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Research Article

Exploring the Challenges Faced by Organisations in Developing Countries During Information Systems Implementation: A Multi-Sector Study of Semi-Autonomous Organisations in Guyana

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ABSTRACT

The implementation of information systems (IS) occurs in both industrialized and developing nations. However, the number of challenges faced by developing countries during IS implementation largely outweigh those of more developed nations. When compared to other regions of the world, there appears to be limited research regarding the challenges faced by countries in the Latin and South American regions during information systems implementation. This research aimed to investigate the challenges to information systems implementation at semi-autonomous organizations in Guyana, South America. Data was collected from 12 information technology practitioners from six semi-autonomous organisations via -structured interviews. Thematic analysis was used to analyze the data collected from the participants. A total of five themes and 17 sub-themes emerged from the data. Many of the factors that affected IS implementation within the organizations showed similarities to the findings from previous literature on information systems challenges in developing countries. These included similarities around manpower shortage, utility and service provider issues, outdated technological infrastructure and poor change management activities during post-implementation. Further, some factors such as dependency on outsourcing and workplace culture were indigenous to this research due to the nature of semi-autonomous organizations. It must be acknowledged that while the findings carry implications for IS managers and practitioners, the approach utilized in this study limits the applicability of the findings to other types of organisations within Guyana. Further research could be done on investigating the differences in challenges faced during systems' implementation among pubic-sector and private-sector organizations in Guyana.

Keywords: Systems, Challenges, Outsourcing, Culture, Manpower.

INTRODUCTION

Today, in a world of ever-changing technological, social and business-related changes, organisations must be positioned to continuously adapt to remain competitive. To capitalize on such changes, organizations must continuously invest in acquiring, changing and implementing ICTs which in turn alter information systems (IS) configurations within organizations (Haktanır, Kahraman, Şeker & Doğan, 2022), Li, Li, Carusone & Profita, 2024; Shahzad, 2023). Attention must be directed not only to the deployment of systems but also to the activities which occur prior to and after the implementation process. The process should contain all organizational activities necessary to transform a newly developed system into an operational system for end-users that is supported by strong change management for the adoption, management and routinization of the innovation (Kolasani, 2023).

The body of research within the field of information systems suggests the challenges surrounding IS implementation can be derived from a plethora of factors ranging from software development processes that create the technology to technical and people-related problems with the system. The current literature on the challenges in information systems implementation extends from industrialized countries in North America and Europe to developing countries within Asia and South Africa. The literature on information systems in developing countries shows a high frequency of IS project failure in developing countries where systems fail to meet their cost, quality

and time-related objectives (Chowdhury, McLeod, Lihoma, Teferra, & Wato, 2023; Hoxha, Hung, Irwin, & Grepin, 2022). The sociotechnical and socioeconomic contexts of developing countries amplify the challenges associated with IS implementation. However, there is currently limited documented evidence of these issues in Latin America and the Caribbean region (Serna Gómez, Díaz-Piraquive, Muriel-Perea, & Díaz Peláez, 2021; Zapata-Cantu and González, 2021) focusing on these particular issues. As such, this research aims to address this gap in the literature by investigating the challenges and barriers that organizations encounter during IS implementation within the developing country of Guyana, South America.

Guyana is a third-world country located on the coast of South America. The country hosts a mixture of public-sector, private-sector and semi-autonomous(public-private) organisations that strive for economic and social prosperity across the disciplines of agriculture, gold, telecommunications and lately, oil. However, many of the organisations in these industries are lagging when it comes to the implementation of new technologies and systems to support their operations and improve their state of existence. This study focuses on the challenges faced by semiautonomous organizations during information systems implementation. In this case, semiautonomous means that organisations are largely self-governing and generating their funds, but their operations remain partly mandated by the government.

This study examines the challenges through the lens of Heeks' design-reality gap model. The model attributes the failure of information systems projects to gaps between the design and the actuality of IS implementation. These gaps exist across dimensions of information, technology, processes, objectives, staffing, management, and resources like time (Heeks, 2002). Using the model in this study allows for a guided and systematic approach to investigate the underlying factors contributing to the failures of information systems projects in the context of Guyana (Ramadhani, Khuzaini, & Shaddiq, 2024).

The application of the Heeks' model to the context of Guyana can provide insights into the sociotechnical challenges associated with IS failure. Further, through its recommendations, this research can guide information technology practitioners when evaluating IS projects and addressing issues with corrective measures. This study therefore carries implications for stakeholders such as organizational policymakers and managers who are charged with leading and improving the success rate of IS projects.

LITERATURE REVIEW

The current literature on information systems implementation provides theories and findings which attempt to generalize and explain the challenges of information systems (IS) implementation in developing countries. These challenges are summarized in the subsequent sections.

Leadership and Commitment

The literature suggests that the absence of leadership and organizational commitment to IS projects can negatively impact the success rate of IS implementation. Research by Al-Kofahi, Hassan, Mohamad, Intan, and Com (2020) and Kirmizi and Kocaoglu (2020) posits that the successful implementation of IS projects is strongly associated with an organization's leadership that has strong knowledge, enthusiasm and long-term commitment to information technology change. However, in developing countries, leadership is often missing from organizations which results in a failure to re-contextualize external technologies to local circumstances (Saracostti, de Toro, Rossi, Lara, & Sotomayor, 2022). The literature suggests that IS projects are often threatened by poor clarity over the ownership and leadership of the implementation process (Omohwovo, Olatokun, Ojutawo, & Okocha, 2021).

