

POTENTIAL IMPACT OF INFORMATION SYSTEMS TACKLING SDG10 ON THE DIMENSIONS OF HEALTH CARE AND GENDER

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ABSTRACT

Inequalities are extending their scope in the wrong direction, impacting such dimensions as health care, quality education or safety in the way of living. The Sustainable Development Goal 10 “Reduced Inequalities” aims to establish equality among nations and within countries themselves. At the same time, technology and information systems have rapidly been integrated in our daily life during the previous decade and will continue to gain significant attention due to approaches such as artificial intelligence or deep learning. This matter under concern does not only affect individuals and communities but also businesses and economies on a global scale. Hence, this paper will take in hand the connection between information systems and the progress towards sustainable development with a particular emphasis on inequalities in developing countries.

Keywords: SDG10, SDG3, SDG5, nexus of SDGs, health care, gender, IS, IT, ICT.

1 INTRODUCTION

Social inequality is proposed as a globally occurring trend. Such differences derive from the history, environmental setting, social conditions, political situation and economic position of a nation. Without a doubt, information technology (IT) and communication shape and potentially redefine the cultures and the way societies cooperate [1]. Whether a positive or negative influence will potentially arise from an IT implementation towards the sustainable development in developing countries, focusing on the Sustainable Development Goal (SDG) No. 10 “Reduced Inequalities” on various dimensions, is examined in this paper. Subsequently, the relevance of this research project arises from the interesting debate on the subject of Information Systems (IS) supporting social and economic goals concerning everyone in a world where globalisation and inter-connectivity play an essential role. While SDG10 as such focuses on ensuring sustainable income growth, stable institutions for financial regulations, support in decision-making or appropriately managed migration policies, the areas being affected by inequality stretch out upon a large field [2]. Therefore, in order to tackle this issue, various aspects as good health, quality education, gender equality, social interests besides several others must be considered.

On the one side, the related SDG3 “Good Health and Well-Being” is taken under a closer lenses. Since inequality in terms of high-income and low-income countries has a significant effect on how much emphasis is put on health care, discussions on the importance and eventual challenges of health information systems in developing countries will be undertaken throughout this paper [3]. As an illustration, health management information systems bear great potential of generating valuable societal benefits in developing countries.

On the other side, in alignment to reducing inequalities the SDG5 “Gender Equality” will be tackled. IT provide a widespread variety of procedures and functions in diverse areas. However, the question on how technology integration as well as information system implementation might benefit equal opportunities for all genders constitutes an essential



aspect. Furthermore, supportive training regarding the use and management of technology along with the equal access to encouragement and guidance play an important role [4].

Concisely, the relevance of this paper persists in revealing the potentials and difficulties of technological integration in developing countries contributing to a sustainable development on a global level. During the previous decade enormous improvements were made, but as the technology sector is rapidly progressing consequences are uncertain and indeterminate. In particular, inequalities among countries, health care and gender discrimination as viewpoints on a sustainable development are under the spotlight.

With the intention of generating a comprehensive overview and providing a different approach on the subject under concern, the research is conducted by undertaking a literature review. This method allows to hold debates on gathered findings and existing insights on various subject matters.

2 BENEFITS AND CHALLENGES OF INFORMATION SYSTEMS

In general, IS comprise an assortment of information technologies providing control, management and exchange of information among several participants from and within diverse organizations, businesses and other social environments. Delivering functions as information management, decision-support, data controlling, monitoring among numerous other beneficial operations demands different technology instruments as internet access, performing hardware, appropriate software, reliable databases or other accommodating devices [5]. According to Boell and Cecez-Kecmanovic [5], four distinct perceptions on how to define IS, evolved. For the underlying research interest, the following two perspectives are from relevance – the technology view and the social view on IS. From the technological standpoint, IT makes up the substance within organizations and between other entities in the constantly progressing digital age. Above basic supportive operations provided by IS, crucial decision-making procedures, knowledge management, tracking and administration of processed data exemplify important functions [6]. An interesting aspect to mention in this respect is the trade-off in integrating IT in IS and the final application and actual usage of the connected network in place. The social perspective on the definition of IS arises from the interpretation of technological output by human beings. While IT manages and delivers accurately calculated data and applicable information, human users are essentially the ones bringing about the expressive interpretation as well as concrete proceedings in order to turn the technological output into profound value [6]. This approach is from particular interest when the enhancement of IS towards a sustainable development is examined. As an appropriate use of IT and communication requires a decent knowledge in how to handle hardware and software, training and guiding instructions are necessary. Thus, it is undeniable that a lack in proper education in this regard will cause challenges.

