of this report. The surrounding ring lists the concepts introduced in this chapter. The outer ring specifies specific research fields within each subject, as discussed in the corresponding segments. Figure 4 depicts the composition of the discussed theories.

Each theory is chosen to depict a perspective of the research question. In academic research, theories are used to create a perspective of reality. Theories are, therefore, one way to look at reality, but never the complete representation. The choice was made to combine multiple theoretical perspectives to approach a realistic representation of the digitalisation of society in Suriname. The designed theoretical framework combines hardware-related

developments with societal and governmental developments to balance perspectives.

The researcher has developed the designed framework. The interdependency and mutual exclusivity of the chosen individual segments have not been academically proven. However, the theories discussed are peer-reviewed and referenced in other research.

The literature review has concluded that there is no readily available formula for successful digitalisation. Furthermore, the national scope this research requires is not easily combined in a model. Therefore the choice has been made to focus on existing research which identify challenges, as is the aim of this report. If the identified challenges of these reports correspond to the conclusions of this theoretical framework, we can combine the peer-reviewed recommendations with our findings.

The paper by Hulla, Herstätter, Wolf & Wamsauer (2021) has been identified to have recently researched the challenges involved with digitalisation. Therefore, the theoretical framework aims to cover the challenges of digitalization as identified. The paper by Hulla et al. identifies six challenges regarding digitalisation and digital transformation for SMEs. The following table links the challenges by Hulla et al. to the theoretical framework.

Table 4 - relation between challenges and theoretical framework

Challenge by Hulla et al. (2021)	Theoretical framework
Lack of strategy/roadmap	Innovation Strategy
Recognizing the potential of digitalization	Digital Developments
Lack of digital skills and competencies	IT governance
Monetary and personnel resources	IT Infrastructure
Knowledge reading state-of-the-art in digital technologies	Digital developments
Mindset of employees	Industry Maturity

In the framework, as well as in the report by Hulla et al., there is no prioritization of challenges and theories. To our knowledge, there is no literature available that ranks the importance of characteristics to digital transformation. At the end of this report, we will return to this framework and discuss whether the challenges by Hulla et al. are met according to our defined theoretical framework.

3. Methodology

In this chapter, the methodology of this research will be discussed. Section 3.1 starts by describing the approach to the literature review. Next, sections 3.2 and 3.3 introduce the theory of conducting and processing interviews for gathering knowledge. Section 3.4 discusses the practical translation of these theories. Then, section 3.5 introduces the data analysis method. Finally, section 3.6 discusses the assumptions made with this methodology and the potential impact this has on the research.

The theoretical framework shows that limited research is available on digitalisation in developing countries, South America, or Suriname. Due to the lack of written sources, this report's research methodology will therefore rely on interviews with experts.

For this research, a balance between literature review and qualitative data has been found using the Gioia theory. The research started with an unstructured literature review which narrowed down to a systematic narrative literature review as more information became available. This led to general knowledge of the subject and some clearly defined fields of interest for the research. Following this literature review, semi-structured interviews were conducted with experts in business, government, and telecom. Then, dimensions of interest are identified using the Gioia theory to answer the research question. In this chapter, the theories and steps are explained in detail.

3.1   LITERATURE REVIEW

Based on the problem statement, a combination of a systematic and narrative literature review has been conducted. Because of the unavailability of academic sources on the IT situation in Suriname, a narrative review is conducted on this subject. A semi-structured literature review is conducted to gather research methodologies and discuss existing models. Because of the limited availability of literature on digitalisation in developing countries, the continent of South America, or Suriname, the literature review uses no fixed defined method or analysis style. (Jesson, Matheson, & Lacey, 2011).

Narrative review ←————————————→ Systematic review
Variety of styles ←————————————→ Structured approach
No defined method ←————————————→ Rigorous method
No specified analysis ←————————————→ Synthesis, meta-analysis

Figure 5 - Types of literature review (Jesson, Matheson, & Lacey, 2011)

3.2   GROUNDED THEORY

The Grounded theory is an interview theory to identify corresponding statements among respondents (Strauss & Corbin, 1997). The grounded theory is well used as a research methodology (Lambert, 2019). The grounded theory states that a theory is developed based on the results of respondents rather than using data to test a hypothesis (Strauss & Corbin, 1997). Given the limited number of academic sources for this subject, grounded theory is the best fit for structuring information in this report.

One way of implementing the grounded theory is the Gioia theory. The Gioia theory adds scientific rigour to the analysis of qualitative data. Gioia's research combines semi-structured one-on-one interviews, written and electronic documentation, and non-participant observations. Semi-structured interviews were seen as the most important source of information by Corley & Gioia (2004).

In the paper from 2004, a strict interview setup was prescribed. All interviewees were requested to speak as a representative on behalf of their organisation. The interviews would then take between 45 to 60 minutes and follow roughly the same interview pattern. The pattern would adapt throughout the interview phase because of increased clarity on the subject and identifying returning

issues. Multiple interviews were conducted with the same respondent to ask more in-depth questions on the emerging data model (Corley & Gioia, 2004).

This research approach focuses on "going native" with an informant. The researcher uses the terminology and examples as the specific respondent handles them. This differs from many traditional research methods where strictly defined research questions are drawn to meet an existing model. Therefore, the goal is not to try to fit existing models but to rely on interview analysis and create a new model (Corley, Gioia & Hamilton 2012).
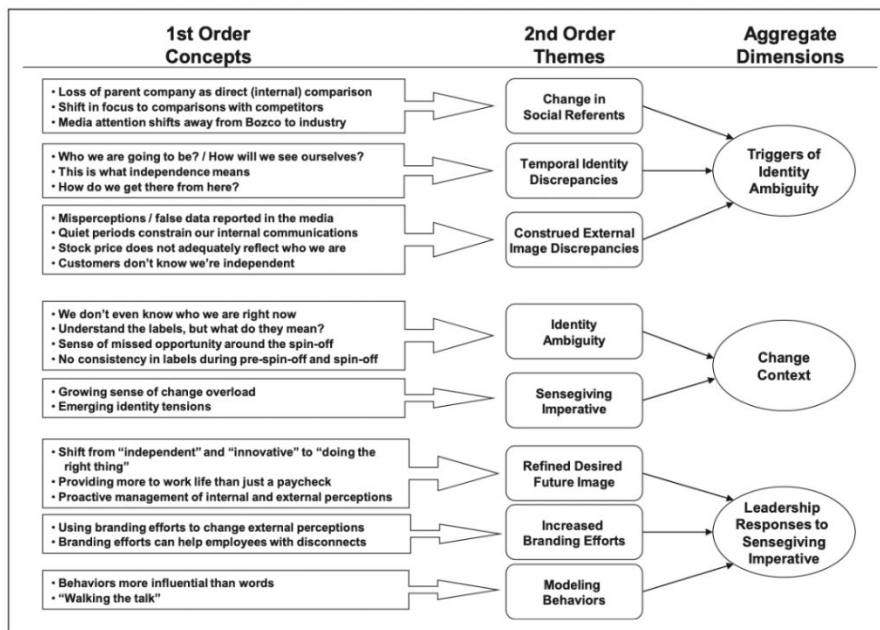
Figure 6 - Example of a Gioia data model (Corley & Gioia, 2004)

Because of the importance of one-on-one interviews, the research strongly relies on the answers the informant gave. Building trust and comfort with the respondent is vital to ensure complete and truthful answers. This can be achieved by mentioning that the research is anonymous but not confidential (Corley, Gioia, & Hamilton, 2012).

The Gioia theory looks for corresponding answers and statements by respondents. Statements by respondents are paraphrased to anonymous summarised statements. These are extracted from the interview transcripts and bundled when they are comparable. By grouping these statements, hundreds of first-order concepts are created (Corley, Gioia, & Hamilton, 2012).

Based on these first-order concepts, it is up to the researcher to bundle these into second-order themes. The themes can indicate a link to potentially relevant literature at this step. If possible, these second-order themes can then be bundled into aggregate dimensions. All these steps can be incorporated into a data structure. Moreover, the aggregate dimensions can be further explored by literature review or structured interviews based on the analysis (Corley, Gioia, & Hamilton, 2012).

A risk of this methodology is that with large sample sets, keeping an overview of multiple themes and dimensions is difficult. As the figure above shows, a graphical data structure would become overly complex with a large set of first-order concepts. Gioia does not propose any guidelines for dealing with large sample sets, which could pose a problem for this report. Therefore, some choices need to be made to speed up the creation of aggregate dimensions while retaining the ability to identify underlying themes. These will be discussed in segment 3.4.

3.3 EXPERT INTERVIEWS

The data collection of this report is divided into two parts: an exploratory phase and a deepening phase. In the exploratory phase, interviews with experts from different backgrounds will be conducted online. Based on these interviews, themes will be identified that are important when discussing digitalisation in Suriname and when contacting new interviewees.

The interviews in the second round have primarily taken place physically. An overall analysis will be conducted based on the combined results of the exploratory and deepening phases. In this paragraph, we will discuss the research approach for each step.

3.3.1 Interviewee selection

This research aims to explore the current digital development of society in Suriname and then identify challenges in further developing that situation. This goal requires a high-level analysis of the situation in Suriname. Therefore, it is crucial to involve representatives from diverse groups in society and experts in the technological field of digitalisation in Suriname. Therefore, the choice was made to interview business leaders, government officials and digitalisation experts to focus on the strategic policy level of digitalisation in Suriname.

The interviewees are selected using purposive selection, a type of non-probability sampling, which is also known as subjective or selective sampling. This sampling method relies on the researcher's judgement (Alkassim & Tran, 2016). Within purposive sampling, there are multiple approaches. In this case, expert sampling is applied. Besides expert selection, the group of potential respondents is created via snowball sampling, which lets respondents propose new respondents (Naderifar, Goli, & Ghaljaie, 2017). Because the researcher has no contacts in Suriname, they heavily rely upon respondents' proposals.

Both selection methods rely upon the researcher's opinion to make a decision. Therefore, there is a higher chance of sampling bias (Schreuder, Gregoire, & Weyer, 1999). Strict selection requirements are required to keep an unbiased representative sample group. This comes down to the following criteria for this report.

The interviewee is:
- Living in Suriname AND
- In a management or policy position AND
- Representing an umbrella organisation OR
- Representing a company with more than 50 employees OR
- Representing a government agency

Besides meeting these requirements, the aim is to keep the field of expertise of interviewees balanced. For example, three interviewees from a business position should be balanced by interviewing three government officials. To be transparent about this balance, the interviewees will be categorised based on three categories: Business, ICT and Government. The categorisation can be found in Appendix B.

3.3.2 Privacy

The data gathered during this research needs to be processed carefully. Suriname is a small country, meaning a person is in contact with a relatively large percentage of society. Some of the statements made during the interview could therefore have positive and negative consequences for participants of this research. Because of this, answers and information could be biased. Therefore, respondents

need to rely on confidentiality and anonymity in processing their data to minimise the chance of biased answers and to promote complete transparency.

Based on the potential impact of the research, the decision has been made to anonymize statements. This means we list the participants, but there is no way to link the statements used in this report to any of the 18 participants. The choice to list the participants has been made in collaboration with the participants and is needed to prove the argument based on authority. The audio recordings and notes of the meetings have been made available to the supervisors of this research.

Sometimes, a part of the interview is directly related to an organization. In most of those cases, we will include the organisation's name, making a decision of inclusion based on the level of criticism expressed by a representative of said organization. Gioia's theory supports data anonymisation by using condensed statements to combine into concepts. In the following figure, one can see how statements are processed in the report.

NL "Surinamese use WhatsApp more than they email, But I really do the professional things through the mail, and I try to teach my customers that a lot has to be done by mail, But I mean, I was discussing something with the minister this morning, and that was via WhatsApp."

NL Surinamers work more with Whatsapp than with email

EN Surinamers work more with WhatsApp than with email

Figure 7 - Data processing

3.3.3 Exploratory phase

The exploratory phase aims to discover the current situation of the digitalisation of Suriname and to specify the scope of the research. The first phase starts with a focus on businesses. As this exploratory phase influences the course of the research, obtaining a balanced and complete view of the situation in Suriname with only limited interviews is essential. Therefore, interviews will be conducted with representatives of organisations that are part of three different groups of stakeholders: the IT sector, local retailers and economic strategists. Furthermore, because this research aims to introduce Suriname's digital development, representatives with knowledge of the entire situation in Suriname need to be interviewed. Therefore, the interviews will be conducted with managers and other representatives that work on a strategic level.

