A Comprehensive Review of Information Systems Utilisation for Effective Development Assistance Management in South African Higher Educational Institutions

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Abstract

The Centre for Higher Education Transformation initially promoted discussion on innovative topics in South Africa. To enable African universities to participate more meaningfully in the global knowledge economy and society, they have recently shifted their focus to enhancing these institutions' regional and national development. The role of development assistance in promoting sustainable development and tackling global challenges in developing higher education cannot be over-emphasised. Information systems have become valuable tools in recent years in enhancing development assistance initiatives. Thus, adopting the information system (IS) tools in enhancing development assistance management (DAM) is essential. The research gap of this study is centred on the need to understand the required strategies for IS in achieving effective DAM. It, therefore, behoves development practitioners, policymakers, and researchers to effectively strategise towards leveraging IS to improve DAM's transparency, efficiency, and accountability. This article identifies and explores the research gap and highlights the challenges and potential benefits of adopting IS in improving DAM. The Systematic Literature Review (SLR) is the adopted methodology in which 40 articles published were identified and analysed, while the Information Systems Success Model (ISSM) is the theoretical framework for this study. The research findings will enhance the effective utilisation of IS, leading to sustainable development and improved outcomes in developing higher education. The article recommends the re-appraisal of DAM policies and strategies towards enhancing corporate planning by enhancing capacity-building programs, strengthening technological infrastructure, fostering partnerships and collaboration, and promoting data ethics and governance.

Key words: Development Assistance Management (DAM), Higher Education Institutions (HEIs), Information systems (IS), Information Systems Success Model (ISSM), South Africa.

Introduction

As per Adam (2016), tertiary education plays a pivotal role in fostering both social and economic development through four main objectives: the cultivation of human capital, the establishment of knowledge bases (primarily through research and knowledge development), the dissemination and application of knowledge (mainly through interactions with knowledge users), and the preservation of knowledge (through inter-generational storage and transmission). With compelling evidence highlighting the significance of human capital as a critical driver of economic growth and emerging findings indicating that higher education (HE) is associated with various non-economic benefits such as improved health and

well-being, governments globally have provided financial support to the sector. Over the past decade, investment in human capital and higher education has taken centre stage in strategies to promote economic prosperity, achieve fuller employment, and foster social cohesion. Universities have traditionally held a crucial role in the realm of knowledge. However, the landscape of higher education has transformed since the post-World War II era with the advent of mass education. HE now plays a critical role in employment, social mobility, economic growth, and overall economic development. The international recognition of the importance of a vibrant higher education sector has become more apparent, especially in the aftermath of the 2008 global recession and financial crisis. Higher education institutions (HEIs) have strategically utilised research and development (R&D) to stimulate economic recovery, aligning with government expenditure targets. When examining the impact of academic research output on economic growth, a certain degree of causality exists, although there is disagreement regarding the direction and magnitude of this influence. Lee et al. contend that their study identified a weaker or nonexistent relationship in developed economies, while a stronger relationship was observed for developing HEIs. The lack of unanimity in the direction of causality found in international literature can be attributed to variations in an HEI's economic growth and development level during different periods examined or differences in academic and research systems. In the case of South Africa, a prolonged period of decline and consolidation in the number of publications was reversed with the implementation of appropriate incentives, leading to increased research outputs from universities.

The existing higher education landscape in South Africa can be characterised as moderately productive in knowledge creation and differentiation, marked by high attrition rates and low participation levels. The ten years following 1994 saw significant attention given to both policy frameworks and capacity building within the sector. However, despite discussions, the implementation of massification and differentiation into effective systems for producing outcomes has not materialised. Given the diverse educational backgrounds of university students in South Africa, targeted interventions are essential to maximise success through effective teaching and learning, academic support, and mentoring programs. This is particularly crucial in efforts to enhance the graduation rates of South African universities, which, as of 2010, stood at a mere 17% at the undergraduate level, falling short of the national benchmark of 22%. The National Development Plan (NDP) aims to raise this rate to over 25% by 2030, increasing the total number of graduates from 167,469 to 425,000. Higher education (HE) has played a significant role in advancing democratic values, social justice, redress, and a culture of civic agency. Achieving these ideals necessitates socially responsive university curricula, teaching practices, and knowledge-generation agendas.
Moreover, universities should exemplify democratic participation and inclusiveness through institutional cultures, structures, processes, and practices. Often, this transformation journey requires universities to cultivate enabling and humanising institutional cultures that affirm and celebrate diversity as a prerequisite for excellence. A comprehensive overhaul of the education system is a crucial component of the NDP, with its success in other priority areas contingent on this transformation (Livingstone et al, 2017). By 2030, South Africa aims for an expanded higher education sector capable of meaningfully contributing to developing high-level human potential and enhanced competitiveness in transitioning to a more knowledge-intensive economy. Achieving this requires articulated funding and quality improvement arrangements in government policies and programs to ensure sustainable implementation strategies and the realisation of desired outcomes for building a better life for all.

Development Assistance Management (DAM) manages technical, financial, and material support to developing HEIs by international organisations, governments, and non-governmental entities. According to the World Bank (2014), the primary objective of DAM is to enhance economic growth, reduce poverty, and ensure sustainable development in recipient-developing HEIs. The purpose of DAM lies in its capability to tackle global challenges, improve the living conditions of disadvantaged populations and reduce inequality. Also, DAM's role in supporting developing HEIs is facing environmental and socio-economic challenges like disease, hunger, poverty, inadequate infrastructure, and limited access to education and healthcare. DAM catapults progress and ensures the actualising of the Sustainable Development Goals (SDGs) of the United Nations in combating poverty, hunger, disease, gender inequality,

inadequate education, and lack of access to healthcare and clean water (United Nations Development Programme, 2021).

Hence, development assistance provides financial support, technical expertise, and capacity-building support for developing HEIs to build resilient institutions, strengthen their economies and improve social services. In the South African Higher Educational Institutions (HEI) context, harnessing IS for DAM greatly improves the impact and effectiveness of these programs. IS provides a platform for organising, collecting, disseminating, and analysing DAM-related data. Thus, stakeholders can track progress, make informed decisions, and ensure accountability and transparency in managing funds and resources. The utilisation of IS among students in South African HEIs can empower them to participate in initiatives for development assistance. It can also deepen their conceptualisation of the intricacies of development challenges, equip them with the necessary skills to contribute effectively to development programs and expose them to practical experiences. By leveraging IS, students can monitor the implementation of development projects, engage in data-driven decision-making, and collaborate with stakeholders. This prepares them for future careers in development, enhances their academic learning, and promotes international cooperation and policy-making. HEIs are essential in driving socio-economic development and shaping the future workforce in any HEI. The utilisation of IS has become increasingly important in educational settings, offering opportunities for promoting learning and teaching processes, supporting decision-making and improving administrative efficiency in today's digital era (Al-Emran, 2016).