Quality and Project Management

Information systems implementation success is heavily associated with project management factors like time, cost, and quality compliance (Saracostti et al., 2022; Tavares, Joia, & Fornazin, 2021). In the context of developing countries, quality compliance is particularly challenging to achieve given an organisation's lack of formalized goals, poor planning, resource constraints and unskilled labour. Further, poorly communicated project definitions can create quality issues in the long run for an information system project due to misaligned expectations among stakeholders (Saracostti et al., 2022).

Infrastructural Hurdles

Infrastructural challenges related to ineffective communication networks and power supply interruptions are major hindrances to effective IS implementation (Zeebaree, Sattar, Ismael, Qader, & Aqel, 2020). Such issues negatively impact systems operability and sustainability (Makoza & Chigona, 2016). In some cases, organisations in developing nations do not have the financial capability to cover the running costs associated with the infrastructural requirements of an information system (Aldowah, Al-Samarraie, & Ghazal, 2019.

Managerial Capacity

Literature has consistently shown that poor managerial practices like short-term planning horizons, ad hoc policy-making and informal staffing policies negatively impact IS implementation (Omohwovo et al., 2021). This issue is exacerbated by the insufficiently trained managerial personnel within organisations to modify and adapt information systems to local contexts and the environment. This results in the systems being technically sound but not socially accepted by organizational stakeholders (Pejovic & Skarlatidou, 2020). To achieve a socio-technical balance, information must be managed as a corporate resource to prompt organisational learning for inexperienced stakeholders during implementation contexts (Pejovic & Skarlatidou, 2020).

Socio-Economic Constraints

The social and economic environment of a developing country serves as barriers to creating national information technology policies which in turn create difficulties in implementing systems suitable to the industrial base of the country (Ntorukiri, Kirugua, & Kirimi, 2022). Further, for such countries, there are limited financial resources and competing national priorities where other needs such as health and education take precedence over information systems projects (Khobi, Mtebe, & Mbelwa, 2020). Consequently, there is a lack of education and trained personnel within organisations which amplifies the risk of IS implementation failure.

Limitations in Literature

While the body of knowledge on information systems implementation and failure in developing countries is extensive in general, the current literature on within Latin and South America remains limited. Furthermore, the literature suggests that challenges associated with IS implementation vary across social, economic and cultural contexts. Therefore, this research focuses on contributing knowledge to this domain, specifically focusing on the context of Guyana to provide directions for future research in IS implementation in developing countries.

METHODOLOGY

Data Collection Technique

The study employed an approach comprising qualitative data collection and data analysis (Saunders, Lewis, & Thornhill, 2009). A case study approach was utilized to examine six semi-autonomous organizations in Guyana from industries including agriculture, oil and gas, telecommunications, and finance. This approach allowed for detailed exploration and understanding of the dynamics of situations in their naturalistic contexts. Organisations were assigned pseudo names to maintain confidentiality, as presented in Table 1).

Sample Size and Sampling Technique

A purposive sampling approach was utilized in this study for the selection of participants from case study organizations. Purposive sampling means that the recruitment of participants was done according to specific criteria necessary to answer the research question (Willig, 2013). In this case, a total of 12 participants were selected which represented IT practitioners from the middle management level of the case study organizations. . Such a sample size follows qualitative research practices, as it focuses on the depth of data (Willig, 2013). The sample size was determined based on data saturation for which the literature suggests that 12 interviews are generally sufficient (Guest, Bunce, & Johnson, 2006). Participants were recruited via email based on a minimum of five years of experience to ensure that they had a sufficient understanding of the information systems implementation process and the work environment. However, it must be acknowledged that the sampling method could have limited the diversity of views on the systems implementation process.

Primary Data

Primary data was collected through semi-structured interviews with 12 information technology (IT) practitioners of the case study organizations who influence the IS implementation process. Each interview lasted about 40 to 60 minutes based on the participant's knowledge and experience with the information system implementation process.

Prior to interviews, all potential interviewees were sent an information sheet outlining the research's aims and objectives. The interview questions were created on the premise of existing literature relating to information systems failure in developing countries and were particularly guided by Heeks' Design-Reality Gap model (Heeks, 2002).

Data Analysis Method

This research employed a thematic analysis approach for the analysis of the interview data (Braun & Clarke, 2006). Thematic analysis strives to identify patterns in the data collected in a non-linear way and categorize the data according to themes. Thematic analysis, through its theoretical freedom, provided a flexible and useful way to provide a rich and detailed account of the data. The analysis followed several systematic steps as suggested by Braun and Clarke (2006) to enhance replicability and transparency of the results. This involved familiarization with the interview recordings, transcription of interviews and coding of transcripts.