The first round of interviews is conducted one-on-one via an online video call. The interviews are semi-structured. This means that topics and general questions have been constructed beforehand, but the exact formulation can differ between interviews. When possible, the meeting is recorded and will be transcribed using AI for further analysis. Based on the transcriptions 1st and second-order concepts and themes are modelled into a Gioia data model. General topics will be discussed during the exploratory phase based on the initial literature review. These topics will form the backbone of the interviews.

Based on the theoretical framework, we have identified a lack of information on the current efforts in digitalisation. As the only source of strategic goals by the ICT association mainly focuses on the digital development of consumers, we need to specify the effects on businesses. When discussing a definition for digitalisation and information systems, it became apparent that these definitions differ per system and situation. Finally, based on the research question, we need to ask about the needs and challenges of digitalisation. All of these points have been processed into seven questions.

No.	Topic
1	What is the current state of digital infrastructure in Suriname?
2	In what way do businesses use this infrastructure?
3	What processes are currently digital within businesses, and is there potential to expand this?
4	In what way could digital systems help Surinam businesses?
5	What goals do businesses have that digital systems could contribute to?
6	What is necessary to fulfil the digital needs of businesses in the future?
7	What are the challenges in fulfilling the digital needs of businesses?

Table 5 Interview topics round 1

The questions are formulated so that the answers narrow down from the general level of IT infrastructure in Suriname to the impact and potential benefits it might have on businesses. The interviews take 30 to 45 minutes, offering the opportunity to talk through the scope of the research and introduce the subject, followed by about 5 minutes per topic. Additional subjects discussed in these interviews can be found in Appendix A.

3.3.4   Deepening phase

Based on the results of the exploratory phase, reoccurring subjects are identified. These subjects will then form the basis of a new round of expert interviews. The second round of interviews will also be semi-structured, but now focussing on more detail on specific subjects. This means that the deepening interviews will differ more compared to the round of exploratory interviews. This also means that in some cases, the report heavily relies on the perspective of a sole expert in a specific field. If possible, statements are corroborated anonymously with other interviewees.

As the paragraph on privacy mentioned, not all interviewees agreed to record their interviews. However, their information is still valuable to this report. Therefore, the choice was made to replace an AI-generated transcription with detailed notes during the meetings where no recording was available. The notes aimed to represent the statements made during the meetings. As the researcher condenses the interviews to a relatively small set of statements, risks arise in the data processing. During the formulation of statements, the actual opinion of the interviewees might be misinterpreted. Furthermore, crucial information might be left out.

To mitigate at least a part of these risks, it has been decided that after formulating statements and Dutch translation to English, the statements will be sent back to the interviewees. The interviewees were asked to check the statements for completeness and accuracy critically.

There are responses from 10 of the 16 interviews. In all of these cases, the interviewees responded with a positive remark, and only minor textual changes needed to be made. Because of privacy concerns, these messages cannot be included in this report, but the correctors of this report have had access to them. Because of numerous reminders to the interviewees without a response, the initial permission to process the results, and the positive remarks from over half of the interviewees, it has been decided to include all results.

This condenses data processing into the following steps: the first step is collecting the relevant raw statements made during the interview. Then, a generalised, shortened statement is drawn based on each statement. This step takes place in Dutch as for both interviewees as the researcher Dutch is their mother tongue. Following the condensed statements, they are translated. These statements are then sent back to the interviewees for control to ensure that no misinterpretations were made during the two changes in the data and that no statements were left out.

3.4   DATA ANALYSIS

After conducting the two rounds of interviews, the collected data will be analysed. First, the translated and condensed statements by the interviewees will be bundled into aggregate dimensions. This will be achieved by assigning a keyword in multiple iterations. These keywords are not linked to the literature and are based solely on the statements. Then, related subjects are bundled into the final dimensions throughout multiple iterations. For example, keywords such as "banks", "money", and "cash" are combined into an aggregate dimension of "payment".

By creating these aggregate dimensions, the key challenges are identified. In the results chapter, these key challenges are discussed in detail. Next, the current situation is discussed in each segment, followed by the identified problems. Finally, concrete challenges are formulated based on the statements from the interviews and their analysis. These are a specification of the key challenges and a recommendation for actions in the future solely based on statements by the interviewees.

3.5   ASSUMPTIONS

Most respondents have recommended each other as a valuable addition to this research. This increases the chance that the research does not represent the entire country. However, we have spoken to representatives of most organisations relevant to this report from multiple political and cultural backgrounds.

This report relies on the expert opinion of the interviewees. As with qualitative research, the answers may not always be built on facts and correct data. Some answers might be based on assumptions and could represent a hidden agenda of the respondent. In the research, we have tried to minimize this risk by corroborating statements as much as possible amongst different interviewees. The semi-structured interview style leaves room for variation in interviews. This means that interviews can take longer depending on the interviewee. Furthermore, the level of detail in interviews differs.

3.6   TIME AND LOCATION

The preparations for this research started in early 2022. After combining these preparations with regular courses, this research was scaled up to a full-time activity from the 25th of April until the 1st of September 2022. During these four months, five weeks focused on conducting interviews. The remaining weeks focused on literature research and processing data. The first round of interviews was conducted between the 9th and 20th of May. After a week of processing information, the second round of interviews was conducted in Paramaribo, Suriname. Finally, from the 29th of May until the 19th of June, interviews were conducted at the interviewees' offices in Suriname.

Appendix D shows the time frame of this research as a Gant chart, including the preparations, data processing and feedback moments.

4. Results

In this chapter, the results of the interview phase of the research will be presented. This will be carried out in three parts. Section 4.1 introduces facts on the execution of the exploratory interviews, and section 4.2 introduces the same for the deepening interviews. In section 4.3, the results will be discussed in detail in sections ranging from 4.3.1 to 4.3.11, focussing on dimensions identified in the interviews. Each section will conclude with a table identifying the main challenges within a specific dimension. Finally, section 4.4 analyses the results in preparation for the conclusion.

Throughout the research, multiple interviews have been conducted with representatives from the national government, businesses, and business interest organizations. The names and functions of the interviewees can be found in Appendix B.

4.1 FIRST ROUND: EXPLORATORY INTERVIEWS

During the exploratory part of this research, five interviews were conducted with representatives from businesses, economic interest groups and IT organizations. The interviews were conducted online and structured as described in the methodology chapter. Based on these five interviews, 181 statements were formulated and processed via the Gioia methodology.

The 181 statements were condensed into 21 themes. Some of these statements were mentioned more often than others. However, we will include all statements as this research aims to report the digital development of Suriname. This requires a balance between in-depth analysis and a complete situation overview. By setting a strict threshold for themes to be admitted for the second round of interviews, the initial five interviews might influence the research too much.

Table 6 - Dimensions of exploratory interviews

Theme	Freq.
Economy	30
Government	13
Strategy	13
Digital maturity	12
Market maturity	12
Payment	12
Opportunities	11
Education to business gap	10
Data availability	9
Education	9
Informal sector	8
Infrastructure	8
KKF	7
Data openness	6
Investment	6
Banks	4
eGov	4
Cash Economy	3
Culture	2
Challenge	1
Human capital	1

Therefore, the choice was made to add an extra layer of categorisation to the themes to end up with ten main aggregate dimensions. The following key subjects were identified by combining closely related subjects like Banks, Cash economy and payment. There remain two categories which have a low frequency: infrastructure and culture. These are included based on the importance of knowledge on infrastructure for this research and the assumption that culture impacts digital development.

Table 7 - Combined dimensions exploratory interviews

Dimensions	Freq.
Economy	38
Maturity	25
Data availability	22
Education	19
Payment	19
Strategy	19
Government	17
Opportunities	11
Infrastructure	8
Culture	3

It is important to mention that an increased frequency of a dimension does not automatically mean that there is higher importance or significance of that dimension. Statements within a dimension can be contradictory, and longer statements can be split into smaller segments. It is, however, clear that at least the first eight condensed dimensions are mentioned by multiple interviewees as a response to the semi-structured interviews. The information provided by the interviewees in this first phase will be discussed with the rest of the interviews to prevent any doubling in information.

4.2   SECOND ROUND: DEEPENING INTERVIEWS

Having identified ten core themes, the next round of deepening interviews took place with representatives of a new set of organisations. As mentioned, these interviews aim to specify more about the identified themes. The choice was made to visit the interviewees in real life and question them based on the identified themes of 4.1. Once again, we used a semi-structured interview technique, differing per interviewee.

In total, 11 interviews were conducted with 13 representatives during this second round of interviews. Two interviews took place with two representatives instead of one. These settings were not planned as such, as the methodology prescribes one-on-one interviews, yet multiple representatives would be present at the arrival of a meeting. Although this might have impacted the weight of those interviews, we see no noticeable difference when analysing the statements from other interviews.

Having decided that all statements are included in the research, the procedure of categorising and structuring the data starts. Because of the diversity of statements and the large size of this data set, the decision has been made to adhere to existing dimensions from the first round of interviews. This does mean that some details and nuance might be lost. However, given the scope of this research, this will have little to no effect on the conclusion.

Table 8 - Dimensions of all interviews combined

Dimension	Freq.
Government	115
Economy	92
Payment	90
Infrastructure	78
Maturity	75
Data availability	70
Education	67
Culture	53
Strategy	46
Opportunities	28

The following total distribution of dimensions throughout all interviews is created by bundling themes into dimensions. In the following paragraphs, the dimensions will be discussed individually. This means that there are, in total, ten sections representing a dimension. The order of these paragraphs will not be based on the frequency that it is mentioned but on the report's readability in total.

We will not discuss the identified opportunities as these do not answer the research question. However, the results could still be of interest to the general public. Therefore, the opportunities are included in Appendix E.

4.3   DIMENSIONS

We will structure the results based on the dimensions identified in table 5. First, we will discuss the statement by the interviewees and identify conclusions in paragraphs named by the dimensions. In these paragraphs, we identify challenges. These should not be confused with "obstacles" or "blockades", as these terms would imply a specified barrier that, when removed, would boost advancement. Instead, we identify statements which require future research

4.3.1 Economy

Suriname is a country in economic hardship. The current government has inherited billions of dollars of debt at international banks from the previous government. Paying back the loans requires strict financial rules, which are partially dictated by international institutions like the IMF and IDB. As a result of these strict rules, the Surinamese Dollar has devaluated twice in the past two years. The SRD is now worth a third of its value in 2020. The most recent devaluation, which occurred in June 2021, has remained stable, supporting sentiments that the economy has stabilized. However, fears remain that "another devaluation is coming up".

There is disagreement on the severity of the situation in Suriname. Some interviewees describe the economic situation as "not sad or dramatic, though it is severe", while others describe that there is a "financial-economic crisis" and that "there are many indicators [..] that indicate that Suriname is doing badly." However, people agree that the economy's current state is not positive. Many businesses have been reduced to a "survival" mode. In many cases, no money is available for luxury or long-term investments. "Getting your money more quickly is better" is a mentality that focuses on short-term results instead of long-term improvements.

The lack of investments impacts the long-term development of Suriname's (digital) economy. Business owners understand the idea of investments. However, IT services are still new to many businesses, and with a lack of examples of how implementing digital systems in a business can help them, the idea of investing in expensive computer equipment is not appealing.

4.3.1.1 Economic composition

Respondents express the impact of the size of Suriname on digital developments, as the "market size is small", "Suriname is a small economy", and "Suriname is a small community". The market size has an impact on the size of businesses. Businesses considered big in Suriname "are internationally seen as SMEs". Therefore, international definitions do not apply to Suriname, and the country is working on its own definition of small, medium and large enterprises. At this moment, "there is no good definition of SME."

The lack of a definition makes it difficult to explain the distribution of businesses in Suriname. An interviewee stated that "80% of the economy is SME", supported by another respondent stating that "after big businesses, it immediately becomes small. There are few medium-sized businesses". This is because the majority of the Surinam economy consists of micro-businesses. These businesses are family-owned or are a way of earning extra money by selling produce grown and made at home.