2.1 Information systems in developing countries

Since IS require various preconditions for being implemented and integrated, diverse approaches on how to handle different set-up environments must be taken in consideration. In other words, there will come up varying challenges when adopting IT in developing countries compared to a realisation in industrialised nations. Information and communication technology (ICT) has not solely modernised our standard of living but also changed the society's approach to exchange information and communicate with each other. It cannot be denied that the divergence between wealthy and underprivileged nations enlarges year by year. The point at issue whether inequalities can be eliminated and whether the status of a balanced society can be achieved, remains a continuous worldwide question [7]. The majority



of research and development on the design and improvement of IS is carried out in highly developed countries due to the availability of financial support and resources. Decisively, globalization made the transfer of this innovation to developing nations possible. However, the implementation of an information system in a region or organization that it is not explicitly designed for will certainly result in malfunctions and deficiencies. During the period of the architectural process for planning IS, distinctive prerequisites existing in various cultures, regions and among different types of organizations have to be taken into account in order to reduce the risk of failure. Furthermore, the availability of financial resources, the education of the users and adaptability of the infrastructure must be ensured for a decent IS implementation in developing countries. In principal, lacking the accomplishment of prerequisites to integrate an information system as intended by the design purpose leads to a high likelihood of failure [8].

2.2 Potential benefits of information technology

Research has been widely adopted in the field of examining advantages brought about through the application of IT within diverse organizations. Among illustrations for potentials empowered by IT are the support in decision-making procedures, the provision of an effective communication, collection of data and knowledge as well as controlling and monitoring. It goes without saying that due to IS, knowledge and information can be distributed more rapidly within a wide-ranging scope by way of a transparent and flexible approach [9]. If knowledge systems are effectively adopted, decision-making procedures may be performed more reliably and dilemmas may be assessed in a more reliable way [10]. Another example demonstrates the health information system aiming to support processes and development in the health care sector. Such IS strengthen the proper allocation of medicine, conclusions of medical treatments and proper planning procedures [11]. Idea sharing on IS potentially fosters innovative thinking and ground-breaking inventions. Particularly small and medium enterprises gain benefits from online access to information platforms, efficient administration of their processes as well from an effective way of communicating [9]. Furthermore, public facilities can derive valuable gains by improving services for inhabitants and communication among society. Frequently, e-governments are implemented as to make use of the advancements generated by IS [12]. For this paper, special focus will be given to IS integrated in e-governments, financial management information systems, health management information systems and knowledge systems in order to tackle the issue of reducing inequalities.

2.3 Potential challenges of information technology

The potentially resulting value gain as well possibly arising difficulties or challenges must be assessed and balanced. One comprehension on why the adoption or maintenance of IT and communication in developing countries occasionally fails might be attributable to the divergence in design and options of implementation depending on the set-up environment [8]. Modeling applicable and efficient knowledge information systems requires persistence and continuous improvement. Furthermore, this procedure involves constantly ongoing adaptations and amendments that result in a consistent learning process [10]. Although information systems managing knowledge play a meaningful role, challenges are frequently to be encountered. Various approaches have failed to combine all crucial perspectives in an aligning social, cultural, organizational and technological context [13]. In comparison to developing nations, industrialized countries do not lack as considerably in the availability of