Similarly, Jones and Cuthrell (2011) and Gakibayo et al. (2020) elucidated that DAM promoting IS utilisation among students is a potential strategy for enhancing educational opportunities and bridging the digital divide. This development has heralded the production of digital-resource materials, such as computers, CD-ROMs, Email, and OPAC (among others), that are configured for storing and processing information for accessibility and for reducing voluminous print information resources. IS is a major player in managing and functioning HEIs, encompassing various software applications, technologies, and databases that support the collection, storage, processing, and dissemination of information within an organisation. Indrayani (2013) and Lee and Choim (2017) opined that IS potential in HEIs requires effective DAM strategies for meeting the needs of South African students. Information management and technology date back to the Mid-20th century from print information resources, also called the era of information explosion. In recent years, information systems have become increasingly important in higher educational institutions as these institutions strive to enhance the learning experience and improve student outcomes. In South Africa, where access to quality education remains a challenge, the effective harnessing of information systems can play a pivotal role in supporting student success. In higher educational institutions, Information Systems support administrative tasks, facilitate communication and collaboration, enhance teaching and learning processes, and provide access to valuable resources. These systems include student information systems, learning management systems, library management systems, research databases, and other technology platforms that contribute to the overall functioning of the institution. Thus, it is germane to point out that education has radically transformed information management/utilisation because it enhances research and human resources capacity development in Higher Educational Institutions (HEIs). In many African universities, most information users find it problematic to access information resources, as they are either underutilised or insufficient.

Hence, Piper et al. (2015) opined that despite the huge investment by HEIs in e-resources, technological utilisation among students in developing HEIs still ranks low. The utilisation of Information Systems in higher educational institutions brings about numerous benefits. It improves administrative efficiency by streamlining registration, admissions, and financial management processes. It enhances communication and information sharing among faculty, staff, and students, increasing productivity and collaboration. Information Systems also enable personalised and interactive learning experiences, allowing students to access course materials, participate in online discussions, and submit assignments electronically. Additionally, these systems facilitate research efforts by giving users access to scholarly materials, tools for data analysis, and collaborative websites (Sedera and Gable, 2010; Lee and Choim, 2017). According to Stair (2013) and Rainer and Prince (2022), there is a rising requirement for flexibility in the use of

Information Systems (ISs) to achieve optimal output in production as the amount of processed information grows daily. Supply Chain Management (SCM), among other ISs, can help achieve this functionality. The importance of this subject is shown by the growing understanding of how information systems may revolutionise educational environments. The beneficial effects of information systems on student engagement, learning results, and the overall educational experience have been highlighted in numerous studies (Turban et al., 2010; Rainer and Prince, 2022). Nevertheless, despite the accessibility of information systems and the advantages, they could provide expanded digital literacy, better educational results, and more chances for pupils to succeed in the digital age.

South African Higher Education Institutions (HEIs) are crucial in driving socio-economic development. Their mission extends beyond delivering high-quality education and conducting research; they are instrumental in fostering innovation, creating employment opportunities, and facilitating social transformation. To effectively fulfil this mission, these institutions heavily depend on development assistance, which manifests in various forms such as financial support, infrastructure development, and capacity-building programs. The literature extensively underscores the significance of development assistance for these institutions, emphasising its pivotal role in addressing historical disparities and inequalities within South Africa's education system. Tshimanga et al. (2016) note that the enduring impact of apartheid has significantly influenced the quality of education and infrastructure. Development assistance is a crucial bridge, supporting initiatives like scholarships, faculty development, and facility modernisation. Not only does this ensure broader accessibility to education, but it also promotes inclusivity by addressing past inequities.

Moreover, South African HEIs operate globally, necessitating their competitiveness and relevance. Cloete et al. (2019) stress that development assistance enables these institutions to engage in international collaborations, research partnerships, and exchange programs, expanding their global reach and enhancing their academic standing. This global engagement contributes to a diverse learning environment, enriching the academic experiences of both students and faculty. In addition to addressing infrastructure and internationalisation, development assistance is crucial in supporting research and innovation—critical components for economic growth and addressing societal challenges. Sotshangane et al. (2013) and Rainer and Prince (2022) underscore that funding for research and innovation grants empowers South African HEIs to conduct cutting-edge research, develop solutions to local problems, and contribute to national development agendas. This research capacity also serves as a magnet for attracting top talent and investment.

Further, development assistance promotes accountability and transparency in the use of funds. As Molotja and Mugova (2014) point out, donors often require institutions to adhere to strict financial and reporting standards, ensuring that funds are utilised efficiently and effectively. Development assistance is instrumental in enabling South African HEIs to fulfil their multifaceted role in societal development. It addresses historical disparities, promotes inclusivity, facilitates international collaboration, fosters research and innovation, and ensures financial accountability. As South Africa strives for growth and equity in its higher education sector, development assistance remains a critical enabler for these institutions

Aim of Study

This research study aims to contribute to developing effective information systems strategies that can optimise development assistance management and ultimately improve education in South Africa.

Relevance of Development Assistance Management Techniques in Information Systems (IS) among South African Students in Higher Educational Institutions (HEIs)

Assistance for development provided before World War II was perceived as the responsibility of the white man, marked by a lack of urgency and granted within the colonial context (Gartner, 2017). The concept of modern aid emerged during the war period, acknowledging the necessity for a post-war aid program for the developing world. While various programs were initiated, it wasn't until the introduction of the Marshall Plan in the immediate aftermath of the war that the first substantial governmental-level aid effort was

established. Management strategies for development aid strongly support students' use of information systems in South African HEIs (Lwoga, 2012). The use of information systems for teaching, learning, and administrative reasons can be improved by various methodologies, regulations, and interventions. To comprehend the relevance of these techniques' effects on student outcomes, institutional performance, and general sustainable growth in the education sector, according to Rainer and Prince (2022), a thorough analysis of their significance is necessary. Effective management of development assistance in South African HEIs relies on information systems.

According to Kwanya et al. (2015), Santos et al. (2019), and Gakibayo et al. (2020) offer several key benefits and opportunities, such as improved education and skill growth, engagement in developmental processes, increased project impact and effectiveness, strengthened partnerships and collaboration, and promoting accountability and transparency. For instance, with improved education and skill growth, instructors can expose students to real-world situations and help them hone their technical and analytical abilities through their involvement in information systems (Kwanya et al., 2015). It gives them helpful information about data management, project planning, and monitoring and evaluation, which puts them in a position to pursue professions in development assistance. Santos et al. (2019) explained that engagement in developmental processes entails students' active involvement in managing development aid programmes to be better able to make decisions, solve problems, and innovate. Their involvement cultivates a feeling of accountability and ownership, preparing them to become future development industry leaders and change agents. According to Gakibayo et al. (2020), increased project impact and effectiveness ensure that students can use information systems to collect and analyse data, identify patterns, and evaluate the impact of development activities. This data-driven approach helps with decision-making based on reliable information, resource allocation, and increasing the overall effectiveness and impact of projects that offer development aid.