4.3.1.2 Formal and Informal businesses

In Suriname, there is a split between formal and informal businesses. Seven interviewees have identified it as one of the current challenges for Suriname. Whether a business is formal or informal is decided on registration at the KKF: the chamber of commerce of Suriname. If a business has been officially registered, it is a formal business, whereas if a business is not registered, it is informal.

A distinction needs to be made; Informal and illegal are two different things. While some informal businesses might be illegal, most are not. The existence of informal businesses appears to be tolerated by the government, as there is little to no enforcement in place to register informal businesses. Informal businesses are publicly known around Suriname and advertise on the internet with their services. Interviewees state that "40 to 45% of the economy is estimated to be informal." A large number of informal businesses makes it difficult to estimate the economic situation in Suriname correctly.

The informal economic sector impacts the economic well-being of the country. However, as it is unknown what the exact number of informal businesses or their revenue is, we cannot know the impact the informal sector has. Moreover, as a part of the economy is not legally registered, it is therefore not paying tax, resulting in missed income for the government.

The economic division of formal and informal businesses is seen as a distinctive factor of the Surinam economy, as "Informal business is a part of the national culture". From the interviews, two main potential reasons are mentioned for the large impact of informal businesses: an unwillingness to pay taxes and an unwillingness to share company data.

The unwillingness to pay taxes has everything to do with a short-term vision. The long-term benefits of paying taxes are unknown or outweighed by a business's short-term increased income. The unwillingness to share company data appears to have its reasons, namely: a desire to keep the business hidden, as not every part of the business might be legal, and at the same time, a fear that if the chamber of commerce would have information on their business, this information could be used against them in the future by passing it on to the government and banks.

4.3.1.3 Illegal activities
As mentioned before, a part of the informal sector has illegal activities. Multiple interviewees mentioned the impact of illegal activities on the Surinam economy. Suriname is a cash economy, which will be discussed in more detail later in this chapter. Someone stated, "It is a public secret that without drugs money, the entire economy collapses." Moreover, "Suriname is a high-risk country for money laundering." While other interviewees did not mention the first statement, the subject of money laundering was mentioned more often.

"NRA analysis shows that there are sectors with suspicions of money laundering", mentioned someone, later reinforced in another interview stating that "Money laundering is Suriname's core business." This shows a hidden illegal economy working in the informal sector. The impact of the illegal economy was directly described as "Suriname is a thoroughly corrupt country." The respondents are aware of the illegal activities taking place. However the total impact and the required actions to solve the problems need to be formulated.

4.3.1.4 Challenges

Challenge
Suriname is currently in economic hardship with an unstable currency
Businesses have been reduced to a survival mode, with no money for luxury or long-term investments
IT services are a new technology for many businesses, and therefore benefits are often unknown
The economy of Suriname is too small for businesses to have a positive return on investments
Businesses are reluctant to share data out of fear of transparency and data abuse by others
The illegal sector has a large impact on Suriname, a country susceptible to money laundering and corruption

4.3.2   IT Infrastructure
Within Suriname, there has been a steady development of digital infrastructure. The country has two large telecom providers: TeleSur and Digicel. TeleSur is the oldest telecommunication provider with the most extensive physical infrastructure available. Digicel is relatively new but working on plans to strengthen its position as a provider.

There is no publicly available information on the market share of TeleSur. However, we can make an estimation. Given that there are 496,166 pre-paid mobile-cellular phone connections and 60,678 post-paid connections in a country with 598,000 citizens, according to the latest estimation of 2019,

we can estimate. It is unknown whether all these connections are in the hands of Surinam citizens, and as there is an estimated increase of citizens, it is safe to put the estimation at around 85 to 90% market share for mobile users of TeleSur.

For this research, there has been contact with TeleSur on the availability of its services. As this is the provider with the most extensive spread of its services, also further into the mainland, and the largest market share, this will be used as a solid basis for the current infrastructure. IT infrastructure development can be split into mobile networks and fixed cable connections.

4.3.2.1 Mobile networks
At this moment, TeleSur has 279 cell towers in Suriname, of which almost all have 3g connectivity. Over half of the cell towers provide access to a 4G network, and in downtown Paramaribo, they are rolling out 5G support, with currently 28 towers offering the newest wireless technology. With this number of towers, the provider has calculated that it covers 95% of the country's citizens.

Besides the coastal area, mobile internet is provided in 19 villages in the interior of Suriname. These villages have a network speed of 40 to 50 Mbit per second. While this is an improvement, another interviewee states that "the ministry tries to point out to companies that an area can be covered, even if it is not an interesting market", but that "analysis shows that TeleSur and Digicel have not adhered to designated service area's". This shows that the national coverage can still increase and that there is dissatisfaction with the current state.

Complaints about access to basic infrastructure strengthen this dissatisfaction. For example, in the interior of Suriname, "Some telephone poles work on solar panels, which do not always work well." Furthermore, "there is not 24/7 electricity everywhere in the country; in some villages, there is a generator that is on from 8 to 10 in the evening." This shows that there is low IT infrastructure stability in Suriname, but basic infrastructure such as electricity is also missing in some regions.

4.3.2.2 Fixed cable networks
Suriname is connected to the world wide web via two sea cables under the Atlantic Ocean. At this moment, Digicel is working on increasing this number by adding another cable. This expansion should drastically increase the total bandwidth of Suriname. The current "network usage is at 104 gigabits" per second. Moreover, "The internet consumption of Suriname increases by 72 percent every year", showing that the country is quickly adopting the internet.

Within Suriname, the internet infrastructure is a mix of older copper cables and new fibre optics. The copper lines are slowly transitioning towards fibre, yet "50% of the transition has not been reached." This number is supported by TeleSur, which mentions that "30% of connected households are already on Fibre optics." The high number of copper cables impacts the stability and speed of the network as "rain causes internet and phone interference" due to corrosion on the copper cables. Furthermore, "the network speed is 20/2Mbit," the fastest available over copper cables, far behind the theoretical speed of fibre optics.

The 30% transition rate has everything to do with the difficulty of rolling out fibre optics in the centre of Paramaribo. This is because "copper cable in the centre is underground" and "laying in the centre is going to be very complex" due to the high number of cables and high traffic and housing density. To bridge the lack of a fibre connection in this region, the provider has "reshaped" existing copper networks ", which means that the central hub is closer to the customer, up to approximately 1 km from the customer." Furthermore, "the hub to the exchange is Fibre optics". This means that on high-traffic connections, stability has increased, which resolves at least a portion of the network instability.

These technologies are FTTH (Fibre To The House) and FTTC (Fibre To The Curb). Recent numbers present that 31,957 households are completely on FTTH, with 52,693 on the reshaped FTTC. However, there is still much work to do with "68.000 households that are on copper cable" in the centre of Paramaribo. The current plans prescribe that "44.000 households will receive fibre in the period up to April 2023." These plans should put the total percentage of fibre connecter households at over 70%.

4.3.2.3 Business connections

Besides regular customers, TeleSur offers company network connections. These are connections that range from consumer speeds to 100mbit per second. "All big companies are connected to fibre", just like "all government buildings are connected to fibreoptics". In total, 4088 businesses have an internet connection, of which 2117 are fibre connected. This means that of the total number of registered businesses in 2016 (12475), a third is connected to the internet with a business connection. However, this means that 2/3rds of the registered businesses have no business internet connection.

It is impossible to say whether these businesses have an alternative consumer connection or are disconnected from the internet based on the current publicly available information, as "the big boys and the SMEs are the only ones who have a connection to a company name." Most informal businesses are connected with a private connection.

Businesses mention a less optimistic view regarding internet speeds and stability. "Because of bad internet, cloud services like google do not always work, " forcing businesses to use locally installed software. However, in some cases, they solve the problem innovatively: "Internet is so bad that we have two providers, a switch automatically uses the fastest network." Currently, industrial areas are not prioritised if the businesses in these areas do not want to pay for fibre installation. "The switch to fibre optics costs 50.000 SRD for an entrepreneur", which is about 2000 euros, a significant investment for a business in Suriname where the minimum wage is 20 SRD an hour (Ministerie van Arbeid, Werkgelegenheid & Jeugdzaken, 2022).

4.3.2.4 Challenges

Challenge
The government has little to no influence on the plans of telecom providers. Requests for service areas are ignored
There are regions in Suriname where there is electricity available in limited time frames
70% of Surinamese households are connected to old, corroded copper internet lines
Changing copper cables in the centre of Paramaribo is complex
Two-thirds of formally registered businesses have no business internet connection and are limited to 20Mbit internet
Because of unstable internet connections, the usage of web services is unreliable
Expansion of fibre in industrial regions is motivated by the payment willingness of businesses in the region

4.3.3 Maturity

Having introduced the current economic situation in Suriname and the development of physical IT infrastructure, we will now discuss the maturity of organizations and citizens in Suriname in the use of digital systems.

4.3.3.1 Digital maturity

As introduced in 4.3.1, the composition of the Surinam economy is different from that of other countries. Besides a distinction based on small, medium and large enterprises, there is another layer

of micro-businesses. To some degree, these business types were all discussed concerning digital maturity. An interviewee clearly stated that "Micro does nothing with digitalisation". Furthermore, "It is unclear what small businesses require for IT." Making it difficult to focus on this group specifically. However, many of the results mentioned will also directly impact these micro-businesses.

One of the interviewees stated that "Suriname has a work culture that heavily relies on WhatsApp instead of email." This statement shows that users in Suriname have adopted a technology developed for use on a mobile device and by using a different technology than in European countries, such as email and teams. However, using different systems and platforms emphasises that it is impossible to directly compare Suriname with European and North American countries.

The impact of social media in Suriname is large as "Suriname has the largest Facebook usage per capita in the world." As a result, "Businesses mainly use Facebook" for many of their business tasks. "Facebook and WhatsApp are common for contacts and marketing/communication." Because of this focus on social media, there is little to no need for a desktop computer. "People have a mobile phone and a cell contract, that is it." Besides social media, "Some businesses have websites, but those are ill-maintained."

Businesses make limited use of digital systems. Many stores, which are part of the micro type of business, "have advanced calculators which can print". Only larger stores, like "Supermarkets with many products, require a computer." This shows that businesses are hesitant to adopt new systems. Why businesses lag in the adoption of digital systems is unclear. "It is interesting to know what withholds businesses to digitise." This Shows that the interviewees themselves are keen to know the answer, and there is not an answer readily available yet.

The problem is not because of the interviewed experts' lack of knowledge, as they realise the added benefit of digitalizing. "There is definitely added value from digitisation", states one interviewee, specified by another, "Digitalisation shortens waiting times and reduces costs", referring to the impact digitalisation could have on the retail sector. There are, however, worries regarding the market size of Suriname. "Digitalisation only works when you do something often." Which is difficult in a small-scale economy. This lack of examples makes it "difficult to explain to business owners why digital systems are a logical choice."

"Many entrepreneurs do not know that they need something" is stated regarding the transition towards fibre optics. Therefore, multiple interviewees point towards the government, a subject we will discuss later in this report. The government, however, states that they cannot help because "There must first be a demand from the SME for digitisation" before support can be offered. These two statements show a contradiction that withholds the situation from changing. All parties rely on the change of others.

4.3.3.2 Large business digital maturity
As can be read in the paragraph on the Surinamese economy, the large businesses in Suriname operate on a different level than smaller businesses. Besides the increased complexity of managing an organisation with more employees, many are internationally oriented. Because of these international links, they are more easily pushed to use IT systems within their organization as they need to meet standards set by other international organisations. As a result, "IT and digitisation at a large company are often based on compliance with international regulations", as stated during one of the interviews.

Besides external influences like the covid pandemic: "Digitisation of HRM has increased due to covid", which forced organisations to innovate. There are also projects and strategies within larger businesses. Specifically, Fernandes, one of the largest private-owned businesses within Suriname, has picked up IT developments to improve its business processes. However, while "company-wide, an ERP platform is picked up", other standards like "The entire customer journey has yet to be made."