Table 1. Overview of Case Study Organisations

No.	Organisation Pseudo Name	Sector	Number of Interviewees	Organisation Size (No. of Employees)	Example of Organisational System Deployed
1	DataCorp	Information and Communication Technologies	P1, P2	≈600	Business Intelligence Systems
2	UtilityCorp	Energy and Power	P3. P4	≈500	Customer Relationship Management System
3	FoodCorp	Manufacturing	P5, P6	≈700	Enterprise Resource Planning System
4	OilCorp	Oil and Gas	P7, P8	≈300	Human Resource Management System
5	InfraCorp	Infrastructure and Transportation	P9, P10	≈400	Geographic Information System
6	FinanceCorp	Finance	P11, P12	≈500	Financial Management System

Microsoft Word Review and Comments feature was used to digitally code the data of each transcript. This tool, despite its limitations when compared to tools such as NVivo, proved quite adequate for initial coding and was chosen due to its accessibility, familiarity and flexibility in managing the qualitative data.

Initial coding was performed on a sentence-by-sentence and a paragraph-by-paragraph basis with the research question of the project in mind. From the 12 transcripts, a total of 436 initial codes emerged and were placed in a code book for reference. The researcher then engaged in interpretive analysis of the collated codes by sorting relevant codes and data extracts into overarching themes. In this process, 17 groups of codes or sub-themes emerged which were representative of the initial codes and data and shared some relationships. The identified groups of codes and themes were reviewed to determine whether some needed to be combined, refined, separated or discarded.

Ultimately, the 17 sub-themes were combined into five major themes, each with their respective working definitions and meanings (see Figure 1). It must be acknowledged that while thematic analysis provides valuable insights, the potential for researcher bias exists. However, this issue was mitigated by incorporating reflexivity into the research process to ensure the findings were guided by the actual data. Also, the reliability and trustworthiness of the research findings were enhanced by member checking and participant validation of the data.

Ethical Considerations

Ethical considerations were made prior to, during and after data collection in this research. Ethics approval was sought and obtained by the relevant ethics review board before the execution of the study. Prior to interviews, all participants in the study were given an information sheet which elaborated on the study's aims, methodology, risks and benefits to participating in the research. Participation in the study was entirely voluntary, and participants were assured of their right to withdraw at any time with consequences.

Participants were debriefed after the interviews to allow for a discussion on issues that arose during the data collection. Regarding data confidentiality, participants' data and feedback were kept confidential and anonymized for data analysis and reporting. Participants were made aware that the data would be kept securely for a period of five years, after which it would be destroyed.