Information Systems (IS) Significance

IS was conceptualised by Kahveci (2012) and Al-Emran et al. (2016) as an integrated system of parts for gathering, storing, and handling data and producing information, knowledge, and digital products. HEIs heavily rely on IS to carry out their formal duties, manage their business operations, foster relationships with HEI management, staff, students, and other stakeholders outside the institutions, and successfully compete with other educational institutions. Due to its considerable role in administration and administrative decision-making, the effectiveness of IS implementation in managing HEIs demands further investigation. The problems that impede the efficient implementation of IS in HEIs, most notably academic administration, need to be addressed to maximise the efficacy of IS execution in HEIs. An HEI-IS fosters professionalism, modernises established institutions, and accelerates the creation of a standardised, integrated higher education environment. Figure 1 (Indrayani, 2013) provides a diagrammatic depiction of IS.

According to Anica-Popa (2012) and Al-Emran et al. (2016), an exceptional institution possesses six forms of IS, which operate at the knowledge, operational, management, and strategic levels. These include the following:

i)   Office Automation Systems (OAS)
ii)   Transaction Processing Systems (TPS)
iii)   Management Information Systems (MIS)
iv)   Knowledge Work Systems (KWS)
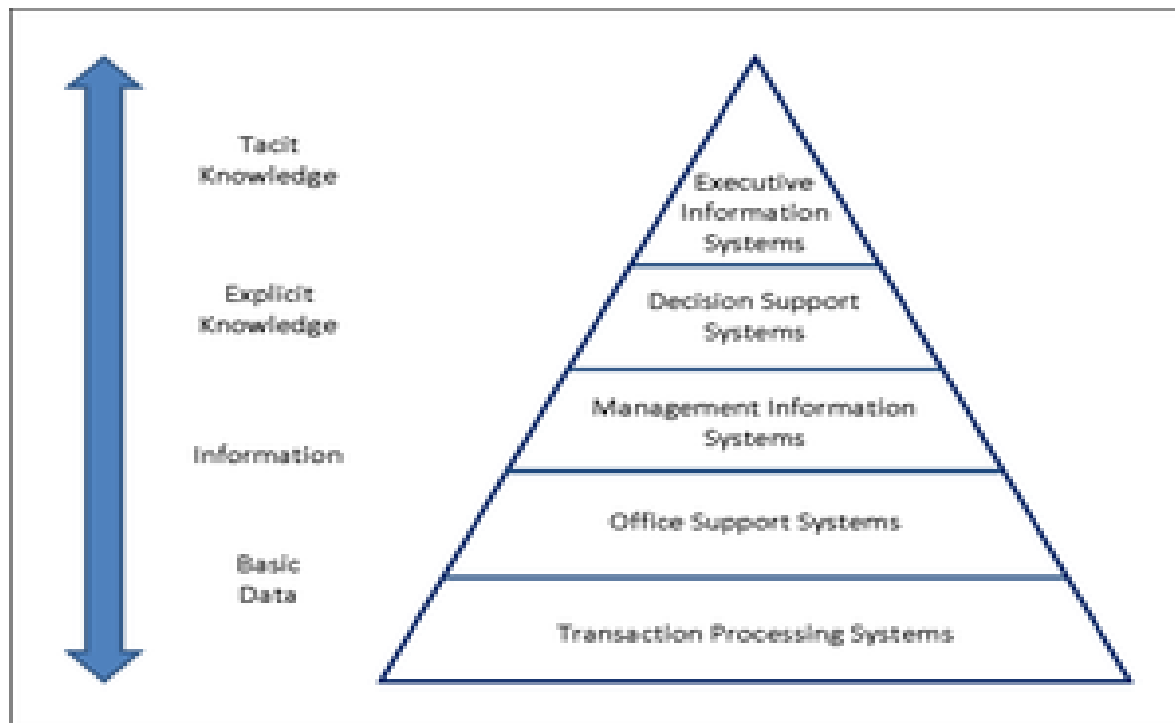v)   Executive Support Systems (ESS)
vi)   Decision Support Systems (DSS)

Figure 1: *IS represented diagrammatically (Indrayani, 2013).*

Systems for Processing Transactions

To speed up their regular corporate operations, all HEIs need standard methods for processing transactions. All endeavours or activities promoting the efficient operation of institutions are considered transactions. However, they vary from one institution to another. For instance, ledgers, ledger entries, order books, receipt books, and chequebooks are all examples of transactions in the accounts department. On the other hand, a library has a book inventory, inter-loan capabilities, records for cataloguing and classification, an archives part, a readers area, etc. However, some actions, including hiring staff, placing orders, maintaining records, etc., are performed by all organisations. In HEIs, Business transactions can be completed more quickly by using transaction processing systems (Al-Emran et al., 2016).

Office Automation Systems (OAS)

To carry out official tasks, Sattikar and Jadhav (2014) conceptualised the OAS as a collection of ICT infrastructure, computers, and qualified staff. This is accomplished by putting official transactions into action accelerating the completion of official tasks in HEIs at all levels of the institutional organogram. These tasks can be divided into managerial and clerical tasks (Tapscott, 2012). Preparing written correspondence, arranging appointments, printing, keeping track of incoming and outgoing mail, typesetting, calendar maintenance, and other clerical tasks may all be done with the help of OAS. OAS assists in organising conferences, recording messages and reports, and overseeing institutional activities as part of institutional responsibilities at administrative levels. Additionally, OAS incorporates programs like electronic filing, word processing, and mailing (Sattikar and Jadhav, 2014).

Knowledge Work Systems (KWS)

According to Sattikar and Jadhav (2014), KWS is a special system created to promote knowledge generation and guarantee the effective incorporation of technical know-how into institutional business. Offering analytical communications, graphics, and necessary document management capabilities improves the generation and dissemination of knowledge and new information. From the aforementioned, knowledge workers also have the right to seek and research knowledge outside institutional boundaries (Higher

Education Funding Council for England. (2009). Therefore, KWS must guarantee easy access to external databases and a user-friendly interface, allowing users to quickly and easily retrieve crucial information. Business/financial workstations, virtual reality systems, and computer-aided design (CAD) systems are a few examples of KWS (Indrayani, 2013; Sattikar and Jadhav, 2014).