Fernandes "decided this year to transfer divert from best of breeds to an integrated ERP system." As "the organization used to work with different interfaces", this is a professionalisation and optimization of its systems. Already "delivery is triggered based on the sales history and forecast." Furthermore, in the future, this could be linked to the inventory of suppliers. Fernandes is already experimenting with apps for both customers as well as businesses. "Communication with the outside world goes through 2 apps; 1 for consumers (B2C) and 1 for consumers (B2B)" By doing these innovations, Fernandes meets the standards required by international partners like Coca-Cola while at the same time improving business processes.

While Fernandes might be a best practice case, other large businesses might not have a comparable vision for the future implementation of IT in their organization. In many organizations, "operational risks are a challenge. Too little has been invested in backups." According to an interviewee. In some cases, systems are merely installed to meet requirements. The maintenance and safety of these systems are of lower importance to the point that "Even large companies do not meet the minimum requirements of IT security", as stated by another interviewee.

4.3.3.3 Business maturity
During the interviews, it became clear that there is not always knowledge about the basics of doing business within businesses. As one interviewee stated: "There is no knowledge of adequate accounting." Because of this lack of knowledge, "Businesses often run into difficulties with taxes." Running into difficulties with taxes is another reason businesses are unwilling to move towards formalization. In many cases, "Businesses hire an accountant, and they solve the tax issues." Showing that businesses solve the issue but not the underlying cause.

A possible solution to help businesses structure their accounting is by moving to digital solutions. "Small businesses certainly do not do their accounting electronically." However, "The accountancy of medium and large businesses is electronic."

4.3.3.4 Challenges

Challenge
Micro businesses do nothing with digitalisation
It is unclear what smaller businesses require for the adoption of IT
Some businesses use websites, yet they are ill-maintained, and Facebook remains the dominant platform
It is difficult to explain to businesses why digital systems are a logical choice due to a lack of best practices
Digital systems are so unknown that businesses are not thinking about the necessity of an IT system
The government looks toward businesses to ask for help with digitalizing, while businesses do not see the reason why
Large businesses adopt IT systems yet do not always meet IT security requirements
Businesses do not have adequate knowledge of financial accounting, resulting in tax issues

4.3.4 Data availability
With digitalisation comes data, the availability of data is, therefore, a good indicator of the development of digital systems and how society responds to this development. During the interviews, three core themes within the subject of data availability were identified: the availability

of data based on its existence, Data openness based on the willingness to share data, and the chamber of commerce which many interviewees pointed toward regarding the availability of data. Each will be discussed in this segment.

4.3.4.1 Data availability

The central organization to gather statistical data about Suriname is the General Bureau of Statistics Suriname. However, multiple interviewees are not satisfied with the functioning of the bureau of statistics. "Statistical data of the CBS has to improve." According to one of the interviewees. While another states that "There is no central collection point of data."

One could assume that this means that there is little information available in Suriname. However, the situation is more complex. "There is a lot of data, but you have to know the sources." The problem is "[…] a lack of research and data in Suriname." This appears to be aimed at the government and the central bureau of statistics because: "The UN is doing some research […]" and "Banks themselves have a lot of data."

The importance of data availability is evident: "More data gives more leverage", "If you don't have data, you can't control", and so are the consequences of not having data: "Because of a lack of data, an organisation can't say whether they have reached its goals."

This makes one wonder why there is so little data publicly and centrally available. "The government wants data, but they don't want to do the research", which identifies the problem as a lack of prioritization. Another interviewee mentions, "You need a good system to collect and store data, only then can one blame others for not sharing the data." Which identifies the lack of a system as the problem. However, this same interviewee mentions: "There are surveys, but they have limited response." Which appears to imply the problem lies within societal participation. There are many more likewise statements that each presents a new dimension to the lack of data.

All in all, these statements show the complexity of the problem. Many individuals identify many problems, yet there is no consensus on the exact origin of the problem and what steps are required to change this origin. This creates a stalemate, where in some cases, people work against each other, slowing change in general.

The central bureau of statistics, the government and many other organizations offer data. However, if there is enough data: "There is some data available, but that is not sufficient to reach a conclusion", the available data is not always complete and cannot be fully trusted to be accurate and reproducible. "There are so many databases that the information is inconsistent" amongst government organizations. Besides inconsistencies between data sets, information is sometimes removed by employees that leave an organization: "If a board member leaves with a bitter taste, they don't transfer data." As a result, "A lot of data has already been lost in the past."

4.3.4.2 Data Openness

Besides the existence of data, the accessibility of the data is important. One can own a large data set, but the data is worthless without access. The interviews discussed the openness and willingness to share data multiple times. Because in the cases where businesses would have their accounting digitally available, "Businesses don't share data because of a trust issue." "Because of the small economy, people think that their data is soon out in the open." This is why organizations are reluctant to share data. "In the past leaking business information has happened from public organizations to banks." However, this is not the complete truth, according to another interviewee. "Unclarity helps people" relates to the importance of the informal sector and the high risk of money laundering.

As a result, "Data is secret, the FIOD people have been threatened 2 or 3 times." This shows that a change in the system is not expected soon. Financial auditing is seen as a threat to an organization. This is not limited to smaller informal businesses. It also happens on a large national scale. "Information important to the ministry is withheld", according to an interviewee when discussing sharing data of a large Surinamese business.

4.3.4.3 Chamber of Commerce

The organization responsible for collecting data on businesses in Suriname is the Chamber of Commerce, or KKF in Dutch. It is being discussed because of its role in the availability of economic data. "The KKF has a large set of data, but no one has access to the data." They have a rich dataset because "it is mandatory to register as an entrepreneur with the KKF." "The KKF is a public organization." This means that the operations of the organization should benefit the general public. "The KKF is an extension of the government, which does not share data with the government." A statement that shows the exact problem and frustration.

The case of the KKF shows that the willingness to share data is not only limited to the willingness of private organizations but also happens at public organizations with the sole responsibility of collecting and sharing said data. "The KKF has data on registered businesses until 2019", which was the last moment data was shared. A delay in new publications has built up for three years because of covid. "Next year, the KKF should share information more easily"; however, there is little trust in the effectuation of this statement.

4.3.4.4 Challenges

Challenge
The central bureau of statistics needs to improve its data collection as there is no central collection point for data
There is data available in Suriname; however, the sources are hidden and often private
The government wants more data but is not willing to make investments in gathering data
If data is available, it is too little to form a conclusion, and there are many inconsistencies among databases
Data is seen as personal property, and if someone leaves an organization, they sometimes take data with them
Businesses do not want to share data out of a lack of trust and the benefit of having unclarity surround their operations
The chamber of commerce has economic data but refuses to publicly share them and has not published data for three years

4.3.5   Culture

In many of the cases that have been discussed so far, there seems to be an impact by culture. While this report does not try to present a representation of the (business) culture of Suriname, the interviewees have made important statements as they explain some of the decisions that have been made and the challenges involved with potential changes in the future.

4.3.5.1 Change

Digitalisation is a relatively new technology, with the worldwide adoption of the internet around the year 2000. "Change is not only a matter of will, but it is also a part of culture", according to one of the interviewees. Earlier in this report, we discussed the awareness of the impact that digitalisation could offer. Many mention the benefits the technology offers. Therefore we will focus on the cultural aspect of developing digitalisation in Suriname in this segment.

One reason change is difficult in Suriname is a fear of losing power: "Everyone says something has to change, but no one is going to say they want to hand over power." This need for power is made more

explicit in the following statement: "Everyone wants to score; every party wants to score." This level of power play continues in the current government. Multiple statements mention a power struggle between the two largest political parties in the coalition. Ministries are unwilling to work together because another ministry has a minister of a different party.

When asked what is required to change this situation, the first response was, "It is accepted. It is culture in Suriname." Showing just how embedded the power-play is. When asked why it has become part of the culture, "one party can say it's not right, but the other does it too" introduced the paradox.

4.3.5.2 Initiating change
Change can be initiated by questioning the current situation and speaking up. However, these actions are challenging in the Surinamese culture as "Criticism is seen as negative." Besides being seen as negative, speaking up can have far stretching consequences. "Suppose you go out on the street; you'll be fired tomorrow. The population is small." The small scale of Suriname removes anonymity, and a critical attitude can quickly influence one's personal and professional life. Therefore "there is no incentive to express your opinion."

There are talks on change, but these do not have the desired effect: "There is a lot of inefficiencies; there is a lot of talking and a lot of explaining, but there is almost no result" Because if someone is required to act, a fear of failure arises: "People are afraid to make mistakes because mistakes have consequences." This results in a culture where doing nothing is safer than taking risks: "Doing something can be punished, not doing something makes you a jerk".

4.3.5.3 Challenges

Challenge
People want to see change yet refuse to take actions that might negatively impact their power position
Coalition parties work against each other instead of together to solve national problems, slowing the government in general
Political parties do not propose change, as they themselves are also exploiting the system
In Suriname, speaking up and being critical is seen as something negative
There is no security for those who speak up; being critical can cause someone to lose their job or get punished
Not taking any risk and accepting the situation appears to be the safest and most desirable way of working

4.3.6 Payment
Suriname is a cash-driven economy. This means that citizens and businesses prefer to use cash transactions over money transfers and bank storage of their money. The use of cash also means that (online) banking is used less frequently. In this segment, we will discuss the payment infrastructure, the cash economy, and the role banks play in transitioning away from cash.

4.3.6.1 Cash Economy
In Suriname, cash is the most popular way to pay for products. One of the interviewees indicates that "60 to 80% of transactions are done in cash." The importance of cash is so considerable that "ATMs are empty at the beginning of the month when people get their salary." The cash issue is not due to a lack of bank accounts because "most people have a bank card." However, "You can have a bank card, but outside the city, everything is done in cash."

There are multiple reasons why cash is so prevalent in Suriname; "A reason for cash is a fear of tax, but also money laundering." Cash transactions are more difficult to track and therefore support the existence of informal and illegal activities. This is made more difficult because many alternative

currencies are used. "A fundamental problem is that SRD, US Dollars, Euro and gold are all used for payment." Another reason is "[…] because the banking system is unreliable." A sentiment that is seen as wrong by banks; "Banking secrecy is holy; the tax agency can never find out."

The cash economy has many risks, which the interviewees know. "The cash economy entails many risks." It is generally stated by some, while others make it more specific: "The risks of cash are that you cannot indicate the origin of all resources" and "Pin is safer; there are fewer robberies." Although the risks are known, cash payment remains popular.

Large businesses and banks want to move away from cash transactions because of the risks; "The biggest challenge for us as a large company is the cash economy." When discussing this transition, it becomes clear that attempts have been made to change the system. For example, there have been "many promotions since 2019 to put money in the bank." However, for multiple reasons, these attempts have failed.

"Efforts have been made to put pressure on companies to move to digital." As stated by one of the organizations. If businesses would not comply, "we don't deliver." "Forcing companies to pay cashless led to an industry-wide boycott." As a result, the organisation had to let go of its plan to force cashless payments. "Now an incentive structure is used that is not successful, still 60-80% cash."

4.3.6.2 Digital infrastructure

The payment infrastructure in Suriname can be divided into two parts: cash infrastructure and digital infrastructure. However, for the scope of this research, only the latter is relevant. Therefore, we will primarily focus on the digital infrastructure in this segment.

At this moment, "Infrastructure for digital payment is in place". However, the "payment system is not fully operational." This is based on interviewees' statements. There are, for example, "complaints of customers getting cut off services while having paid." This shows that although there might be a digital banking system, there are still challenges in the implementation.

The infrastructure for transactions via bank cards, also called Point of Sale (POS), is in place in Suriname. The technology has also been updated to be more future-proof. "Point of sale previously went via phone line, [and] now it's nearly everywhere on the internet." "Point of Sale transaction is instant but not generally accepted." Throughout Suriname. Many businesses have a POS device yet state, "The payment terminal does not connect 9 out of 10 times." While some interviewees made statements that this was due to lousy maintenance by banks: "Payment terminals are the property of the bank, they need to install updates." The perspective of banking institutions is different: "Some entrepreneurs have a POS device but say it is broken, which is not true."

Besides the POS payment terminals, there are alternative ways of digital payment. For example, rolling out a payment system without a bank account dates back to the introduction of SMS. The technology was ready to be implemented back then, but "legislation was an obstacle." Since then, "alternative payment methods […] exist but have not been adopted." An example is Mopé. "Mopé is payment without cash. You buy it with phone credit, and it can be used for iDeal."