financial resources, technological background knowledge, possibilities to actually carry out research or the accessibility of an adequate infrastructure [9]. Yet, the reassignment from information systems originally designed for industrialized countries evolved in developing countries during the course of globalization [8]. Consequently, modifying approaches depending on the needs demanded by different environments and settings have to be acquired in order to reduce the possibilities of failure. The majority of IS being designed in developed nations are commonly based on rational assumptions. Yet, such preconditions and expectations may not be fulfilled by less developed countries given their comparatively different economic, social and political circumstances [8]. Another challenge in a developing country persists in the availability of an appropriate technical infrastructure like dependable connected ways of transportation, interactively communicating networks, a functioning internet connectivity as well as operating technical equipment [14].

3 SUSTAINABLE DEVELOPMENT GOALS

Sustainable development covers a wide spectrum of associations and, therefore, provides a broad scope for interpretation. An important measure in this context designates the 17 SDGs set up by the United Nations in 2015 as descendant of the Millennium Development Goals. Striving to build and retain a sustainable future in an environmental, social and economic perspective the goals and their individual sub-targets ought to be achieved by 2030 [2].

3.1 SDG10 reduced inequalities

The remarkable point to be determined on the SDG10 “Reduced Inequalities” is its influence in various fields as well as on other SDGs. Endeavoring to accomplish SDG10, progress has already been attained in regard to moderate poverty in underprivileged areas of developing countries. Furthermore, income equality has been improved between countries as well as within nations. Another noteworthy aspect to remark, is the potential of IT eventually allowing to decrease transmission costs for allocating money since this presents a principal issue in this respect [15].

Target10.1 of SDG10 means: “By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average.” Evaluations on the relative income growth among the poorest 40% show a comparatively greater development than the richest population. While 61 countries, being among the poorest ones, have been showing an income growth more rapidly than the average, 31 countries still remain under deficient income conditions [3].

Target10.2 means: “By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status” [3], [15]. A total of 80% of disabled people, being the biggest minority in the world, reside in developing countries. At the same time the female population living with disabilities encounter twice times more discrimination. Moreover, women giving birth in rural areas or developing countries are enormously higher at risk [3].

Target10.6 means: “Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions” [3]. This target may be enhanced through technology as, for instance, IS are able to provide support for decision-making. Consequently, resolutions, assessments as well as monitoring may be undertaken in a more efficient and reliable way [15].

Target 10.c means: “By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent” [3].



The costs of transferring money amounts at a high level. However, as remittances remain a principal existence basis for countries with low and middle incomes, this sub-target represents an important aspect. According to statistics obtained from the World Bank, the Sub-Saharan Africa, occupying a great scope of developing countries, faces the highest transaction costs on average with a percentage of 9.3 [3].

3.2 Nexus of SDGs

On a global level, imbalanced circumstances and conditions are in place in terms of health care, access to quality education, gender equality or availability of clean drinking water. As a matter of fact, particularly developing countries are affected by these negative consequences [16]. We will mention here some examples of the link between SDG10 and SDG3 “Good Health And Well-Being” as well as SDG5 “Gender Equality” in relation to developing countries.

SDG3: In 2018, 39.7 million people were living with AIDS, however, the vast majority originating from African developing countries [17]. While access to qualitative and reasonably priced health care services differs from country to country, it can be specified that sub-Saharan Africa is heavily affected by a severe shortcoming in available medicine and vaccines [3]. Developing countries are particularly exposed to the risk of consequences due to climate change, global warming and the resulting disasters. The shortage in properly functioning warning systems and coordination in adequate risk protection likewise leads to difficult economic circumstances and unbearable social situations in affected developing countries [18], as after effects frequently entail devastation, waste and unaffordable damage [19].