Management Information Systems (MIS)

According to Laaser et al. (2017), Management Information Systems (MIS) were primarily created to improve middle-level institutional employees' planning, control, and decision-making abilities. A functional MIS gathers transaction records, produces product information through reports, answers, or displays, and retrieves the records. These informational items align with what institutional managers and supervisors need to make decisions. Additionally, MIS use straightforward procedures like reviews and assessments to guarantee that managers make official policy decisions for which the method of coming up with a potential solution has been outlined in advance. A typical MIS report summarises the institution's monthly, quarterly, or yearly activities. However, MIS can offer managers access online to historical and present performance data for institutions and daily or hourly data.

Decision Support Systems (DSS)

Laaser et al. (2017) defined DSS as a communicative computer-based IS similar to the MIS, as it also serves in the administrative sector of an institution. On the other hand, it differs from MIS because it plays a supporting role by enhancing the HEI decision-making process by administrators. It provides middle managers with the required information, enabling them to make intelligent official decisions. Thus, DSS is designed for administrators to implement particular tasks or challenges. By and large, DSS serves the administrative needs of managers in making semi-structured assessments to arrive at logical conclusions (Rainer and Prince, 2022). It is also imperative to state that DSS can assist in taking complex official resolutions, and in support of such solutions, they rely on information produced by TPS and OASs. DSS have more analytical influence than other ISs because they utilise a wide array of decision models in analysing or summarising large volumes of data (usually in the form of charts or tables), making data analysis and comparison less cumbersome for HEI administrators. Additionally, DSS provides an interactive platform for users to directly work with and add or change data when such a need arises (Kou, 2011; Laaser et al., (2017).

Executive Support Systems

An ESS is an expanded form of MIS, a computer-based IS that improves decision-making at the highest administrative level of an institution. The decisions made with the help of ESS are unusual decisions that impact the entire institution and call for wisdom and insight (Luo, 2016). Compared to DSS, ESS offers more general computing skills and uses cutting-edge software packages to improve the presentation of essential data in graphs and charts. This aids administrators in resolving official problems, such as using internal data from DSS that has been summarised to make wise decisions about the administration. Additionally, ESS aids in tracking, filtering, and compressing high-priority data to make it available to HEI administration. Additionally, ESS improves trend forecasting, opportunity identification, tracking of official activities, and performance monitoring (Rainer and Prince, 2022).

Research Gap

Development assistance is critical in addressing global challenges and promoting sustainability in HEIs (Maunder and Schöer, 2018). Effective management of development assistance is essential for ensuring optimal utilisation and maximising its impact. In recent years, information systems have emerged as valuable tools for enhancing the management of development assistance programs (Laaser et al., 2017). However, a research gap exists in understanding the strategies required to harness information systems for efficient development assistance management. Furthermore, another research gap for this study is the limited knowledge in effectively utilising information systems in developing assistance management. While

information systems have the potential to enhance transparency, accountability, coordination, and data-driven decision-making, there is a lack of comprehensive strategies guiding their adoption and implementation (Jansen and Ebersohn, 2015). This gap hinders the ability of policymakers, development practitioners, and researchers to leverage information systems to their full potential in managing development assistance.

Key challenges contribute to this problem, including the limited technological infrastructure and connectivity in developing HEIs, the need for capacity building and skill development among stakeholders, concerns regarding data quality, privacy, and security, and institutional and policy barriers. The potential advantages of information systems in managing development assistance cannot be wholly realised without addressing these issues and coming up with workable strategies and solutions. Therefore, conducting research and establishing thorough strategies for utilising information systems to manage development assistance to close the knowledge gap is imperative. The best practices, obstacles, and opportunities related to the adoption and use of information systems in managing development assistance will be revealed through this study. It is important to note that the research gap will be eliminated by more empirical studies similar to the one under consideration, such as those that examine the efficacy of development assistance management systems in practical contexts.

Theoretical Model for the Study

In determining a framework for success in effectively utilising information systems among students in South African higher educational institutions, it is essential to adopt a comprehensive framework that can guide the evaluation and measurement of information systems utilisation (Dwivedi et al., 2019). The Information Systems Success Model effectively utilises information systems among students in South African higher educational institutions. To ensure the success of these strategies, it is essential to adopt a comprehensive framework that can guide the evaluation and measurement of information systems utilisation. The Information Systems Success Model provides an excellent theoretical framework for evaluating the success of management methods for development aid in accomplishing their objectives and improving student use of information systems. Dwivedi et al.'s (2019) original proposal for the Information Systems Success Model offers a comprehensive framework for evaluating the effectiveness and impact of information systems in organisations. System quality, information quality, utilisation, user satisfaction, individual impact, and organisational effect are the six fundamental elements of information systems success identified by this approach. These dimensions offer a thorough grasp of the elements that govern the efficient use of information systems and their effects on users and organisations.

In bolstering the fundamental elements of information systems, system quality is the technical term for the information system's functionality, performance, usability, and dependability (Jansen and Ebersohn 2015). The implementation of information systems in institutions of higher learning should adhere to strict criteria of system quality, according to management strategies for development aid. Increasing students' overall use of information systems may entail offering a solid foundation, user-friendly interfaces, and effective system performance. According to Laaser et al. (2017), the term "quality of information" refers to the system's information's accuracy, relevance, completeness, and timeliness. By ensuring that students have access to trustworthy, current, and pertinent information through the information systems, development assistance management methods should seek to increase the quality of information. This may entail implementing efficient data management procedures, guaranteeing data integrity, and granting access to in-depth information sources. Meanwhile, individual impact" describes how information systems affect students' academic performance, learning outcomes, and personal growth. On the other hand, organisational impact refers to the consequences of information system use on higher education institutions' general effectiveness and efficiency. By matching the use of information systems with the unique goals and objectives of the institutions, management strategies for development aid should work to maximise the impact on both the person and the organisational levels (Dwivedi et al., 2019). The Information Systems Success Model is a helpful framework for analysing how the utilisation of information systems influences development assistance in South African higher education institutions.