Also, the government has introduced its own platform to promote cashless transactions. They have "introduced Uni5Pay. It costs 0srd, and people still don't use it." When discussing the low adoption rate, interviewees state that: "The problem is that everyone wants to impose their own solution, you don't want six bank accounts, but 1." This also seems to correspond with a large number of non-bank accounts digital payment services.

4.3.6.3 Banks

When discussing payment in Suriname, the banks have a big impact. Statements such as "the risks of cash such as theft and crime are the bank's social responsibility." Show that banks are aware of their role in the payment development of Suriname. "Banks have had a very difficult time working together for a long time." However, banks are now cooperating in multiple ways to innovate. The first big cooperation between banks is the founding of B-Nets. "B-Nets aims to make ATMs work together." It rebrands ATMs to one brand to simplify logistics and lower costs. "B-net is now separate from the banks, including logistics."

Furthermore, "all banks have offered the government to give the socially disadvantaged access to a bank account." However, the plans have never been executed. "If the plan had been carried out, 60,000 people would now have had an account. But this project has been running for 1,5 years."

Besides these positive developments, there are still issues within the banking system. For example, some interviewees mention the difficulty of setting up a bank account: "Requesting a bank account can take up to 3 months" and "a request to open an account you might never get a response to." Both statements are familiar to the banks and could be solved with digitalisation. At this moment, "all banks offer online banking."

4.3.6.4 Challenges

Challenge
Suriname has a cash economy, with 60 to 80 percent of transactions being cash
The cash economy stays in place out of fear of paying taxes when money is in the bank
The Surinamese economy uses multiple currencies besides the Surinamese dollar, such as gold, euros and US dollars
There is a digital payment infrastructure, yet people have issues with payments not coming through from time to time
Businesses have a payment terminal yet state that they are broken to force customers to pay cash
Alternative easily accessible digital payment methods are widely available, yet citizens refuse to adopt them
Banks are working to make banking accessible to everyone, yet the government does not respond with the required urgency
Setting up a bank account is a tedious, long procedure that can take months, with a plausible chance that the procedure halts for no reason

4.3.7 Education

Education has been a returning subject during this research. People need to be educated to drive innovation. However, almost half of the interviewees have stated their worries regarding education in Suriname. "Knowledge is the big problem." It appears to be seen as one of the biggest reasons why innovation is lagging.

4.3.7.1 Education to business gap

To begin with, the general level of education. "Education numbers are low. 10% have a degree in higher education." This means that "The mode of education is around high school." However, this is not seen as the main challenge in education. "The real challenge lies with matching training and programmes to businesses." This mismatch is called an education-to-business gap. Moreover, the respondents are clear: "there is a business to education gap", and the "education to business gap is large." Their message: "the curriculum needs to be better aligned with business demand."

However, the exact cause and scale of this education gap are difficult to describe. One of the respondents explains that the cause lies in stubbornness: "The business-to-education gap is mainly there because the older generation does not want to accept the knowledge of the younger

generation." Others state that the studies do not provide experienced employees: "Companies want employees with experience, but studies do not provide in this." Because education does not match the job market, "there is a lack of qualified personnel." Because of this lack of qualifications when graduating, "[…] graduates do not get the work."

To solve this issue, educational institutes are looking into ways to incorporate the opinion of businesses. For example, one of the educational institutes has adopted the American DACUM model, which involves a panel of business representatives to shape the curriculum of a study programme. Because of the success of this model, "there is a law that will implement a version of the DACUM model in the future." At all higher education institutes, "[…] the programs are evaluated by professional field experts and the professional field."

However, not everyone agrees with the statement that there is a business to the education gap. "There is a brain drain going on", according to some. "If you are able to leave, then you leave. Can you go to the Netherlands, then you go." This implies that while the education system might not match the desires of Surinamese businesses, it could meet that of businesses abroad. This strengthens the earlier point that the newer knowledge is not accepted.

4.3.7.2 ICT education
Especially for this report, it is important to focus on the integration of ICT in the curriculum of education in Suriname. "Digitisation is being included in education, but it is not given the highest priority", according to a respondent. At multiple higher education institutes, ICT studies are offered, "but that mainly focuses on innovation in business management."

Currently, at least one of the institutes is working on expanding its ICT programmes. "We have now finished 1 part; data science", Yet it remains a challenge to offer a differentiating educational programme to the half a million citizens in Suriname. "We try to prevent that we set up an ICT study and that it is duplicated by another institute." At this moment, "there are a number of people in Suriname who have a bachelor's degree in ICT; now the challenge is setting up a master's degree."

During the segment on the economy of Suriname, it became clear that some businesses lack knowledge of accounting. The government offers support: "coaching and funding for a business are available." However, when asked about coaching and funding for support in digitalisation, it became clear that "Information for digitisation is not yet available." "Businesses do not have the knowledge to digitalize." at this moment.

4.3.7.3 Challenges

Challenge
Suriname has a low number of higher educated citizens, at around 10%
Study programmes do not match the requirements of businesses
Educated citizens leave Suriname to work and study abroad, which causes a brain-drain
Digitalisation is being included in education, yet it is put aside, with studies focussing on the oil and gas sector being prioritized
A bachelor's in ICT is offered, yet a master's programme still has to be created
Businesses do not have the knowledge to digitalize, and information to teach them is not available

4.3.8   Strategy

We have so far discussed a large part of the foundation of Suriname as a society and the level of its infrastructure. We will combine many of these aspects in the following section when we focus on strategy and innovation. We start by introducing the overall investment mentality of Suriname, working towards identifying the position of digitalisation in the strategy of organizations.

4.3.8.1 A lack of investments

As discussed in the segment on the economy of Suriname, businesses are currently focussing on the short term instead of the long term. At this moment, "survival culture is a thing." "People are in a survival mode because of economic hardship." According to multiple interviewees. As a result, "IT is not the highest priority." However, behind the current economic hardship lies more that can explain a lack of innovation and strategy.

"The average business owner is not thinking about policy." Furthermore, "business owners do not want to invest." These are two statements that show both a lack of awareness and willingness to invest and strategize. Besides a lack of planning for improvements, "businesses have no middle to long-term vision." Because of this, "businesses have no goals, so investments stay away." When asked why businesses make this decision, the following was mentioned: "Businesses understand the importance of investments, but there is no priority."

4.3.8.2 IT vision

"Organisations want to invest, but the return on investment is too small or too expensive." In some cases where an investment shows immediate results (e.g. an extra chicken increases egg production), this is harder to visualize with investments in technology like IT. As a result, "IT and ICT costs are characterized as literal expenses, returns have never been passed on or studied what can be obtained from them." This results in a list of building problems: it is unknown what is spent on IT, so a return on investment cannot be created, and because of a lack of investment perspective, people refuse to invest more in IT.

Besides this, another problem arises: "Digitalisation increases efficiency and therefore improves competitive advantage, but too expensive at the moment." An interviewee states. To increase the profit of an organization, investments need to be made. Nevertheless, investments cannot be made without an increase in profit. "Funding for IT development is lacking", and "Digitizing SMEs is a very long way to go." This shows that there is still room for improvement.

When we look at an earlier statement, we can link this to the described innovation strategy. The connection cost of a fibre connection to a business costs 50.000 SRD for an entrepreneur. Because of a lack of information on the potential ROI, a lack of knowledge on the potential of IT and an overall market consensus that stability is best without investment, we can start to understand the reasoning behind lagging IT development.

As discussed, larger organizations focus more on implementing digital systems in their organization: "The digitisation of administration is in the spotlight." However, most smaller business owners are currently at a different step in their IT development: "It's a big step for business owners to take an internet connection."

4.3.8.3 Challenges

Challenge
The average business owner does not have a vision of the future; they live by the day
ICT costs are seen as an incidental expenditure, not as a structural part of business operation costs or an investment

Business owners understand the principle of investments, yet there is no incentive for them to do so
Investments in digitalisation can increase efficiency and revenue, yet the initial investment cost is too high for the average business
For many businesses taking an internet connection is a big step on its own

4.3.9   Government

The next subject was mentioned most during the interviews. In many ways, the government impacts the development of IT in Suriname. Key subjects within this section have been identified based on the categorisation of statements. At the centre of these subjects lies the eGov working group.

There is a lack of national vision and strategy regarding IT policy. Although the government has taken action to provide a strategy and vision for IT policy, this has not shown any impactful results. Drafting a vision was started by founding the eGov working group. This working group was created by presidential decree during the previous government period and continued by the current government.

EGov is a presidential working group and an under-directorate. The working group was created to bridge maximum earnings between the public and private sectors to attract more experts on digitalisation from the private sector. At this moment, a brain drain of the government is occurring. The government has low salaries but good benefits compared to the private sector. The government is therefore seen as a great place to start one's career but is often traded for a private position after a few years of working.

In the change from the previous government to the current government, the exact reason for creating the eGov working group was lost. The current goal of eGov is to centralise government IT policy and, simultaneously, make it more effective. At the moment, all ministries have their own IT service. As there are 17 ministries, this causes a lot of duplicates and redundancy in IT workflow.

An example of redundancy is system redundancy. However, the government has its own centralised data centre and mail server. It is mentioned that many ministries have data servers. These servers often do not meet modern requirements, with examples of server PCs lying on the ground, no backup infrastructure or unclarity of permissions on the server.

Besides redundancy, employees within the government fulfil their IT needs with their own solutions. For example, individuals still use private email addresses to communicate official work-related matters. Some interviewees explain this to ensure that the data is not lost during a management change. However, others refer to this as a lack of confidence in governmental data security and a personal claim on data.

Multiple respondents have mentioned a reoccurring subject: data ownership is often seen as linked to an individual instead of the organization they work for. For example, if a person retires or is moving away from a position in office, it is not a rarity that data is removed from the office server and taken by the person leaving.

Because all ministries have their own data servers, and employees sometimes install their own servers, there is no centralized control and backup of the data on these servers. Therefore, if a server crashes, it can mean that all the data from a ministry is lost—no centralised agency checks for backups. In the past, this has already occurred, resulting in missing passport data.

The primary goal of the eGov working group is to digitalize the citizen register further and link it to other systems and services to optimize processes. The current situation requires citizens to retrieve a printout of their personal data, which needs to be physically requested at the ministry. An estimation

made by an interviewee is that 80% of the government services require such a print-out. Due to the limited validity of a printout, citizens are often required to re-apply for a printout of their data. This involves application costs, waiting time at the registry, and causes work for the government. By linking the citizen registry to other government services, citizens would no longer be required to apply for a print-out but can prove their identity at the respective government organization by showing their passport or ID card.

The plans of digitalizing the citizen registration took more time than the eGov working group had anticipated. The plans are there, the means are these (Inter-American investment bank), but contracts are not signed. As a result, the eGov working group does not Honours the working group is contacted when a ministry cannot solve its issues. Therefore, the eGov committee is more reactive than proactive.

Multiple ministry buildings have burned down in the past, and servers have crashed. In each of these cases, data was lost. Losing data in such a situation appears to be accepted. If the data is lost, the organization starts from scratch again, with no questions asked. Investing in a backup solution to prevent this from happening is not embedded in this culture of accepting data loss.

The government understands the importance of the economic development of Surinam businesses. Therefore, the ministry of economic affairs is organising events throughout Suriname to educate business owners to optimize their businesses. However, the subject of digitalisation is only a small part of these events. Instead, the ministry has stated that they support businesses with digital development if they contact the ministry for support. However, as mentioned before, most business owners do not have digitalisation as a focal point for the development of their company. This means that although some businesses might use the support offered by the ministry, most businesses remain in the dark.

4.3.9.1 Challenges

Challenge
There is no functioning national vision, strategy or coordination regarding IT policy
Ministries all have their own data servers and IT infrastructure, which often do not meet modern requirements
Between the 17 ministries, there is a lot of redundancy in hardware and software contracts, causing high costs and overall inefficiency
Government employees use their private communication channels for work-related communications
There is no centralised agency that checks backup infrastructure; as a result, in the past, a lot of data has been lost in fires, crashes and transfers of power
The presidential eGov working group has a lot of potential but is currently held back by ministries making it reactive instead of proactive
Losing data has been generally accepted by the government. If data is lost, you just start gathering from scratch

4.3.10 Conclusion

We have identified nine challenges and opportunities based on the statements made during the interviews. The statements have been bundled into concrete challenges. These will be discussed in segment 4.4, which discusses the outcome and links it to the research questions.