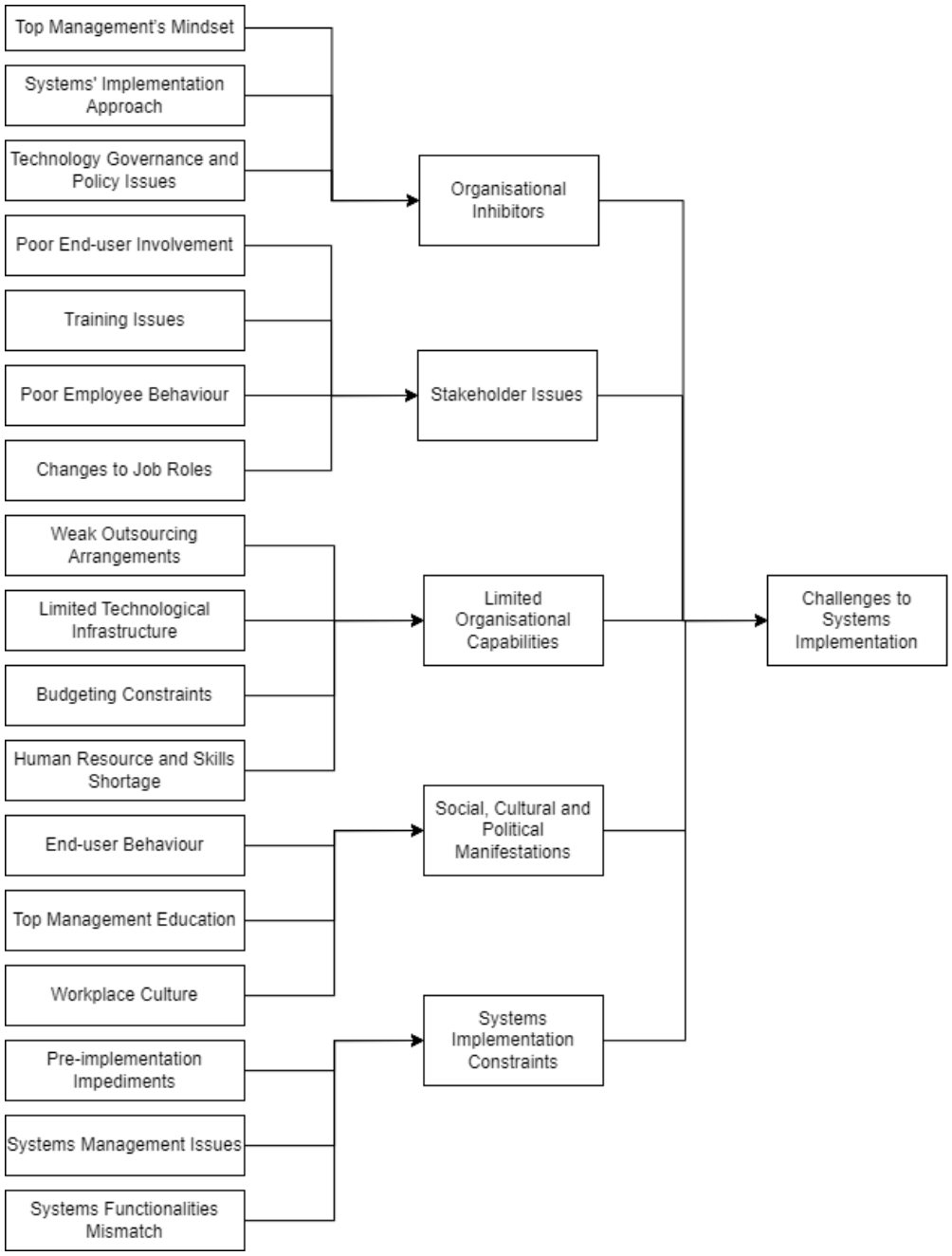

Figure 1. Challenges to Information Systems Implementations Across Semi-autonomous Organisations in Guyana

FINDINGS

This section highlights the major themes and sub-themes uncovered through the coding and analysis of the interview data. These themes and sub-themes were all derived with the research objective in mind which is to ascertain the underlying factors contributing to IS implementation failures in Guyana.

Theme 1: Organisational Inhibitors

This theme captures the organisational inhibitors to information systems implementation at semi-autonomous organizations in Guyana. Three sub-themes emerged under this theme and tied with sub-themes in Themes 4 and 5 of this study.

Top Management's Mindset

The data revealed that when top management initiates the implementation process, there is poor consultation with the information technology department because of their poor perception of what an IT department is intended to do. Many participants further reported the difficulty of convincing top management of the need for new IS projects or changes. One of the officers from FoodCorp said:

"*The struggle in there to explain why you need this or why you want to implement that… Sometimes as an IT person talking to a non-IT person, the struggle is really real… you can't get over certain things with them because of their mindset… they don't always see the benefits of the systems. It's a seeing-to-believing kind of attitude."* (Participant 6, FoodCorp)

The inadequate engagement of top management with the IT department can be remedied by improving top management's knowledge of information technology projects (Theme 4). If top management is made to understand the positive impact that technology brings to contemporary organisations, they are linked to remaining actively engaged with the pursuit of systems projects. There should be active and sustained engagements between the IT division and top management within semi-autonomous organizations for knowledge-building on the prospective benefits of new systems.

Systems' Implementation Approach

Many participants reported that systems implementation projects were executed based on a top-down mandate from upper management. The challenge here is the exclusion of technical staff from decision-making on what systems to implement. This causes mismatches between actual needs and delivered needs. The respondent from InfraCorp mentioned:

"The higher ups go directly to those whoever is outsourcing. They don't really come to the technical people. So if you purchase an equipment, it might not suit the needs of the organization." (Participant 10, InfraCorp)

The top-down approach to systems development projects often leads to the misconception or oversight of the actual requirements of an organization, especially from an end-user perspective (Theme 5). Semi-autonomous organisations should create a culture that fosters a bottom-up approach to systems planning and development. Therefore, new systems would be built from the actual user realities on the ground or those of the technical IT personnel of the organisations which would ultimately minimize the mismatch between system functionalities and organizational needs.

Technology Governance and Policy Issues

Participants revealed that there are circumstances beyond the control of the organization that plagued the IS implementation process. Oftentimes, government legislation creates technical hurdles during some implementations. The data showed that some companies do not have IT governance policies nor do they have the manpower and time to create the necessary policies. The participant from FinanceCorp mentioned:

"I don't think there are sufficient IT policies… the lack of staff puts that sort of thing on the back burner… we just don't have the time given the number of projects in order to flesh out these policies and have them in place so that persons are properly guided when it comes to these decisions." (Participant 11, FinanceCorp)

The absence of IT policies is linked to issues in managing systems after implementation (Theme 5). Organizations should strive to build a dedicated team of individuals from the IT department that is directly responsible for the design and oversight of internal IT governance policies as well as the organisations' compliance with new external mandates from the government and industry.

Theme 2: Stakeholder Issues

This theme captures the key challenges around the management of end-users before, during, and after information systems implementation. Four sub-themes are subsumed under this theme and connect with Themes 4 and 5 of this study.

Poor End-User Involvement

Many of the participants revealed that there is usually poor stakeholder involvement during the pre-implementation phases of systems implementation. The official from DataCorp mentioned:

"Implementing systems is only something done within the technical department and the IT staff and upper management. We usually don't communicate with stakeholders or other staff members." (Participant 1, DataCorp)

Involvement of the end-users during pre-implementation is minimal according to the findings, often leading to a mismatch in system functionalities (Theme 5). It is clear that the IT department in semi-autonomous organisations must dedicate sufficient time to properly understanding user requirements to ensure that the systems that are developed to support the nature of the organizational work. This can be accomplished by holding pre-implementation workshops during systems design and planning.