Research Methodology

The research employed a systematic literature review (SLR), a methodical and organised approach to locating, evaluating, and synthesising previous research on a specific topic. This rigorous process involves critically assessing all relevant research to comprehensively summarise the currently available information. The methodology encompasses various components, including search terms, utilised databases, criteria for inclusion/exclusion, measures to address publication bias, and data extraction and synthesis techniques. Precise search phrases such as Development Assistance Management, Higher Education Institutions, Information Systems, and Information Systems Success Model were employed to identify all relevant material comprehensively. Synonyms and similar expressions were also considered to ensure a thorough exploration. Boolean operations (AND, OR) were used to combine these words logically. Academic databases, including PubMed, Scopus, Web of Science, JSTOR, ProQuest, and Google Scholar (for grey literature), were amalgamated as part of the methodology. The consulted literature underwent thorough access, comparison, and critical evaluation to ensure the reliability and validity of the information. The databases covered specific search phrases and relevant social sciences and education literature. The process also incorporated inclusion/exclusion criteria, delineating the studies considered for inclusion and those excluded from this article. These criteria ensured that the chosen studies adhered to specific quality and relevance standards. Inclusion criteria encompassed factors such as relevance to the research problem, publication type, citation index, and outcome measurements. The relevance criterion facilitated the selection of articles directly related to the study problem and the article's topic, pinpointing crucial aspects of the study challenge and precisely defining the scope of the review. While systematic reviews typically include peer-reviewed works, selecting publications depends on the research issue and the available evidence.

    The exclusion criteria in the methodological approach involved the exclusion of databases based on content relevancy, publication status, citation index, and outcome measurements. Studies that did not specifically address the study question or topic were omitted to ensure the review focused on its intended subject. Studies lacking peer review or publication in reputable sources were also excluded regarding publication status. Additionally, studies without empirical research or reporting on necessary outcome measures or endpoints were omitted. This step ensured that the included articles were directly related to enhancing development assistance management or involved relevant interventions or exposures, thus minimising bias and ensuring the studies were pertinent and of high quality to address the study issue. To capture a diverse range of perspectives, the inclusion criteria encompassed studies conducted in higher education institutions (HEIs), those focusing on how information science contributes to enhancing development assistance management, studies appearing in books, peer-reviewed journals, and conference proceedings, and studies conducted in various locations. Grey literature sources were deliberately excluded to reduce publication bias, and any restrictions related to publishing bias were transparently stated. A systematic approach was employed to gather essential data from each study for data extraction, including the author, publication year, methodology, significant findings, and topics relevant to enhancing development assistance management through information systems in South African higher education. A thematic analysis was conducted during the data synthesis phase to identify recurring themes and patterns among the included research. The consulted literature underwent access, comparison, and critical evaluation to ensure the reliability and validity of the information. Figure 2 below illustrates the flow diagram,

providing an overview of the authors' assessment throughout the various phases of the systematic review.
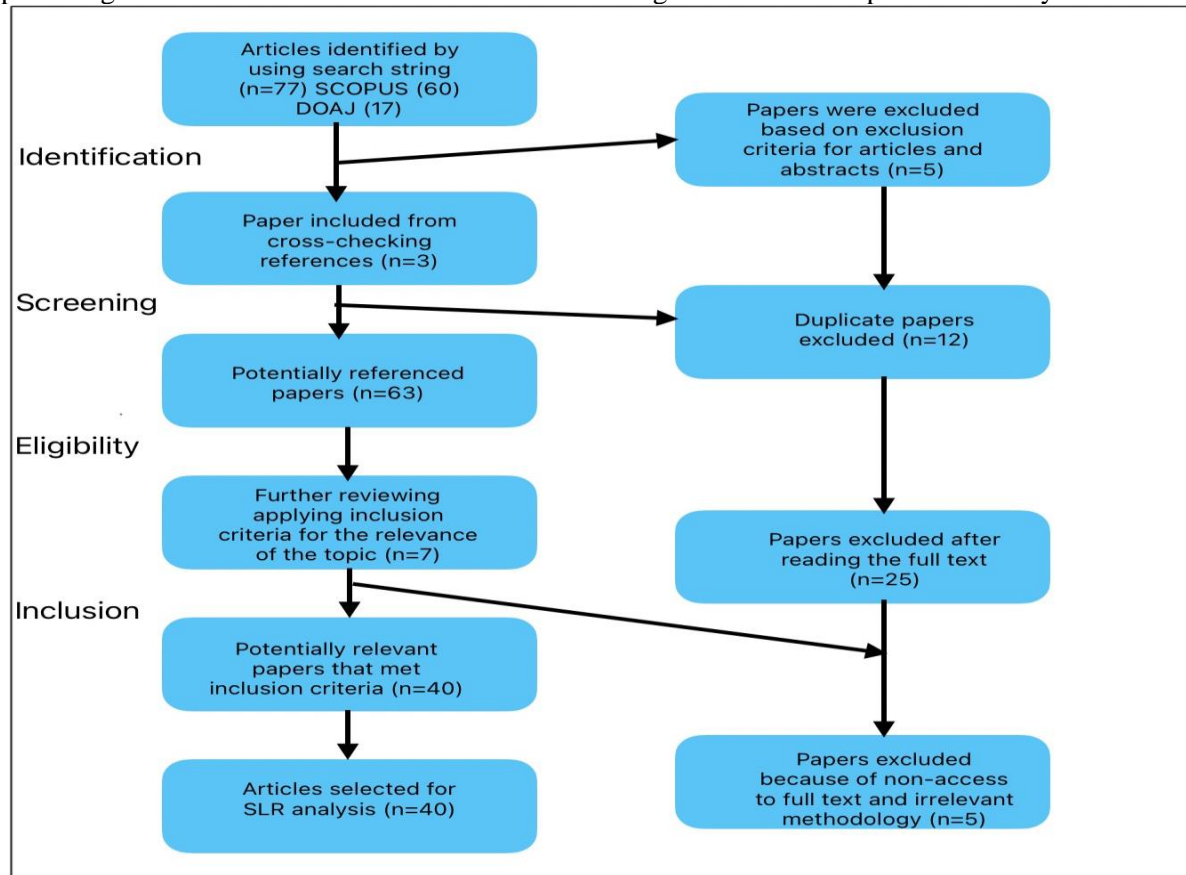

Figure 2: *Systematic Literature Review (SLR) Flow diagram adopted for the study (Odularu, 2022).*

The Google search yielded 77 articles, with 17 obtained from Direct Open Access Journal and 60 from Scopus. Out of the 77 articles selected for the research, five were excluded based on the exclusion criteria applied to titles and abstracts, and 12 were removed due to duplication. Upon reading the complete text, 25 articles were excluded as they did not sufficiently address the topic under review. Additionally, three articles were included after cross-referencing references and seven others were added due to their relevance to the subject under review. Furthermore, five articles were excluded because of their irrelevant methodology, and their full texts were inaccessible. Consequently, the articles eligible for inclusion in this research's systematic literature review analysis numbered 40.

Development Assistance Management Strategies

Development assistance management strategies play a crucial role in promoting the effective utilisation of information systems in various sectors, including education. These strategies provide guidance and support to ensure that information systems are implemented, managed, and utilised efficiently to achieve desired outcomes. In the context of higher educational institutions in South Africa, development assistance management strategies are essential for harnessing the full potential of information systems utilisation among students (World Bank. 2014). Below are the development assistance management strategies.