5. Analysis

Based on extensive interviews and structured processing, we can now start to analyse the results to answer the research questions. First, we will discuss the questions introduced at the beginning of the report, starting with two sub-questions and finishing with the main research question.

5.1 "WHAT IS THE CURRENT STATE OF DIGITALISATION IN SURINAME?"

At the end of the interviews, it became clear that more information was available than previously thought. However, most of this information is not publicly available and incomplete. The data offered by Telesur is not publicly available, making it difficult for legislators and businesses to create policy.

In the theoretical framework of the model by Sabbagh et al. (2012), Suriname was ranked as constrained in its digital development. Having collected information during this research, it appears that the largest increase in the digital infrastructure has been in the capacity and speed of mobile networks. However, interviewees still criticize the network's affordability, reliability and speed. This appears to show that the state of digitalisation has barely improved.

After the interviews, it became clear that the model by Haris (2010) did not fit the development level of Suriname. In many cases, there was no information available about the domains identified by Haris. Furthermore, there was limited information on neighbouring countries, making comparative modelling difficult. We can, however, draw some important conclusions about the physical development of digitalisation in Suriname.

In 2022, most internet connections were offered via old, corroded copper cables. There are plans and investments to improve these fibre connections; however, 70% of customer connections have not yet been improved. Furthermore, mobile data connections are available with modern protocols (4G, 5G). However, these are often limited to densely populated or economically attractive regions such as Paramaribo and Gold mining industries.

Despite most households having a fixed broadband internet connection, many businesses do not have such a connection. There is uncertainty on the exact number of business connections as there is no restriction for businesses to use consumer connections. Many businesses are unaware of the benefits and potential return on investment of implementing digitalisation in their organization. For many businesses, having an internet connection is a big step.

Furthermore, there is a large difference in digitalisation based on business size. Micro businesses use no digital technology, whereas large organizations often have to meet international requirements. Furthermore, the government is reluctant to digitise data and enhance processes with digital solutions.

Suriname is not in one state of digitalisation but is developing at different speeds in different social groups. Large businesses are working on digitalisation and sometimes a digital transformation, whereas smaller businesses remain stuck at the step of digitisation. The few SMEs between these two groups implement limited digitalisation. The government appears to have settled on partial digitisation and limited digitalisation.

5.2 "WHAT ARE THE PLANS FOR IMPROVING THE DIGITALISATION OF SOCIETY IN SURINAME?"

Although Suriname has limited centralised written plans, organizations in different layers of society do have plans. Despite the government not having formulated digitalisation plans, a presidential working group (eGov) has started to create policy. Furthermore, telecom providers are investing in the sustainable innovation of the network in Suriname and with the expansion of national bandwidth

by increasing ocean cables, replacing copper cables with glass fibre, and increased coverage with mobile networks.

Whereas on a national level, decisions are made for the digitalisation of society, businesses develop at different speeds. Large businesses actively focus on developing digital infrastructure. The reason behind this is often meeting international standards and competitive advantage. However, as businesses get smaller, so does the attention to digital systems. Medium-sized organizations often have their finances digital, and small businesses run without any digital systems.

The ICT Association of Suriname has formulated a vision supported by strategic goals. However, this document does not translate the goals into actions. Furthermore, no additional information is available on concretising the strategic goals. Because of this, it is not easy to track the progress of plans as well as the achievability of the plans.

Finally, education institutes in Suriname have recognized a need to offer courses in digital fields. At this moment, courses are being developed in collaboration with society. At this moment, however, the priority lies in adapting education to the requirements of the offshore oil and gas industry. Furthermore, because of the

5.3 "WHAT ARE THE CHALLENGES IN THE DIGITALISATION OF SOCIETY IN SURINAME?"

We have identified nine key challenges that impact the digitalisation of Suriname. Many of which are connected and cannot be seen separately. In total, 63 concrete challenges have been identified, an average of six per dimension. While the complete list can be found in Appendix C, we will discuss the general outcomes here.

The first challenge is the economic situation in Suriname. There is a consensus that Suriname is economically not doing well, which results in many businesses postponing investments such as digitalisation. Furthermore, the economy of Suriname has a considerable number of informal businesses which benefit from haziness. Digitalisation could endanger these businesses by introducing clarity.

The second challenge is the quality of IT infrastructure. Suriname has invested in the development of its mobile networks. However, outside the densely populated regions, internet is scarce. Furthermore, the majority of the fixed cable network consists of copper cables. These copper cables are corroding and unstable. Finally, many businesses do not have a proprietary business connection. As a result, businesses are limited to low bandwidth and unstable networks, slowing the adoption of digital systems within their business.

The third challenge is the low maturity of digitalisation at this moment. Most small businesses do not use any digital solutions. Medium-sized businesses are often limiting their digital systems to financial management. Only large businesses use digital systems structurally throughout their organisation. Because of this limited adoption of digital systems, there are no best practices or companies that offer customised implementations.

The fourth challenge is the availability of data. The government, bureau of statistics and chamber of commerce offer limited data. One of the reasons behind this is a lack of data openness. Many organizations withhold sharing data with others out of fear that it could be used against them. However, some organizations do not own any information because they do not wish to invest in collecting relevant information. Due to the lack of data, it is difficult to formulate concrete policies and measure policy performance.

The fifth challenge is culture. In Suriname, obtaining and staying in power is essential, so people are not eager to initiate changes that might reduce their power. As a result, power-play occurs regularly, which slows change. Personal advantages are more important than overall improvement. Furthermore, criticism is seen as unfavourable and can have significant consequences. Therefore, people in power change little to remain in power, and people without power are not undertaking actions out of fear of losing what little they have.

The sixth challenge concerns payment. Suriname is a cash-driven economy. The use of cash results in risks such as money laundering and drug trafficking. People are aware of these risks, yet the opportunities cash offer outweigh the downsides. Cash helps evade taxes and supports the informal sector. Because of the cash economy, the digitalisation of services such as web stores and online food delivery is slowed, as citizens withdraw money immediately when possible.

The seventh challenge involves education. In Suriname, the percentage of higher educated citizens is low. Furthermore, there is a mismatch between the requirements of businesses and the education offered. However, long-term developments might be slowed by focusing too much on the requirements of businesses at this moment. Currently, there are limited educational opportunities in the field of digitalisation. Furthermore, awareness in society of the benefits of digitalisation is low, suggesting that it should be a subject in more curricula.

The eighth challenge is the lack of strategy. According to the interviewees, the average business owner in Suriname does not have a vision of the future. Instead, they live by the day. Businesses are not incentivised to invest in digitalisation. Because of this, ICT costs are still seen as an incidental expenditure instead of a structural part of business operation costs. The initial investment in digitalisation can be high, which prevents businesses from investing. All in all, one of the main challenges is that businesses have no strategy.

And the final challenge is the government. There is no national vision, strategy or coordination on IT policy. The government has a complex IT infrastructure, which often does not meet modern requirements and has redundancies across ministries. Government employees are not correctly using government data; because of all this, much government data has been lost. As the government does not have its own IT services organised, nor does it focus on improving the IT infrastructure of the country, digitalisation is in the hands of individual businesses without national coordination or supervision.
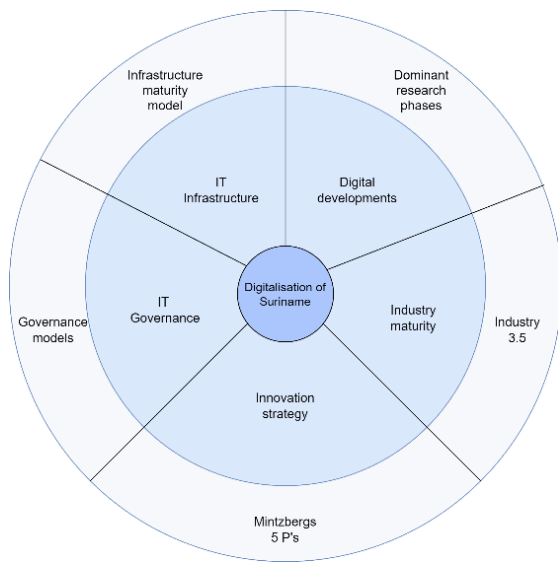
5.4 THEORETICAL FRAMEWORK

Figure 8 - Theoretical Framework

Chapter two introduced a theoretical framework with academic literature relevant to this report. Having conducted the interviews and analysed the results, we will now discuss whether the results can be linked to the subjects from the theoretical framework and reference these to the identified challenges in Appendix C. We will also analyse whether the results are not covered by the literature from the theoretical framework.

The theoretical framework identified five quadrants; Digital developments, Digital maturity, Innovation strategy, Governance and IT infrastructure. When comparing these to the identified challenges, we see a partial overlap in subjects. However, the framework does not include literature on the challenges involving Culture, Payment and Education. These subjects require future research.

Digital Developments

We start by discussing the result concerning digital developments. During the literature review, we identified multiple digital development research phases. These phases indicate the focus of international research on the subject of digital developments. By identifying the phase most suitable to Suriname, we can identify which era of research fits the situation in Suriname.

The interviews proved that there are digital businesses in Suriname and that some businesses use digital technologies to connect with customers. However, digital businesses and technologies are limited to larger businesses. A potential reason is that larger businesses are inclined to compete with international standards and therefore meet more recent research standards.

However, small businesses are limited in their digital developments, as supported by challenge 14 in appendix c. As small businesses comprise the majority of the economy, we can conclude that the majority of the economy of Suriname is in the first to second phase of Ritter and Pedersen (2020), with outliers to Phases three and four in larger businesses. This shows that international research focuses on developments beyond the development level of Suriname, which increases the barrier for Suriname to catch up with digital developments.

Furthermore, the segment on digital developments identified institutional barriers that limit the digital transformation in developing countries. In a paper focussing on the economic development of Ghana (Effah & Nuhu, 2017), the following three barriers were identified: "(1) failure to adopt an integrated process approach; (2) failure to completely deinstitutionalize the existing paper-based process flow and physical signatures, and (3) failure to update outdated laws and procedures."

It was unknown whether the barriers in Ghana and the following recommendations would apply to the situation in Suriname. We, therefore, compared these statements to the outcome of the interviews. Based on the results, we can conclude that all three identified barriers apply to the situation in Suriname. We have identified that there is (1) a missing national vision and strategy for

digitalisation (challenge 54, appendix c). Furthermore, we have heard statements that (2) many government processes still rely on paper backups and physical personal data print-outs. Finally, we have heard that (3) laws on privacy are missing and that the adoption of digital bank accounts in early 2000 was blocked because of outdated laws and procedures.

Knowing that the barriers of Ghana can be applied to Suriname helps broaden the source of relevant literature. Furthermore, the proposed solutions by Effah and Nuhu (2017) could be adapted to Suriname in future research.

Industry Maturity

The second quadrant of the theoretical framework is industry maturity. The literature review used Industry 4.0 as a reference for maturity, because Industry 4.0 (or smart industry) is actively being discussed in the literature. During the literature review, we identified that industries develop at a different pace globally. The model of industry 4.0 is developed in western Europe, an economy that develops differently from countries in Asia. Because of this difference, models might not fit businesses' situations. Therefore hybrid maturity models are being developed, such as Industry 3.5. There was, however, no information available on the industry maturity of Suriname.

Based on the interviews, we can assume the current industry maturity of Suriname. When we compare the interview results with the conceptual framework and comparison table for Industry 3.5 in appendix G (Chien, Hong, & Guo, 2017), we can estimate the industry development of Suriname. In the analysis of the results, we notice that the features of Industry 4.0 are not mentioned once during any interviews. Furthermore, the features of industry 3.0 and 3.5 are met by only a small part of the Industry in Suriname; the larger businesses.

The majority of businesses do not meet the Industry 3.0 features as supported by challenges 14, 16 and 17 in appendix C. This means that instead of the anticipated Industry 3.5, Suriname appears to be closer to an Industry 2.5 level. Based on these findings, we can conclude that there is no fitting model to compare the industry maturity of Suriname directly with industry 3.0 and 4.0 standards. Future research is needed to identify the exact development level of the economy. Future research could profit from focussing on research that discusses transitioning from industry 2.0 directly to industry 4.0, such as (Lyer, 2018) and (Yin, Stecke, & Li, 2018).