Training Issues

The data revealed several challenges around training to use new information systems. Some participants commented that there was inadequate IT training and support when new systems were implemented to encourage staff buy-in. The official from UtilityCorp said:

"*We don't have a lot of IT training for support staff so when you do implement new systems, they don't get up to speed with how to use the systems right away."* (Participant 3, UtilityCorp)

The results further revealed that there is sometimes inconsistent training for the staff especially when training is conducted by foreign-based external consultants with a limited presence within the organization. It is clear that inconsistent training results in resistance to new technologies (Theme 4). To overcome this issue, organizations can introduce structured and streamlined training programmes that include consistent training for all employees involved in the adoption and usage of new systems. The train-the-trainer mode can be utilized where IT staff can provide standard training for departmental managers who can in turn train their individual teams.

Poor Employee Behaviour

The data reveals that there is generally dishonest end-user behaviour when both the new and old systems run concurrently. End-users would falsely claim to be using the new system. The official from AgriCorp mentioned:

"You would give them a parallel run of both applications but persons would not use the alternate applications in the parallel run… When you go to them and do a survey of how the application is working at present with the parallel run, everyone will say yes it is working fine and everything is okay." (Participant 2, AgriCorp)

Employees faking the usage of the systems is related to the type of workplace culture exhibited by employees (Theme 4). Organisations must track and monitor system usage during deployment to address this issue. To further assist with this issue, organisations can incentivise employees to transition to the new system by offering rewards for the completion of new work.

Changes to Jobs Roles

Most participants revealed that there is usually insufficient consideration given to employees' roles that get inadvertently changed because of the implementation of new systems. Furthermore, employee resistance arises from these inadvertent changes in roles and privileges because they have to do more work for the same compensation. The respondent from FoodCorp mentioned:

"They don't bring on staff to manage the new systems, they just reassign roles and responsibilities but they won't give you additional money or additional benefits." (Participant 6, FoodCorp)

This sub-theme is related to workplace culture where changes to job functionings with no changes to internal reward systems create resistance to change. To address this issue, organizations must develop transitional management plans for the changes in job roles that include necessary training and support for the transition.

Theme 3: Limited Organisational Capabilities

This theme captures the limitations around tangible and intangible resources and capabilities of semi-autonomous organizations when it comes to implementing information systems. Four sub-themes emerged under this theme and relate to Themes 1 and 5 in this study.

Weak Outsourcing Arrangements

The data revealed challenges that prevail over the outsourcing process because of occasional insufficiency of supply within the market and the bureaucracy and for approval to purchase items. Participants from the case organisations said:

"It's been witnessed on a few occasions, that the device was no longer in stock or no longer in the market because it was sold out. So…the whole bidding process had to be restarted." (Participant 1, AgriCorp)

Challenges associated with outsourcing arrangements in semi-autonomous organisations are connected to management issues (Theme 5). The data further suggests that delays due to outsourced vendor arrangements create unnecessary complexities in system maintenance due to vendor lock-in situations. Semi-autonomous organizations must enhance the process by which vendors are selected and establish clauses in the legal outsourcing contracts that stipulate deliverables and contingencies for delays and maintenance.

Limited Technological Infrastructure

The data revealed that the current IT infrastructure at the organizations stifles the implementation of new systems. There is a need to change the existing infrastructure because it does not have the capacity to support the new systems. An official from AgriCorp said:

"Sometimes it is a difficulty because the technology that we have maybe old and might not be compatible." (Participant 3, AgriCorp)

The limited technological infrastructure is associated with Pre-implementation Impediments (Theme 5) where there is limited technical input from the IT department when it comes to pursuing information systems projects. This means that there needs to be an understanding of the current state of affairs of IT infrastructure to understand whether new systems can be accommodated. This issue can be resolved through regular IT infrastructure audits. Another complication suggested by the data is the discontinued support from IT vendors for the internal information systems within semi-autonomous organisations.

Budgeting Constraints

Many participants revealed that when budgeting for IS projects, there is no room for mistakes. The year-to-year price shifts in systems and technologies make the budgeting process difficult since budgeting must be done well in advance. There is also a timely process of acquiring funding because of the bureaucracy involved. A participant from FinanceCorp said:

"By the time we want to get a project started, we have to wait on time especially when it has to go to national tender board; a three-month wait on average and that's a lot of time wasted." (Participant 12, FinanceCorp)

Such financial constraints create delays in information systems implementation when urgent procurement is a necessity. Semi-autonomous organisations should arrange an IT contingency or reserve fund for either immediate disbursement of funds for procurement or to address price fluctuations or changes. This could serve as a cost buffer during the bureaucratic budget approval process.

Human Resource and Skills Shortage

The data revealed that many organisations are plagued with insufficient knowledge and skills necessary for systems implementation. The insufficiency of skills places a dependency on outsourcing arrangements and overseas consultancy arrangements which are difficult to manage. An OilCorp respondent said:

"We do need consultants to come especially from overseas who do these things and because locally, there is lack of companies that do these things so most likely there is a need for outsider help." (Participant 8, OilCorp)

This finding is connected to the development of IT governance policies within organisations by internal staff members (Theme 1). To address this issue, organisations should embark on training their local staff members through external consultants who are hired to develop policies or manage new projects. In that way, new knowledge can be preserved for the organization and transferred to the relevant staff.

Theme 4: Social, Cultural and Political Manifestations

This theme captures the challenges to IS implementation which stem from social, political and cultural elements of the organizations. This theme ties closely to organizational behaviour and top management's influence on IS projects. Three sub-themes emerged under this theme and share relationships with Themes 1 and 2 of this study.