Policy and Planning

Gartner (2017) states that policy and planning are integral to development assistance management strategies. They entail creating policies, rules, and procedures to direct the deployment and use of information technology in higher education institutions. Planning establishes a methodical approach to

installing and managing information systems, while policy creation ensures a defined direction and alignment with organisational objectives (World Bank, 2014). In addition, policy development, according to Nowduri (2011) Dwivedi et al. (2019), includes the aims, objectives, and guiding principles that direct the use of information technologies in higher education establishments. It covers data governance, personal information protection, network security, ease of use, and ethical dilemmas. Policies offer a framework for decision-making, resource allocation, and accountability concerning the implementation and use of information systems. Planning entails identifying the precise steps, deadlines, and resources necessary to accomplish the goals stated.

Infrastructure and Resources in Development Assistance Management Strategies
Infrastructure and resources are essential management techniques for providing development support that maximises the use of information systems at universities. Sufficient resources and infrastructure are needed to ensure the efficient operation of information systems and support accessibility for schoolchildren. In accordance with Fisser and Voogt (2019), infrastructure is the technical components needed to support physical and technological information. This category includes hardware items such as computers, servers, networking gear, software program services, and internet access. For information systems to operate efficiently, a solid infrastructure is required, which allows uninterrupted use by students as they access and use them. Advanced Learning Resources include both human and natural capital. According to Dwivedi et al. (2019), sufficient funds are needed to invest in infrastructure upgrades, software licences, and training initiatives. Textbooks, educational content, and learning resources are additional elements that contribute to the general accessibility and efficiency of information systems. It is crucial to ensure institutions receive the necessary infrastructure and resources to enable students to use information technologies in the context of development support management plans. This entails evaluating the current infrastructure, spotting holes and restrictions, and allocating funds to deal with these problems. Regular maintenance and upgrades are also required to stay up with technological changes and maintain the durability of information systems.

Capacity Building and Training
To maximise the use of information systems in higher education institutions, management plans for development aid must include both capacity building and training. To provide students, teachers, and support staff with the skills and knowledge required to utilise information technology successfully, adequate capacity-building efforts and thorough training programmes are necessary (Pimmer et al., 2016). Capacity building strengthens people's skills, knowledge, and competencies to improve performance and productivity. Capacity building in information systems concentrates on enhancing students' and faculty members' technical skills, digital literacy, information management capabilities, and problem-solving talents. The United Nations Development Programme 2021) states that it also includes increasing the ability of support employees to manage and maintain the information systems infrastructure. Training programmes offer targeted, structured learning opportunities that will help you learn how to use particular information systems. A few examples of these programmes are workshops, seminars, online courses, and practical training sessions. Through training efforts, students and faculty can learn best practices for using information systems efficiently, deepen their awareness of them, and develop the essential skills to use various software tools and applications. Higher education institutions can enable their stakeholders to use information systems for teaching, learning, research, and administration by incorporating capacity building and training into their management plans for development support.

Curriculum Integration
Curriculum integration is essential to the development of assistance management strategies for maximising the use of information technologies in higher education institutions, according to Pimmer et al. (2016). It entails integrating information systems and technology-related knowledge and abilities into the curricula in various academic fields and programmes. Students are exposed to real-world technology uses and gain the requisite digital literacy and competencies by integrating information systems into the curriculum.

Integrating information systems into the curriculum can take several forms, such as incorporating technology-based assignments, projects, case studies, online learning platforms and resources, and other approaches. It enables students to understand the relevance and importance of information systems in their fields of study and prepares them for the demands of the digital age. Technology can be integrated at the course and programme levels, ensuring a thorough and coordinated strategy across several disciplines (Pimmer et al., 2016). Through integrating the curriculum, students are given theoretical knowledge and practical experience using information systems to research, solve problems in the real world, and improve their learning outcomes. It encourages innovation, critical thinking, and cross-disciplinary cooperation.

Stakeholder Collaboration
Management methods for development aid must incorporate stakeholder participation to maximise the use of information systems in higher education institutions. It entails involving a range of stakeholders, including students, faculty members, administrators, IT professionals, and outside partners, in a collaborative effort to develop and implement effective methods (Maunder and Schöer, 2018). Collaboration among stakeholders encourages a sense of ownership, shared accountability, and group decision-making, which results in the creation and execution of sustainable and relevant projects. Collaboration brings together a variety of viewpoints, areas of expertise, and resources to handle problems, spot opportunities, and promote positive change in the use of information systems. Establishing interdisciplinary committees or task forces, scheduling frequent meetings, workshops, and conferences, and fostering open lines of communication for stakeholders are just a few examples of how stakeholders might collaborate. It enables stakeholders to contribute unique insights, align their goals, and work towards common objectives. The benefits of stakeholder collaboration in development assistance management strategies are manifold. Collaboration encourages stakeholders to share knowledge, advance their careers, and grow their capacities, establishing an improvement-oriented culture. Furthermore, collaboration among stakeholders makes it easier to identify and mobilise the human and financial resources required for the efficient execution of initiatives involving information technology. To benefit from their added knowledge, resources, or assistance, external organisations, including businesses, governmental bodies, and nonprofits, are encouraged to partner with the company (Maunder and Schöer, 2018).

Empirical Studies on Information Systems Utilisation
To gauge the effects and results of these tactics in maximising information system usage among students in higher education institutions, it is critical to examine the efficacy of development assistance management strategies. It offers insights for future planning and implementation and aids in identifying areas of success and those in need of development. Evaluation offers fact-based information to guide decision-making and guarantee that resources are used effectively and efficiently (Santos et al., 2019). Key performance indicators (KPIs) are one method of assessing the efficacy of development aid management systems. KPIs are quantifiable metrics that indicate the objectives and desired results of the plans and resources—both human and financial—necessary for the effective execution of projects utilising information technologies. It promotes collaborations with other organisations, like those in the industry. They offer quantitative or qualitative data that can be used to gauge development and measure how well the methods have succeeded in producing the desired outcomes. In this context, KPIs could take the shape of statistics on information system utilisation, student satisfaction scores, academic performance indicators, and system adoption rates. Utilising qualitative research methods, such as focus groups, interviews, and case studies, is another approach to evaluation. These methods enable thoroughly examining stakeholders' experiences, viewpoints, and comments on the tactics' efficacy. Qualitative data can capture stakeholders' perspectives on the results and implications and offer deep insights into the complexities and subtleties of strategy execution. Collecting data on a bigger scale and evaluating the statistical significance of the strategies' impacts, quantitative research techniques like surveys and statistical analysis can also be used. These techniques can offer more prominent viewpoints and assist in spotting trends, patterns, and connections between the tactics and the desired results. Additionally, Lee and Choi (2017) stated that evaluating development assistance

management systems over a sufficient time to account for immediate and long-term consequences is essential. To thoroughly understand the initiatives' effectiveness from all angles, it should involve various stakeholders, such as students, professors, administrators, and outside partners.