Innovation Strategy

During the literature review, we identified that strategy is the primary driver of digital transformation. To discuss the readiness for digital transformation in Suriname, we need to understand the general strategy of businesses in Suriname. The five P model by Mintzberg (1987) is used to break up the strategy of a single organization into a structured overview. Because of the scope of this report, we will use the model to make a generalised overview of industry strategy in Suriname. Based on the outcomes of the interviews, the model will be filled in. The result can be seen in the following table.

Table 9 - Five P model of Suriname

Approach	Strategy in Suriname
Plan	A small group of society has long-term plans. For example, small businesses have no long-term plans, while large corporations do.
Ploy	Organisations are suspicious of competition yet do not adapt their products and services for a competitive advantage.
Pattern	Suriname has an unstable political and economic situation. Because of this, there is little consistency in the action of organisations.
Position	*We do not have enough information from the interviews on the strategic positioning of businesses and organisations.*
Perspective	There is limited availability of vision and direction in organisations. Large organisations have plans, yet smaller businesses do not.

Based on the interviews, we can conclude that (small) organisations in Suriname have difficulty with planning. As supported by statements 49 and 50 in appendix C. This is not a challenge for Suriname alone and has been documented in research abroad (Cordeiro, 2013). However, with a lack of planning, a lack of strategic patterns and no strategic competitive differences, small organizations in Suriname appear to be missing any Strategic planning, which could slow the digital transformation.

Based on the findings by Kane et al. (2015) that involve organisational planning and execution, we can estimate whether the identified strategy meets the requirements to accelerate the digital transformation. We will do so in the following table. The table emphasises the impact of the lack of a (digital) strategy in Suriname.

Table 10 - Findings by Kane et al. 2015 linked to results

Findings	Situation in Suriname
Digital strategy drives digital maturity	We identified that many businesses do not have a strategy. A digital strategy is rare and only occurs in larger businesses.
The power of a digital transformation strategy lies in its scope and objectives.	*Due to limited digital strategy, no information is available on the scope and objectives.*
Employees want to work for digital leaders	There are few digital leaders in society, and Suriname's digital service economy is small.
Taking risks becomes a cultural norm.	Taking risks is explicitly mentioned as dangerous in Suriname. People prefer to accept the situation as it is.
The digital agenda is led by the top	There is no digital agenda, and individual ministries hold back the EGov working group tasked with making an agenda.

We can conclude that a change in the perception of the digitalisation strategy is needed. The literature review stated that the opinion on information systems needs to change to adopt a digital strategy. Based on the results, we can confirm that many businesses are unaware of the added benefit of information systems and the importance of an organisational strategy, as supported by challenges 51 and 53 in appendix C.

 IT Governance

The literature review introduced a variety of potential governance models. These models are designed for specific scopes and process types. However, based on the interviews, we cannot conclude that a generally accepted IT governance model is in place. We can now assume that majority of the Surinamese economy does not use any (IT) governance model. This is supported by challenges 54 through 59 in appendix C.

IT Infrastructure

The final quadrant of the theoretical framework focuses on IT infrastructure. At the centre of measuring the infrastructure lies the maturity model by Haris (2010). We use the level descriptions as defined by Haris in Appendix F combined with the interview statements. We have ranked ten of the thirteen dimensions. Not included are: infrastructure provisioning, Ecosystem relationship and pricing scheme due to difficulty with scaling up to a national level and therefore missing data. In the following table, the remaining ten dimensions are discussed

Table 11 - IT infrastructure maturity

Dimension	Level	Motivation
Infrastructure management	1-2	Telecom providers decide the course of infrastructure developments. Because of this, some businesses and urban regions are stuck with older connections.
Knowledge	1	One of the returning statements during interviews is a reluctance to share data.
Service management	2-3	In the cases where digital services are available, such as banking and limited government agencies, services are well architected, and no complaints on stability are registered.
Solution driver	1	Interviewees have stated that service prioritisation can depend on the position of an individual instead of the size of the problem.
Management focus	1	Although Suriname has a centralised government, the economy is characterised by organic growth and an uncoordinated, distributed structure.
Organization	0-2	The basic level requires a focus to avoid downtime. Most small businesses are not reliant on or have access to digital systems to meet this level. Larger corporations focus on keeping control
Agility	5	Due to a lack of consistency or pattern strategy, organisations are completely agile.
Business interface	1-3	Service level agreements are a level of formalisation reported to be scarce in Suriname. Although larger businesses are required to make agreements to guarantee production stability, most of the economy does not.
Utilization	1-3	Small and micro businesses are reported not to manage resource utilization. However, larger businesses which need to comply with international standards have a better yet basic understanding of resource utilization.
Automation & Process management	1-2	Small and micro businesses are reported not to automate or manage their processes. However, larger corporations have implemented process management systems yet remain reactive, partially because ad hoc is standardised.

When we analyse the levels of each dimension, we can spot a trend. The economy of Suriname ranks as basic/controlled on the maturity of IT infrastructure. One innovative outlier is agility, which appears to be enabled by an unstructured, inconsistent business strategy. These organisations often have very high desktop and server management costs and have a minimal positive impact on IT. The low-scoring dimensions are supported by challenges 8, 9, 11 & 12 in appendix C.

In conclusion, the theoretical framework supports the analysis of sections 4.1 through 4.3. First of all, Suriname is behind in the international developments of digitalisation. Secondly, the industry develops uniquely, not covered by conventional industry maturity models. Thirdly, the country lacks strategic planning and a digital strategy. Fourth, there appear to be no governance models in place, and finally, the IT infrastructure of Suriname is meeting a basic maturity level in a model from 2010.

After the literature review, we formed a theoretical framework based on the challenges identified by Hulla et al. (2021). Having discussed the results from the perspective of the theoretical framework, we can now link these results to the challenges by Hulla et al. In the following table, we combine the challenges by Hulla with the results from this report as discussed before.

Table 12 - Combining Hulla et al. (2021) & Research results

Challenges by Hulla et al. (2021)	Results of this report
Lack of strategy/roadmap	Multiple respondents have expressed a desire for a national strategy and roadmap. The proposal by the ICT association supports this desire of businesses. In September 2022, there was no national digitalisation strategy.
Recognizing the potential of digitalization + Knowledge by reading state-of-the-art in digital technologies	International developments in digitalisation primarily focus on issues surrounding Industry 4.0. Because of this, international developments to not meet the requirements of Suriname. This makes it difficult to see the potential of digitalisation.
Lack of digital skills and competencies	Currently, there is a digitalisation team under presidential decree, the eGov working group. However, it has been stated that this working group has not yet had an immediate impact on digitalisation in Suriname.
Monetary and personnel resources	There are resources available for the development of IT infrastructure. Some parts of the Surinam network exist of up-to-date international technologies such as 5G. However, resources are limited to physical infrastructure, which is limited to select geographic locations.
Mindset of employees	We have heard statements that the majority of business owners is not focusing on long-term innovation and risk. As a result, society is not in a mindset of accepting and implementing digitalisation.

Based on the table, we can see that the current situation in Suriname compares closely to the identified challenges by Hulla et al. (2021) for SMEs. Having identified these similarities, we can use the recommendations form the same paper to structure our conclusion and recommendations in the final chapter.

6. Discussion & Conclusion

This chapter consists of three segments. Section 5.1 presents the conclusion, discussion and limitations based on the three research questions. Section 5.2 discusses possible further research and actions.

6.1   CONCLUSION

More information on the digitalisation of Suriname is available than first anticipated. However, the available information is often privately available. Suriname has developed since ranking "constrained" in 2012, yet the statements made during this research indicate that the situation has barely improved. Interviewees state that most businesses do not use digital systems, and most households use unstable copper network cables. In addition, digitalisation in Suriname is unregulated and unmonitored and therefore develops at different speeds in society, increasing inequality.

At the time of writing, Suriname has no national plan to improve digitalisation. However, large businesses are investing in their digital infrastructure—showing potential for improvement.

Nine key challenges are identified to impact the speed of digitalisation in Suriname: economic instability, outdated IT infrastructure, low digitalisation maturity, low availability of data, a power-play culture, cash economy, education, a lack of strategy and bad governance.

With certainty, it can be said that this is the first report to present findings on the current digital developments of Suriname on a national scale. We have documented challenges that some interviewees stated as generally known to many. However, none of these challenges was available in writing before. The literature review has shown that the majority of current research focuses on the further advancement of already advanced societies. Research focussing on the digital improvement of developing countries is scarce.

This report not only goes against the mainstream trend in digitalisation research by not focussing on advanced countries but also offers clearly defined challenges that researchers and legislators can use. We, therefore, present a report with potential for societal impact.

6.1.1   Findings

This report is the first to research the digital development of Suriname, and it is, to our knowledge, the first qualitative research with this scope to take place in Suriname. The information gathered in this report applies to more than the subject of digitalisation; it is an introduction to the workings of society in general. Therefore, challenges that have been identified can be applied to many other fields. Therefore, this research is far more than identifying challenges in IT; it is a first step toward the development of Suriname in general.

This research paves the way for future research, as it is the first to present a structured overview of challenges in Suriname. Many subjects require more information and thorough research, and scholars can now identify a field of research based on this deepening research.

6.1.2   Limitations

Throughout this research, decisions have been made that have impacted the outcome. These are the limitation which will be discussed in this segment. This research was conducted in a strict time window. The interviews took place over a period of three weeks, which limits the scope of this report and has limited the ability to conduct an in-depth analysis of specific statements. Digitalisation is still a very generalised subject, which this report has not specified. Therefore, the research is broad and can miss a nuance.

The researcher had no previous knowledge of Suriname, which makes them reliant on information provided by others and increases the chance of bias. Furthermore, the limited knowledge of the country means that underlying sentiments cannot always be explained.

The literature was searched via Google Scholar and Scopus. Via these platforms, literature has often been filtered for publications since 2018 to guarantee recent research. This excludes more fundamental, older research and the algorithms of these platforms focus on popularity over keyword matches. The research could have been linked more to existing models to structure the interviews. Instead, the research is structured based on the statements of the first five interviews.

Because of a lack of literature about Suriname, interviewees have directly impacted the scope of this research, as their input could not be placed in a literary context. This means that the focus of the research has not been based on a complete set of data, yet subconsciously. Furthermore, the processing of interview statements has shown that statements are not always based on facts and are often intertwined with an opinion. Therefore, this report should be seen as a combination of perceptions and not a presentation of the whole truth.

The interview population is limited to management and business representatives > no ministers or local business owners have been interviewed. Nor have "normal" citizens been interviewed. Furthermore, interviews were not recorded, which makes it impossible to quote interviewees literally. This means that statements can be an inaccurate representation of reality.

It has been challenging to adapt existing models for an organizational approach to a national level. Many of the used theories are not developed to measure the maturity or development of a country in general. This has resulted in generalised results, which might miss the nuance required in some cases, such as the difference between small and large businesses and the public and private sectors.

Finally, the methodology used to process the interviews required many generalizations. This has resulted in a loss of nuance in the interviews. Furthermore, assigning statements to one dimension neglects the potential interconnectedness of dimensions.

6.2   FUTURE WORK

Having completed this research, another step has been taken in the digital development of Suriname. However, still, much work needs to be done. In this segment, we will present recommendations for future work.

This report has shed light on many subjects not available in any literature. It describes observations and perceptions of many aspects of Surinamese society. Unfortunately, this research did not research these in detail. Therefore, data is missing to prove whether statements are grounded on facts or opinions. The primary recommendation of this research is to continue research and expand the available knowledge on the subjects that have been included in this research.

Furthermore, each of the challenges that have been identified can be analysed for a potential solution. Many students and researchers can continue based on the identified challenges. We, therefore, highly urge the Anton de Kom University of Suriname and other higher education institutes to pick up where this research has stopped.

We especially recommend increasing the scale of future research to a larger sample size study. For example, at this moment, a relatively small group of people was interviewed, and a more extensive, well-structured set of interviews could help develop a more specific result.

Besides future research, many identified challenges require action to be taken sooner than later. Because many of these points have far-stretching consequences and require a drastic change, we urge the Surinamese government and large corporations to use this report as a basis for a national vision. Join in constructive conversations and make comprehensible plans that all parties support.