End-user Behaviour

One of the most frequently commented on areas by the participants is the behaviours of end-users towards the IS implementation process. The data shows that end-users typically demonstrate an unwillingness to change and remain fixated on the traditional ways of working. An official from FoodCorp mentioned:

"Staff do not really want to venture into software and automation. They are accustomed to paper and most systems become dormant because of that." (Participant 5, FoodCorp)

The data revealed that some end-users develop the belief that changes in the way the operate through new systems bring about new measures to surveil and control them. In such instances, new systems may not diffuse effectively through organisations, may not be accepted by users to undertake their responsibilities and could potentially result in general resistance to change (Theme 2). Semi-autonomous organizations should ensure that they have robust change management strategies and communication plans to prevent negative behavioural manifestations toward new systems from emerging.

Top Management Education

The majority of respondents indicated that top management needs education on information technology to provide direction for IT pursuits at the organization. Currently, managers' absence of awareness of the transformative power of information technology for organisations serves as a hindrance to the implementation of new technological systems. One official from FoodCorp mentioned:

"Top management doesn't always see the benefits of the systems. So there is a need for them to be more educated on what information systems can do for an organization… for them, it's a seeing-to-believing kind of attitude." (Participant 6, FoodCorp)

Due to inadequate IT education among top management, IT projects are not recognized as priority projects when compared to other divisional projects. This makes it increasingly difficult for officials from the IT department of an organization to receive support from the executives of a semi-autonomous agency to pursue a systems project. Therefore, an association exists between this sub-theme and Top Management's Mindset (Theme 1). This consequently results in the manifestation of a culture within the organisations that is not accepting technological changes. Semi-autonomous organisations must therefore institute educational workshops specifically for senior management officials to build their understanding of the importance of technology in contemporary organisations.

Workplace Culture

The data revealed that there is a culture of resistance to change within the semi-autonomous organizations which causes a hindrance to smooth information systems implementation. The data shows evidence that there is a laid-back culture permeating the organizations where there is a lack of job commitment among employees. An official from InfraCorp said:

"We usually have this culture of being laid-back and letting things get done slowly and I think it disrupts the implementation of systems in a timely manner because everyone seems to just drag their foot on the job." (Participant 10, InfraCorp)

This type of workplace culture directly leads to poor employee behaviour (Theme 2) where resistance to change pervades semi-autonomous organisations when new systems are introduced. Organisations must work towards building a culture that fosters innovation and the leveraging of new systems for more meaningful work. This can start from the top, where the leadership of the organisations champions new systems-based projects and promotes continuous learning initiatives centred around digital transformation.

Theme 5: Systems Implementation Constraints

This theme captures the challenges and constraints faced around those activities and procedures that occur before, during and after the implementation of information systems in semi-autonomous organisations. Three sub-themes emerged under this theme and linked with Themes 1 and 3 of this study.

Pre-implementation Impediments

Most participants revealed the challenge of poor needs assessment and feasibility studies of intended systems

projects due to a top-down approach to systems implementation. An official from UtilityCorp said:

"They [management] go about and get that system in place without talking to technicians or technical people who may be able to help them…they don't really address whether the system could feasibly be used in this environment." (Participant 3, UtilityCorp)

The inability to conduct proper feasibility studies and needs assessment activities is due to the absence of communication between the organisations' IT teams and top management (Theme 1). This is a major hinder to getting appropriate projects to serve the needs of the organisations. To address this issue, top management needs to be more actively involved in the IT affairs of an organization and remain in constant consultation with the IT team when new systems projects are being mandated by the government or internally orchestrated. Otherwise, the system's purpose will be misguided and uninformed.

Systems Management Issues

The participants revealed issues around the deployment and maintenance of information systems at the semi-autonomous organizations. There are compatibility issues around hardware and software services and making the necessary local improvisations as well as challenges around insufficient documentation or loss of vendor support in managing the systems. A participant from DataCorp mentioned:

"The documentation is not there and even if it's a minor something, it is difficult for us to figure it out because we don't have an idea of how the application flows… recently, we have been trying to do upgrades to these systems, but we don't have the documentation." (Participant 2, DataCorp)

Furthermore, reliance on different external consultants in the design, development and management of the systems creates issues around systems integration and connectivity. It is clear that this issue emanates from poor IT governance (Theme 1) and can affect the sustainability and efficacy of the systems. Therefore, semi-autonomous organizations, through their IT departments, must develop stringent IT governance policies to guide the way new systems are introduced, mandating the provision of system documentation and continued support in the longest term possible where external vendors are involved.

Systems Functionalities Mismatch

The data revealed a major issue of mismatches between the way the system was designed to be used and how the staff used it. A participant from FinanceCorp said:

"We had because when the software developer created the software, he was saying that the data was supposed to be inputted in this way, but staff didn't want to do it that way." (Participant 11, FinanceCorp)

This type of mismatch exists due to poor engagement from end-users of the organization during the design of the system (Theme 2). To address this mismatch, organisations must embed as part of their systems implementation process, user acceptance testing of new software systems. This will ensure that the systems are tested for alignment with fundamental user needs. A further preemptive approach to addressing this mismatch is promoting a participatory approach to systems development where end-users are constantly involved in the design of a new system.