Case Studies on Successful Implementation Of Strategies

According to Abubakar et al. (2020), case studies on the practical application of management strategies for development assistance offer valuable insights into actual instances where these strategies have been used to maximise information system usage among students in higher education institutions. These case studies illustrate the elements contributing to practical implementation, best practices, and lessons gained. They provide institutions looking to implement comparable tactics with real-world examples and motivation. Implementing a thorough technology integration programme at a university in South Africa is one example of a case study in this category. This case study assessed the efficiency of several capacity-building, stakeholder collaboration, and infrastructure-improvement initiatives to handle development aid. The results showed that the tactics promoted student engagement, increased the use of information systems, and improved learning outcomes (Smith, 2018). The implementation of a mobile learning project at a university in Kenya was the subject of another case study. The study examined how the tactics affected students' involvement, access to information, and academic performance. The findings demonstrated that initiatives like mobile devices and training courses boosted student happiness and academic progress while increasing access to educational resources (Wang'ombe and Ng'ambi, 2019).

In addition, a case study at a higher education facility in Malaysia investigated the application of a blended learning strategy, integrating in-person instruction with online tools and resources. To promote student-centred learning, collaborative engagement, and the integration of information systems into the curriculum, the study looked at how well the tactics worked. The results showed that the tactics enhanced students' use of information systems, improved their learning experiences, and promoted a culture of continuous improvement (Abubakar et al., 2020). These case studies emphasise how crucial it is to apply development aid management techniques in a thorough and well-thought-out manner. They stress the importance of educational approach alignment, infrastructure support, capacity building, and stakeholder collaboration. Institutions can learn essential lessons about efficient tactics by studying and modifying successful case studies.

Challenges and Barriers Faced In Information Systems Utilisation

The effective use of information systems within the framework of management strategies for development aid may encounter several difficulties and roadblocks. Maximising the effectiveness of these tactics requires an understanding of and response to these issues. According to Fisser and Voogt (2019), the following are some significant issues and hindrances mentioned in the literature: technological infrastructure, technology divide, technological skills, change resistance, institutional resources, privacy concerns and data security. Concerning technological infrastructure, **i**nformation systems might be hampered by inadequate or outdated technology infrastructure. The efficient application of development assistance management systems might be hampered by a lack of dependable internet connectivity, insufficient hardware and software resources, and a lack of technical help (Bwalya et al., 2016). Additionally, the technology divide, characterised by unequal access to digital resources and technology, can lead to differences in how information systems are used. Accessing and effectively using information technologies may present challenges for students from underprivileged backgrounds or remote locations, aggravating already-existing disparities (Gakibayo et al., 2020). Also, students and instructors who lack the necessary digital literacy and technological proficiency may find it difficult to use information systems efficiently. A significant hurdle can be a lack of training or assistance in using technology for learning and research (Adam, 2016; Gibson and Chingosho, 2020).

Furthermore, it is essential to note that development aid management solutions may be challenging without institutional support and funding. Information systems utilisation projects can lack administrative commitment, have an inadequate workforce, and have limited finance (Bwalya et al., 2016), and utilising information systems necessitates gathering and storing sensitive data, which raises data security and privacy

issues. Institutions must address these worries by enforcing strong security measures and following data protection laws (Bwalya et al., 2016). Incorporating information systems into the curriculum and teaching methods can be complex. It takes considerable planning and training to match information technology with pedagogical approaches and instructional techniques (Gibson and Chingosho, 2020).

Impact on Students

The application of information systems can significantly impact students' learning experiences, academic performance, and overall development. The following are some crucial areas where these tactics' effects on students have been noted such as enhanced access to resources and information, enhanced experiential learning, and digital skills development. For instance, information systems and digital resources are frequently provided as part of development assistance management strategies, which can improve students' access to course materials, research resources, and learning possibilities (Maunder and Schöer, 2018). This improved access can aid students' academic aspirations and boost their knowledge base. Information systems utilisation facilitated by development assistance management strategies can enrich students' learning experiences. Interactive learning platforms, multimedia resources, and online collaboration tools can engage students in active learning and promote higher-order thinking skills (Kwanya et al., 2015). This can contribute to improved student engagement, motivation, and academic achievement. Students' involvement with information systems can aid in developing crucial digital competencies and skills. Students can improve their digital literacy, critical thinking, problem-solving, and information management abilities by using technology for information seeking, data analysis, and communication (Beetham and Sharpe, 2019). These skills can help students prepare for their future academic and professional ambitions and are helpful in the digital age. Also, information technology gives students more control over their learning processes, empowering them. Students can access knowledge, learn independently, and own their educational experience (Nguyen and Li, 2021). Students may feel more independent, autonomous, and capable due to this.

Students' collaboration can be facilitated by management techniques for development support that encourage information system use. Students can communicate, share ideas, and absorb knowledge from their peers using online discussion boards, virtual group projects, and shared repositories. Collaboration can improve students' interpersonal and communication abilities while building community among classmates. Furthermore, students can be better prepared for the digital workplace by using information systems in development aid tactics. In professional contexts, mastery of digital technologies, working with online resources, and successfully using technology for communication and collaboration are increasingly valued (Jansen and Ebersohn, 2015). By integrating information systems, higher education can benefit students' employability and potential professional success.

Academic Performance And Learning Outcomes

The application of development assistance management systems can significantly impact student's academic performance and learning outcomes. The following are some crucial areas where these tactics' effects on learning outcomes and academic achievement have been noted, such as improved academic performance, enhanced research skills and information retrieval, increased motivation and engagement, and enhanced problem-solving and critical thinking skills, among others. As regards improved academic performance, it is essential to note that management techniques for development aid that encourage the use of information systems can boost academic performance and success. According to Olatokun and Ayeni (2017), the accessibility of digital resources, online learning platforms, and interactive educational technologies can improve students' access to knowledge, boost their grasp of challenging ideas, and promote personalised learning. Higher grades, increased topic mastery, and improved overall academic results may result.