SDG5: South Asia and Africa are significantly behind in terms of womanly leadership and business ownership. Furthermore, it needs to be noted that male representatives dominate parliament seats and political positions on a global scale [3], [15]. In accordance to the FAO Gender and Land Rights Database, female landowners are still considerably outnumbered compared to men owning land. And, if women are in control over such properties, the conditions are frequently worse. As a consequence, specifying equally balanced rules on the rights of being in possession of land will impact the other elements outlined in this sub-goal of SDG5 [20]. If female citizens in less developed countries were able to properly utilize IT, the impact would reach out on the entire population. The essential involvement remains in obtaining adequate education and training on how to properly handle ICT. Women in Africa encounter the most serious problems, demonstrating a gender gap of 31% in regard to being able to access IT in an appropriate manner [21].

4 CONTRIBUTION OF INFORMATION SYSTEMS TO SDG10

Altogether, the matter of aiming towards the achievement of the SDGs under the lenses of reducing inequalities on a global scale must be understood as overlapping fields taking an influencing impact on each other. As to draw an example, being affected by a disease might not be medically treated because of financial difficulties and a lack in sufficient and adequate health care services. Consequently, the financial situation is getting worse because of the incapability to be employed and generate income. Furthermore, elevated interest rates will cause more debt and livable conditions will reach their unbearable limits [22]. Here the impact of ICT and IS as a contributor towards a sustainable development is shown.



4.1 E-Readiness of developing countries

Are developing countries sufficiently prepared and supplied with adequate resources to implement IS in their specific environments? Being aware of the status on the availability of IT infrastructure and ability to productively using it presents an important matter. In spite of this, undertaking an e-readiness assessment is costly, time-consuming and involves a lot of effort [23]. E-readiness is defined as uncovering the limits within which an environment is able to successfully implement as well as integrate ICT tools, and also efficiently benefit from the resulting operations. The evaluation to what extent an organization or social setting is prepared to receive improvements through IT and IS is measured with e-readiness indicators [24].

4.2 Decision-making support in economic and financial institutions

The service sector has undergone an immense development during the previous decade. Consequently, the way of supplying knowledge and information has also been modified as coping with altering needs and demand must be aligned on a global level [12]. However, considering this fact, different opportunities in terms of resource availability, cultural practices and legal situations in various nations as well as difficult circumstances and exceptional conditions occurring in developing countries must be taken into account.

A financial management information system may be described as technological combination of automated systems that provide support in planning, achieving as well as tracking intended budgets and financial predictions [25].

Nigeria, as a developing country in Africa, is affected by inequalities concerning the rights of financial conditions. Fundamental reasons behind this occurrence are grounded on the lack in the accessibility to financial entities, shortcomings in proper ways of exchanging and communicating information as well as deviations in research undertakings [26]. Currently the majority of economic influence and power is retained by state-run entities and governmental interventions.

Nigeria's capital sector is composed of Nigeria's central bank as well as the Nigerian Deposit Insurance Corporation representing the country's main governing institutions. The banking sector established its base in 1986 along with the liberalization in Nigeria. It greatly improved the opening of commercial banks and merchant banks. The economic upsurge, while anticipated, has not followed and, subsequently, the financial market was subjected to a crucial time that still affects African developing countries these days. Nevertheless, these tough times, which are marked by high risk and misery, have led to a discussion of economically viable ways of enhancing services and restoring faith. The first route to implementing computerized information systems at Nigerian financial institutions has begun at this stage.

The integration of IT was perceived as an instrument to potentially enhance transaction procedures, improve service provisions for customers or to take advantage of databases for generating important market predictions. Thus, due to the inclusion of automated information systems the Nigerian banking industry was able to remarkably advance its situation nationally but also regarding interactions with foreign countries [27].

4.3 Social and economic inclusion

Here it is shown how IS may play a role concerning economic and social inclusion by the implementation of e-governments. In particular, information and communication technology



should inventively be incorporated in various applications and services aiming to offer an easy approach on acquiring information that is important for the affected society [28]. Likewise, the inclusion of involved citizens, businesses and organizations as well as the fostering of relationships between these groups may be promoted this way. Additionally, the participation in democratic procedures, provision of efficient decision-making procedures and delivery of valuable services are intended to be simplified. If e-governments are properly integrated in compliance with the status of e-readiness that is achieved by a developing country, these systems can have an enhancing influence on the SDG10 [23], [24].