DISCUSSION

The findings in this study share a significant interplay with elements of the design-reality model proposed by Heeks (2002). Heeks' model attributes challenges in information systems implementation to gaps between the design and reality of information systems. However, the findings in this study only support six gaps in the Design-reality model on dimensions of information, technology, objectives and values, staffing and skills, management systems and other resources.

One of the key findings in this study pointed to a general mismatch between the information needs required by implemented systems at the semi-autonomous organizations and the way information was being supplied to them. This could be explained by a hard-soft gap in information needs where insufficient system training and staff reluctance to adopt new systems exist (Ngereja, Hussein and Wolff, 2024). Also, as shown by other studies, there may be poor staff involvement during requirements gathering which forces an inaccurate capture of users' perception of a system (Luz et al., 2021). The data revealed occasional mismatches between design functionality and delivered functionality of the systems by outsourcers. Past studies indicate this may be due to issues rooted in the designer's perspective because of a country-specific gap (Alduraywish, Xu and Salonitis, 2017; Nyansiro, Mtebe and Kissaka, 2021; Puspitasari and Kurniawan, 2023).

The results further demonstrate a significant gap in the "technology" dimension of Heeks' model where the organisatons' technological infrastructure was not sufficient to accommodate new information systems. This can be explained by the incompatibility between hardware and software, outdated infrastructure, insufficient networking infrastructure, and discontinued support from vendors for outdated systems. These findings corroborate the findings of Zeebaree et al. (2020), Cont et al. (2021), Levallet and Chan (2022) and Barsha and Munshi (2023) who relay that information systems design require a stable IT infrastructure and improvisation efforts which not usually present at the semi-autonomous organizations to accommodate the systems. Low improvisation at these organisations can be attributed to the high complexity of systems, the local capacities of implementers additional technologies that must be procured to support new systems (Alawamleh et al., 2021; Renaldo et al., 2022).

The research highlights that effective systems implementation relies on support from the top management of organisations (Damanik, 2021). However, the findings in this study express that in semi-autonomous organizations, the technological priorities of upper management are sometimes misguided. This finding relates to the "objectives and values" dimension of the Heeks Design-Reality gap model. Technology-based projects are not seen as a priority for organizations whose business is not technology-based. This can be explained by the lack of education among top management on the importance of technology to an organization. Kagoya and Mbamba (2020) and Varajão et al. (2022) explain that when managers lack a vision of what technology can do for an organization, such projects are not prioritized. The data showed that some semi-autonomous organisations have employees who do not take their work seriously and have a laid-back style of operating. This finding aligns with the works of Lewis et al. (2013) and Apridiyanti, Suharman and Ardianto (2020) who posit that employees' values differ across the public and private sectors.

The results of the study demonstrate a gap in the "staffing and skills" dimension of Heeks' model. The data revealed a general shortage of manpower and skills to facilitate the implementation process internally in two key areas; development of systems and change management. Further, the lack of internal skills to develop and maintain systems in the organizations created a dependency on outsourcing. Past studies show that public organizations frequently carry limited skills for IS implementation (Gantman and Fedorowicz, 2020; Kapler, 2021; Silva et al., 2023; Kobayashi, 2018; Kim and Kishore, 2019) and this appears to be transferable to semi-autonomous organizations. The findings further suggest inadequate end-user skills to use the systems effectively due to insufficient management techniques. Past research supports these findings and explains that such events may be due to budgetary restrictions around hiring professional trainers (Pasape and Godson, 2022).

The study also identifies several challenges in relation to the management of information systems within semi-autonomous organizations. These findings manifest and relate to the "management systems and structures" dimension. There exists a dependency of the organizations on outsourced talent to design, develop and implement information systems. This results in siloed systems because each is usually built by a different consultant. Such a finding is not mentioned by previous research and appears to be indigenous to these semi-autonomous organizations. Further, there is poor outsourcing support and documentation to manage the systems. This creates a lock-in situation with an outsourcing vendor. This finding aligns with the works of Gantman and Fedorowicz (2020) and Silva et al. (2023).

Another important finding was a gap in the "other resources" dimension of the design-reality model that affected the IS implementation process. In this research, "other resources" referred to end-user behaviour, the organizations' financial capabilities and time constraints. One of the major challenges to successful IS implementation was the lack of end-user motivation to utilize new systems. Past research emphasises the need for change management measures like training, top management enforcement and coaching after systems implementation to gain employee's commitment and change their negative perceptions of the IS changes (Raja et al., 2023; Pasape and Godson, 2022). In terms of organisations' financial capabilities, the data showed that funding for IS projects was dependent on the severity of the needs of organisations.. This financial challenge appears to be indigenous to these types of organizations. Also, the data revealed that there are usually time constraints around waiting for approval of funding. While these findings on funding IT projects correlate to previous research like Glyptis et al. (2020) and Greenhalgh et al., (2017), some are unique to these organizations. Table 2 presents a summary of the challenges to IS implementation based on the findings from the study.