Furthermore, utilising information systems and employing development assistance management techniques can help students become more adept at finding information and conducting research. Students can learn how to conduct efficient information searches and evaluations, critically evaluate research results,

and use evidence-based strategies in their academic work. These abilities are necessary for carrying out excellent research and creating intellectual outcomes. Students' motivation and involvement can also be increased by integrating information systems through development assistance management tactics. Learning can be more engaging and interactive through gamified educational technologies, multimedia resources, and interactive learning platforms (Joo et al., 2018). This will motivate students to engage in their studies actively. The learning results may be enhanced as a result of this increased involvement. Also, the development assistance management strategies that strongly emphasise using information technologies can help students improve their ability to think critically and solve problems. Students may be forced to exercise critical thought, analyse complicated issues, and develop novel solutions through technology-enabled learning activities, case studies, and realistic simulations (Nguyen and Li, 2021). Both academic and professional environments place a high importance on these abilities.

Accessibility to Resources and Information

A key component of development assistance management strategies for maximising information system usage among students in South African higher education institutions is access to information and resources. The following are some significant considerations on the significance of having access to resources, information, and pertinent in-text citations, such as "Equality in Accessibility to Information, Equality in Accessibility to Information, Technological Information Literacy". Development assistance management strategies should ensure equitable access to information for all students, regardless of their socio-economic background or geographical location. Access to relevant and up-to-date information resources can empower students, enable self-directed learning, and enhance their academic performance. Furthermore, it is essential to note that students also need the ability to browse and assess the large amount of information available efficiently, including infrastructure and information resources, among others. Simply having access to knowledge is insufficient. For students to critically evaluate information sources, conduct effective searches, and utilise and share information ethically, development assistance management methods should include measures to foster digital information literacy among them (Badke, 2017). Also, for information systems to be used effectively, there must be an adequate supply of information resources and infrastructure. Development assistance management plans should address infrastructure-related issues, such as dependable internet connectivity, accessibility to computers and gadgets, and well-equipped libraries or digital learning settings (Olatokun and Ayeni, 2017).

Management techniques for development support should guarantee access to a wide range of thorough information resources that meet the interdisciplinary needs of students. This can include electronic books, academic journals, online databases, digital libraries, and other learning tools pertinent to their academic programmes (Maunder and Schöer, 2018). Also, development aid management strategies should encourage collaborative learning environments where students can access and exchange information with their classmates. By facilitating information sharing, group debates, and collaborative projects, online platforms and social learning networks can improve students' access to other viewpoints and build community (Maunder and Schöer, 2018).

Technological Skills and Digital Literacy Skills Development

The successful execution of development assistance management techniques for harnessing information systems utilisation among students in South African higher educational institutions depends critically on developing digital literacy and technology capabilities. Here are some significant ideas regarding the need to develop technology skills and digital literacy, along with pertinent in-text citations digitally literate students can better use and navigate online information sources. To get pertinent and trustworthy information for their academic needs, students must be able to seek, assess, and critically analyse material from various online sources (Anica-Popa, 2012; Olatokun and Ayeni, 2017). Developing pupils' fundamental technological abilities is a critical component of management methods for development assistance. These abilities may include mastery of programming languages, data analysis software,

collaboration platforms, and productivity tools, enabling students to work on challenging assignments and solve problems (Olatokun and Ayeni, 2017).

Conclusion

The administration of information systems in harnessing development assistance management in South African higher education institutions has been examined in this review study. This study has contributed valuable insights into the significance, problems, and potential solutions in this context through an in-depth analysis of many issues linked to development assistance management systems. The analysis has emphasised the value of policy and planning, infrastructure and resources, capacity building and training, curriculum integration, stakeholder collaboration, evaluation, case studies, challenges and barriers, impact on students, academic performance and learning outcomes, access to information and resources, and the development of digital literacy and technological skills. The effective use of information systems to benefit students in South African HEIs depends on each area. Additionally, this study has highlighted the need for additional research and empirical studies by pointing out gaps in the existing literature. The gap also includes a lack of expertise and comprehension of using information technology efficiently in managing development assistance. Filling the research gap will increase our understanding of the subject and provide information for developing and implementing more efficient tactics. By providing a thorough evaluation of development support management strategies for maximising information system usage among students in South African higher educational institutions, this review article added to the body of current knowledge. The study offers a strong foundation for upcoming work in this field, both academically and practically. Stakeholders involved in the formulation and execution of these strategies can establish initiatives that promote the best possible use of information systems for long-term educational growth by taking into account the numerous aspects covered in this paper.

Recommendations

Assessment of the Long-term Impact

Conduct longitudinal research to evaluate the long-term effects of management strategies on students' use of information systems for development support. This will shed light on the long-term viability and efficiency of these techniques.

Comparative Research

Analyse the impact of various management practices for development aid in South African higher education institutions. The most effective techniques will be identified, and the elements influencing their effectiveness will be determined thanks to this comparison analysis.

Cross-Cultural Research

Investigate the application of management practises for development aid in various cultural contexts in South Africa and other nations. Examine the cultural elements that may have an impact on these tactics' efficacy and note any modifications or adaptations that may be required.

Infusion of Technology

Examine how to incorporate cutting-edge technology like virtual reality, data analytics, and artificial intelligence into information system utilisation strategies. Analyse the possible advantages and difficulties of using these technologies to improve student engagement and academic results.

Perspectives of Students

By conducting surveys, focus groups, or interviews to get their opinions on the efficacy of development aid management systems, include students' viewpoints in the research. To better inform the development and application of future initiatives and comprehend their requirements, preferences, and experiences.

Assessment Frameworks
Standard assessment frameworks should be created to evaluate the impact and efficiency of management methods for development aid. This will enable monitoring and comparing results consistently across various institutions and circumstances.

Dissemination of Best Practices
Share examples of institutions implementing development aid management techniques and their best practices. Encourage knowledge sharing and cooperation between institutions to encourage innovation and ongoing progress.

Models of Sustainable Funding
To support the installation and upkeep of development aid management techniques, look into sustainable funding models. To assure long-term financial support, consider forming partnerships with businesses, the government, and other stakeholders.

Capacity Development
Explore strategies for effectively enhancing faculty members' capacity to utilise information systems. Provide professional development opportunities and training programs to equip faculty with the necessary skills and knowledge to support student learning through information systems.

Ethical Implications
Look into the moral ramifications of using information systems, such as data privacy, security, and responsible technology use. Create rules and regulations to ensure information systems are used ethically and responsibly. By addressing these research recommendations, the understanding and implementing of information systems in harnessing development assistance management strategies in South African higher educational institutions can be further advanced. These recommendations will contribute to the enhancement of educational practices, student engagement, and learning outcomes in the context of sustainable development.

Conflict of interest
There is no conflict of interest before, during or after the submission of this manuscript.

Data statement
This is a review article, and all the material used has been duly cited and acknowledged in the manuscript. No primary data was collected for this study. It is wholly desk research.

Author Contribution
This is a sole-authored manuscript.

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