Sri Lanka is an interesting example of the implementation of e-government. In the 1970s, the drive to incorporate networks of automation and technology into governments across Sri Lanka started. Due to the civil war, followed by difficult political times, these attempts were inadvertently brought to a standstill. In the end, numerous application suggestions were recommended. The implementation recommendations, however, were not enforced due to deficiencies in the necessary resources as well as uncertainty and instability in the country. [29]. However, circumstances have changed and e-governments that support the public sector are now integrated in Sri Lanka.

As governmental procedures have the status of being inflexible, interminable and frequently corrupt in Sri Lanka, the integration of e-governments in public facilities across the country is perceived as a constructive implementation. Practices performed through this kind of information system, as sending e-mails or saving certain files, can easily be monitored and tracked within the technological environment being integrated in the governmental facility [30]. While social inclusion may be enhanced through technology-supported and reliable processes concerning publicly administrative state of affairs, citizens could additionally benefit from the reduction in repeatedly occurring fraudulent and corrupt practices. In accordance with research completed on the evaluation of e-governments in Sri Lanka, it has been found that it plays an important role that public entities provide qualitative services for their citizens. However, change has been in progress and the technological network including the e-government system provides easily accessible public services and supports time-saving processes these days [30].

5 THE IMPACT OF IS ON INEQUALITY IN THE CONNEX OF SDG3 AND SDG5

If income is reallocated from wealthier among low-income countries, the situation on well-being and health can potentially be recovered within these nations. Alongside such developments, the way and quality of living can also be meaningfully enhanced [22]. It has to be noted that sustainable development towards reducing inequalities covers a wide spectrum of components that play a role in this context. Here the impact of IS on the dimensions of SDG3 “Good Health and Well-Being” and SDG5 “Gender Equality” in addition to SDG10 is analysed.

5.1 Influence on SDG3

IS integrated in the health care sector stand in for potential advantages as, for instance, higher quality in health facilities, significant reduction in costs and time, or reliable data collection. However, in particular developing countries frequently face problems as regards the implementation of IS. Such difficulties may arise from lacking IT infrastructure, insufficient financial resources, deficient human resources or ineffective communication procedures [31].



5.1.1 Health management information systems for Malaria

The sustainable development goal No.3 aims to eradicate epidemics as well as other communicable diseases. Malaria, which is a significant burden in the developing countries of Sub-Saharan Africa, counts against this target to be reached by 2030.

To acquire a constructive progress, health indicators like the number of disease diagnoses, number of undertaken tests, the rate of positive test results or identified costs must be reliably assessed and controlling operations have to be carried out. As a result, this process will allow for an adequate linkage of tools and technology for improved development. Health management information systems offer effective and efficient resources to assess disease, for risk evaluation, for sensitive information monitoring, and data management. Various approaches have been discovered for assessing the effects of malaria by evaluating the measures determined from data generated by the information systems for health management. While health information systems develop enormous capacity to initiate support and handle systematic assessments of malaria-specific data, it must be borne in mind that all improvements can only be made accurately if high-quality information systems are used [32].

According to the World Malaria Report 2018, international and national assistance have been contributing to a dependable data collection through the improvements of technological techniques during the previous years [33]. The Global Fund has provided upgraded information systems designed for proper monitoring, accurate calculations as well as reliable examinations. In addition, district health information software was introduced in affected areas to advance reporting [33].

5.1.2 District health information systems

In 1994, the district health information system (DHIS) was developed at the University of Oslo in pursuit of research undertaken in this field [31]. The initial intention behind this idea was to deliver improved services in the health care sector by providing a reliable data assortment and evaluation in public health facilities [31], [34]. Further developments and new features improved the DHIS continuously, like the possibility to run the program in an offline mode. Due to a modifiable interface and the set-up as an open source system, individually determined adaptations in a specific context could be conveniently performed. DHIS 2 comprises a central server for administrating data and therefore, allows to function on various hardware devices including not only notebooks and computers, but also smartphones among other gadgets operating in this network. As a consequence, the main improvement persists in the instant information availability for any employee who needs reported data and documentation access in health facilities. The leading procedures of the district health information system were taken to a national level in order to facilitate a controlled data collection process by introducing a data-warehouse. As a result of the DHIS integration, medical procedures could be tracked, the provision to health services could be documented as well as inclusive organization could be supported on a national level [31].