In summary, the results of the study showcase a myriad of challenges across semi-autonomous organisations that contribute to the gaps specified in Heeks' Design-Reality gap model. The nature of these challenges suggests a need for systems to be better designed, improvised and managed to suit the organizational context in which they

are deployed. As such, these organisations should, among other things, focus on a participatory approach to the design of new systems, increase management support, investment in local capacity building to ensure the success of information systems projects.

CONCLUSION

This research aimed to derive the challenges to information systems implementation in semi-autonomous organizations in Guyana. It can be concluded that the factors impacting the IS implementation process fall under five themes with twenty-two sub-themes. While each sub-theme contributed valuable information regarding the factors that affect IS implementation in semi-autonomous organizations, the most frequently commented-on challenges resided in the domain of organizations' outsourcing arrangements, technical infrastructure, manpower and skills, staff actions, reactions and behaviours and systems deployment, usage and management processes. Many of the factors correspond to findings from previous literature. The examination of all the sub-themes revealed that there were also indigenous factors specific to the nature of semi-autonomous organizations in Guyana. These included heavy dependency on outsourcing for the design and the laid-back culture of the employees of the semi-autonomous organizations.

IMPLICATIONS AND FUTURE RECOMMENDATIONS

Based on the findings in this study and per the socio-technical systems theory as guided by Heeks (2002), the following recommendations are made for implementing information systems in semi-autonomous organisations in developing countries.

1. **Stakeholder Engagement**: The data indicates that it is necessary to utilize a participatory approach to systems development where stakeholders are actively involved during requirements gathering. This involvement can reduce misconceptions, encourage acceptance of a system post-implementation and lead to the long-term sustainability of a system.
2. **Change Management**: The data suggests that there must be an effort on the part of organisations to transfer training to their local employees to ensure the sustainability and longevity of systems. This would ensure that local employees remain trained and the reliance on external consultants gets reduced. Efforts must be placed into showcasing the benefits of new systems to employees of an organization to encourage buy-in and acceptance.
3. **Managerial Education**: The data indicates that top management within organisations needs to be educated on the strategic and tactical benefits of investments in technologies to their organizations so as to create new priorities for digital development. Further, there must be programmes instituted to promote the integration of information technology into the organizational culture and way of operating.
4. **Internal Capacity Development**: The data suggests that organisations must focus on developing their internal skills and capacities when it comes to systems development and deployment projects. This can be done by establishing partnerships with external consultants for training and knowledge acquisition. This will reduce the dependency on long-term outsourcing arrangements.
5. **Streamlining Funding Approvals**: The data suggests the need for a more streamlined funding approval process in pursuing information systems projects. This would to avoid bureaucratic delays, promote the faster implementation of IS projects and allow for potential cost savings against elements like inflation and contract renegotiations.
6. **Systems integration**: The data suggests that organisations must consider the alignment between new information systems projects and existing systems and processes. The design of a new system must take into account the existing systems prevalent within an organizational setting to avoid a siloed system.

Table 2 presents a summary of the challenges to IS implementation based on the findings from the study.

Table 2. Summary of Challenges to Information Systems' Implementation in Semi-autonomous Organisations in Guyana

Challenge to Information Systems Implementation	Challenges Identified in Previous Studies	Findings from This Study
Top Management's Mindset	No	Yes
Systems' Implementation Approach	Yes	Yes
Technology Governance And Policy Issues	Yes	Yes
Poor End-User Involvement	Yes	Yes
Training Issues	Yes	Yes
Poor Employee Behaviour	Yes	Yes
Changes to Job Roles	No	Yes
Weak Outsourcing Arrangements	No	Yes
Limited Technology Infrastructure	Yes	Yes
Budget Constraints	No	Yes
Human Resource and Skills Shortage	Yes	Yes
Top Management Education	Yes	Yes
Workplace Culture	No	Yes
Pre-Implementation Impediments	Yes	Yes
Systems' Management Issues	No	Yes
Systems' Functionalities Mismatch	Yes	Yes

Note: Shaded cells represent Indigenous challenges to systems' implementation specific to the context of Guyana.

LIMITATIONS

It must be acknowledged that this study is not without limitations. While the number of participants in the study was sufficient for qualitative research, the study only focused on information technology practitioners at the middle management level at semi-autonomous organizations. In the future, a larger sample size with more diverse respondents internal and external to the organizations including but not limited to upper management officials, end-users and consultants can be chosen.

Further, the case study approach utilized in this study limits the applicability of the findings to other types of organisations within Guyana. Further research could be done on investigating the differences in challenges faced during systems' implementation among pubic-sector and private-sector organizations in Guyana. Such limitations can be overcome if future studies can utilise mixed-methods or quantitative research designs to enhance the applicability of results beyond semi-autonomous organizations in Guyana.

FUTURE WORK

Given the ever-changing wave of technological changes, there is increasing potential to study organisational challenges in pursuing projects to capitalize on these changes. This analysis in this study was confined to organisations operating in the Guyanese context. Research in the future should seek to make cross-country comparisons on the implementation of information systems within similar organisations to explore and expose larger trends and contextual factors related to IS success. Further,

while this study focused on internal organisational challenges to IS implementation, there is potential for the investigation of the impact of external environmental factors that influence IS implementation success.

CONFLICT OF INTEREST

There is no conflict of interest to report.

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