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8. Appendices

8.1 Appendix A – Interview subjects round 1

No.	Topic/statement
1	Thank you for participating
2	Do you agree with recording the conversation? A transcription will be made using word and sent to you for control.
3	This interview is confidential; statements will not be linked to you as a person unless you agree to them as such.
4	Introduce myself and the goal of this research: identify challenges of digitalisation
5	Ask for the introduction of the interviewee
6	What is the current state of digital infrastructure in Suriname?
7	In what way do businesses use this infrastructure?
8	What processes are currently digital within businesses, and is there potential to expand this?
9	In what way could digital systems help Surinam businesses?
10	What goals do businesses have that digital systems could contribute to?
11	What is necessary to fulfil the digital needs of businesses in the future?
12	No more questions from my side. Is there something else I missed?
13	What are the challenges in fulfilling the digital needs of businesses?
14	I currently have meetings planned with… Do I still miss an important organization?
15	Do you wish to receive my report when it is finished?
16	Do you want to have another meeting when I visit Suriname?

8.2　Appendix B – Interviewees

Name	Function	Organization	Category
Anuskha Sonai	Voorzitter & CEO Spang Makandra	ICT association Suriname	ICT
Anvit Ramlakhan	CEO	DataSur	ICT
Bart van Zwieten	Deputy Head of Mission	Nederlandse ambasade	Gov
Carl Schuster	ICT manager	Fernandes	Business
Ciefranie Menig	Directeur Communicatie	Ministerie van Transport, Communicatie Toerisme	Gov
Dimitri Lemmer	Secretaris	Suriname Business Forum	Business
Doric Ramlakhan	CTO	TeleSur	ICT
Glen Holband	Directeur	Polytechnic College Suriname	ICT
Gretl Wolfram	Voorzitter	Winkeliersvereniging	Business
Ixon Sanamin	Senior beleidsmedewerker	Ministerie van Economische zaken	Gov
Karishma Mathoera	Waarnemend Directeur Ondernemerschap	Ministerie van Economische zaken	Gov
Prewien Ramadhin	Onderdirecteur	E-Gov	Gov
Ratan Kalka	Manager business support services	Suriname Business Development Center	Business
Rene Gosen	Directeur	Sure Beef	Business
Steven Debipersad	Voorzitter	Vereniging van Economisten	Business
Vanessa Codrington	Manager Innovation & Digital Channels	Hakrinbank	Business
Virendya Battja	Beleidsmedewerker Handel en Economie	Nederlandse ambasade	Gov
Wilgo Bilkerdijk	Voorzitter	Associatie van Surinaamse Fabrikanten	Business

8.3 Appendix C – Challenges overview

No.	Challenge	Dimension
1	Suriname is currently in economic hardship within an unstable currency	Economy
2	Businesses have been reduced to a survival mode, with no money for luxury or long-term investments	Economy
3	IT services are a new technology for many businesses, and therefore benefits are often unknown	Economy
4	The economy of Suriname is too small for businesses to have a positive return on investments	Economy
5	Businesses are reluctant to share data out of fear of transparency and data abuse by others	Economy
6	The illegal sector has a large impact on Suriname, a country susceptible to money laundering and corruption	Economy
7	The government has little to no influence on the plans of telecom providers. Requests for service areas are ignored	IT infrastructure
8	There are regions in Suriname where there is electricity available in limited time frames	IT infrastructure
9	70% of Surinamese households are connected to old, corroded copper internet lines	IT infrastructure
10	Changing copper cables in the centre of Paramaribo is complex	IT infrastructure
11	Two-thirds of formally registered businesses have no business internet connection and are limited to 20Mbit internet	IT infrastructure
12	Because of unstable internet connections, the usage of web services is unreliable	IT infrastructure
13	Expansion of fibre in industrial regions is motivated by the payment willingness of businesses in the region	IT infrastructure
14	Micro businesses do nothing with digitalisation	Maturity
15	It is unclear what smaller businesses require for the adoption of IT	Maturity
16	Some businesses use websites, yet they are ill-maintained, and Facebook remains the dominant platform	Maturity
17	It is difficult to explain to businesses why digital systems are a logical choice due to a lack of best practices	Maturity
18	Digital systems are so unknown that businesses are not thinking about the necessity of an IT system	Maturity
19	The government looks towards businesses to ask for help with digitalizing, while businesses don't see the reason why	Maturity
20	Large businesses adopt IT systems yet don't always meet IT security requirements	Maturity
21	Businesses do not have adequate knowledge of financial accounting, resulting in tax issues	Maturity
22	The central bureau of statistics needs to improve its data collection as there is no central collection point for data	Data Availability
23	There is data available in Suriname; however, the sources are hidden and often private	Data Availability
24	The government wants more data but is not willing to make investments in gathering data	Data Availability
25	If data is available, it is too little to form a conclusion, and there are many inconsistencies among databases	Data Availability
26	Data is seen as personal property, and if someone leaves an organization, they sometimes take data with them	Data Availability
27	Businesses do not want to share data out of a lack of trust and the benefit of having unclarity surround their operations	Data Availability
28	The chamber of commerce has economic data but refuses to publicly share them and has not published data for three years	Data Availability
29	People want to see change yet refuse to take actions that might negatively impact their power position	Culture
30	Coalition parties work against each other instead of together to solve national problems, slowing the government in general	Culture
31	Political parties do not propose change, as they themselves are also exploiting the system	Culture
32	In Suriname, speaking up and being critical is seen as something negative	Culture

33	There is no security for those who speak up; being critical can cause someone to lose their job or get punished	Culture
34	Not taking any risk and accepting the situation appears to be the safest and most desirable way of working	Culture
35	Suriname has a cash economy, with 60 to 80 percent of transactions being cash	Payment
36	The cash economy stays in place out of fear of paying taxes when money is in the bank	Payment
37	The Surinamese economy uses multiple currencies besides the Surinamese dollar, such as gold, euros and US dollars	Payment
38	There is a digital payment infrastructure, yet people have issues with payments not coming through from time to time	Payment
39	Businesses have a payment terminal yet state that they are broken to force customers to pay cash	Payment
40	Alternative easily accessible digital payment methods are widely available, yet citizens refuse to adopt them	Payment
41	Banks are working to make banking accessible to everyone, yet the government does not respond with the required urgency	Payment
42	Setting up a bank account is a tedious, long procedure that can take months, with a plausible chance that the procedure halts for no reason	Payment
43	Suriname has a low number of higher educated citizens, at around 10%	Education
44	Study programmes do not match the requirements of businesses	Education
45	Educated citizens leave Suriname to work and study abroad, which causes a brain drain	Education
46	Digitalisation is being included in education, yet it is put aside, with studies focussing on the oil and gas sector being prioritized	Education
47	A bachelor's in ICT is offered, yet a master's programme still has to be created	Education
48	Businesses do not have the knowledge to digitalize, and information to teach them is not available	Education
49	The average business owner does not have a vision of the future; they live by the day	Strategy
50	ICT costs are seen as an incidental expenditure, not as a structural part of business operation costs or an investment	Strategy
51	Business owners understand the principle of investments, yet there is no incentive for them to do so	Strategy
52	Investments in digitalisation can increase efficiency and revenue, yet the initial investment cost is too high for the average business	Strategy
53	For many businesses taking an internet connection is a big step on its own	Strategy
54	There is no functioning national vision, strategy or coordination regarding IT policy	Government
55	Ministries all have their own data servers and IT infrastructure, which often do not meet modern requirements	Government
56	Between the 17 ministries, there is a lot of redundancy in hardware and software contracts, causing high costs and overall inefficiency	Government
57	Government employees use their private communication channels for work-related communications	Government
58	There is no centralised agency that checks backup infrastructure; as a result, in the past, a lot of data has been lost in fires, crashes and transfers of power	Government
59	The presidential eGov working group has a lot of potential but is currently held back by ministries making it reactive instead of proactive	Government
60	Losing data has been generally accepted by the government. If data is lost, you just start gathering from scratch	Government

8.4   Appendix D – GANT chart

8.5 Appendix E – Opportunities

This extra section deals with the opportunities identified in Suriname. These is a combination of both economic and digital opportunities. Respondents state that "there are good perspectives for the future."

A subject reoccurring the most has to do with the opportunities of the oil and gas industry in Suriname. Offshore Oil fields have been discovered, and currently, oil rigs are built off the coast. "In 2025, oil and gas production starts, which is a big chance for the economy." It is expected that education and manufacturing companies in Suriname will shift their focus toward providing services and personnel for these rigs.

Besides the oil and gas industry, Suriname has a growing number of call centres. "Call centres now employ 6000 people, which will grow to 10,000." In a country of half a million citizens, call centres are now one of the largest industries.

During the interviews, it was stated that there are many opportunities for potential businesses in Suriname. However, "you have to find your niche." Furthermore, if one does find a niche, "It is difficult for a small entrepreneur to start in Suriname." However, if a starter has more resources, like a large company, it is easier to start a business. As there are many resources to gain in Suriname, like wood, oil, gas and gold, besides a potentially expanding tourism market, there are enough options to start a business.

When looking at the opportunities for IT developments in Suriname, the respondents are more reserved. Implementing the technology could help against maleficent actions in banking, yet respondents "don't see the ICT business growing in Suriname." At this moment, the digital infrastructure at businesses is substandard. "If there is a digital infrastructure, it is easier to trade with Surinam businesses."

8.6 Appendix F ITI-MM Models

Level 1 Basic	Level 2 Controlled	Level 3 Standardized	Level 4 Optimized	Level 5 Innovative
• Disjointed, manual infrastructure • Knowledge not shared • Reactive and ad-hoc • Unpredictable service performance • User driven 'who shouts loudest' • Passive Observer • Focus is to avoid downtime • Distributed organization • Able to change in months to weeks • None or ad-hoc pricing scheme • SLAs • Unknown resource utilization • Chaotic – reactive ad-hoc processes	• Coordinated, manual infrastructure • Knowledge silos exist • Reactive with some planning in place • Services manageable and getting predictable • Problem driven • Active listener with self-reflecting actions • Focus is to get control • Centralized organization • Able to change in weeks • Fixed costs pricing scheme • Arbitrary SLAs • Known but poor resource utilization • Reactive – proactive lifecycle management	• Standardized infrastructure • Individual level collaboration and knowledge sharing • Reactive and become proactive • Stable and architected IT infrastructure • Request driven • Start to contribute as active member • Focus is to adopt standards and best practice • Consolidated organization • Able to change in weeks to days • Reduced, fixed costs pricing scheme • Class-of-service SLAs • Rationalized resource utilization • Proactive mature problem management	• Consolidated, and virtualized infrastructure • Team level knowledge sharing and collaboration • Proactive and accountable • Continuous service improvement • Service driven • Drive ecosystem, with controlled exception • Focus is efficiency • Pooled organization • Able to change in days to minutes • Fixed shared costs pricing scheme • Flexible SLAs • Shared pools of resource utilization • Proactive, prediction, dynamic capacity	• IT and business stakeholders work in partnership • Enterprise level knowledge sharing and collaboration • Strategic asset • Drives service innovation • Value driven • Actively innovate the ecosystem • Focus to become a catalyst for innovation • Business-oriented organization • Able to change in minutes to seconds • Variable business costs pricing scheme • Business SLAs • Policy-based sharing resource utilization • Value policy management

Figure 9 - ITI-MM model's levels description (Haris, 2010)

8.7 Appendix G Industry maturity figures

Table 13 - Comparison among Industry 3.0, 3.5 and 4.0 (Chien, Hong, & Guo, 2017)

Features	Industry 3.0	Industry 3.5	Industry 4.0
Core Concept	Highly automated system	Decision making ability with the improvement of existing environments	Smart factory with CPS and IoT
Production Strategy	Mass Production	Flexible Manufacturing (diverse products with small lot size	Mass Customization
Quality Control	Statistical Process Control	Advanced Process Control	Self-aware; Self-predict
Resources Management	Materials Management; Human Resource Management; etc.	Total resource Management	Self-configure; Selfoptimize
Development Priorities	Investment of hardware	Integration of ability of data analysis and experience of management	Construction of CPS and IoT