5.1.3 Patient care information systems

One demonstrating benefit of implementing IS in the health care sector displays the decrease of human-related errors, in developing as well as in developed countries [35]. Patient care information systems (PCIS) are identified as systems encouraging the procedures in the health service provision. Implementing such applications in health facilities, makes improvement possible by arranging for availability of medical documentation, connection to radiology information and documents providing essential records of patients. Furthermore, involving patients in the process of operating within the network of an integrated information



system will establish a fundamental trust between the clients and health workers. Another supportive invention in this regard are computerized provider order entry systems as well as automated reminder systems. These two additional process improving approached seek to avoid misunderstandings, enhance the way of communication, monitor orders and send reminding notifications if interaction is required. As a consequence, medical mistreatments, wrong decisions about medicine types and amounts are counteracted against [35].

5.1.4 Indonesia: Tackling health inequalities

As for advancing the expertise in health monitoring in general and for certain nations, in particular (like Indonesia), with the goal of reducing inequality, some competences and skills need to be obtained. Needless to say, accurate and correct information is a pre-condition for a robust health monitoring program in this area. In addition, data has to be correctly collected and analyzed, and a nationalized database of existing health inequalities must be available in a contemporary state and there needs to be a plan of behavior to tackle country-specific disparities [36].

In 2014, the World Health Organization created and started so-called training of trainer workshops with participants from South-East-Asia taking place in Indonesia. Professionals from academic institutes residing in the event region supported the training. With the aim to enhance the understanding of how health inequality monitoring and the according systems operate, applicably important procedures were in practice. Research projects in this field have found that advance towards an adequate decision-making procedure with health monitoring could be undertaken if comprehensible technological systems that are convenient to utilize are in use. Visualizations and brief reviews of inequality indicators allow a proper understanding of the functions that make such tools available and accessible. As a result, several entities in Indonesia were interested in obtaining access to the health inequality data that is collected through systematised tools. Accordingly, partnerships were built, the network expanded and the abilities as well as capabilities to collect, observe, and track health data increased in a remarkable manner [36].

5.2 Influence on SDG5

Here it is shown how IS may contribute to a sustainable development under the lenses of gender equality. The rising demand of IT during the 21st century has brought about a serious need for qualified IT personnel [13]. The issue under concern finds its challenges in appropriately handling diversity. Trauth [37] came up with the diversity argument saying that several factors as, for example, demographic characteristics, race or origin must be considered alongside the examination on connecting technology and gender. Therefore, dealing with gender equality does indeed touch important matters and stands in relationship with various other influences.

5.2.1 ICT and gender equality for economic development

From a social point of view, it must be noted that ICT also bears great potential in advancing gender equality and consequently moves forward economic growth. According to research undertaken by Chen [38], it has been found that better education across society correspondingly leads to a reduction in gender inequality. Chen provides three suggestions how gender equality could be enhanced through ICT. Firstly, society must be informed about the matter of gender equality. The understanding of this issue can be attained by knowledge distribution through IS. If the society is familiar with the subject and aware of the need for change, policymakers must face the problem and involve gender equality in their



decision-making process. Secondly, equal access to education for women must be provided. The integration of technology in educational activities allows to individually adapt times of studying and learning. Furthermore, for women living on the countryside far away from educational facilities distance learning supported by IT presents a useful option. Hence, the integration of technology in educational systems potentially supports gender equality in countries facing high inequalities and underprivileged access to quality education. Lastly, enlarging economic possibilities for women is likewise getting stronger when IT and communication tools are in use. Especially, female entrepreneurs settled in rural areas have the chance to spread and exchange innovative ideas as well as actively participate on the global labor market [38].

5.2.2 Nigeria: Gender equality through information technology

Women residing in rural areas of developing countries are exposed to a severe risk of poverty due to deficiencies in energy, educational facilities and social opportunities. In Nigeria, the responsibilities of the female population are restrained to agriculture and employment in health facilities beside the obligation of housework and taking care of their children. Their reality is characterised by hard, long and poorly paid working days. Although various programs had been introduced in Nigeria, none of them has reached the anticipated aims [39]. According to a research study from Nigeria, it has been found that women working with IT are frequently considered as performing inappropriate and uncomfortable practices [39]. This demonstrates the urgent demand for strengthening gender equality through the application of ICT in this country. If gender equivalent chances are ensured that enable the use of ICT, women will subsequently face major improvement. As to outline examples, IT makes information and opportunities of communication accessible, generates prospects for female entrepreneurs, provides home-working opportunities, which will make the life in a family with children a lot easier, and consequently, improves the way of living [39]. An empirical study conducted by Olatokun [40] has uncovered gender inequalities in regard to differences in the accessibility of ICT in Nigerian universities. It is claimed that female academics still have significantly less chances to use information systems. Yet, supporting female researchers, students and professors to participate in educational training in order to acquire knowledge in the functions of technology and information systems, would empower them to find an adequate employment, engage in the global market and take part in leadership positions. Moreover, the design of modern technological innovations requires female participation for development, which represents another reason to provide access to information technology for women.

6 CONCLUSION

Fig. 1 shows the relations on the subject of sustainable development and technological integration. Historical occurrences must be taken in consideration in order to assess successful accomplishments, on the one side, and failures, on the other. For constructive achievements, improvements can be pursued whereas mistakes need to be precisely analysed. In the course of preparation and development, four major indicators are to be concerned about: the economic situation, societal background, political circumstances and environmental setting. All these factors require an assessment when an implementation of an information system is planned in a developing country. However, trade-offs will transpire like lightning. Therefore, balancing scheming and estimates on whether positive results will exaggerate negative consequences need to be evaluated. Once the outcomes of the analysis are fully obtained, the process of designing the plan to adopt an information system in a less developed country can be proposed under the consideration of the previous conclusion on



trade-offs. Subsequent to the implementation of IT, maintenance should be ensured by continuously repeat evaluations based on newly discovered innovations and by bearing in mind constant changes turning up on a global scale.

In regard to the sub-targets of the SDG10 “Reduced Inequalities,” financial management, IS, and e-governments demonstrate capabilities to enhance decision-making processes in public institutions, which consequently also leads to more reliability in economic entities. Furthermore, such systems will enable inclusion on a social, economic and political scale. Structural systems in the financial sector, appropriate health care for affected people as well as gender-balanced opportunities in education and employment play an important role for income growth.

On the subject of achieving the targets of SDG3 “Good Health and Well-Being,” health management information systems present an essential integration in less developed countries to progress towards universal health coverage. Malaria-specific IS, patient care information systems and applications for health tracking demonstrate samples for crucial accomplishments. Such information systems allow to monitor health status, keep track of medical treatments, discover symptoms for the out-break of a disease among other vital functions.

In view of the targets of SDG5 “Gender Equality,” particularly developing countries are behind in achieving these objectives. As research findings have shown, women in sub-Saharan Africa often work in agriculture but do not have the right or chance to own and administrate land. In order to empower women’s opportunities, ICT is from relevance. However, an integration of IT is in many cases not affordable and hardly accessible, and even more difficult for female citizens. For instance, online education systems would provide women living in rural areas in developing countries, usually lacking proper educational institutions, the chance to gain skills and knowledge.

Thus, technological innovation bears great potential to enhance sustainable development, particularly in developing countries. While IS in the field of generating equality on the dimensions of economic and social inclusion, health care and gender equity bring about considerable improvement towards the targets, eventually arising trade-offs must continually be thought through on the other side.

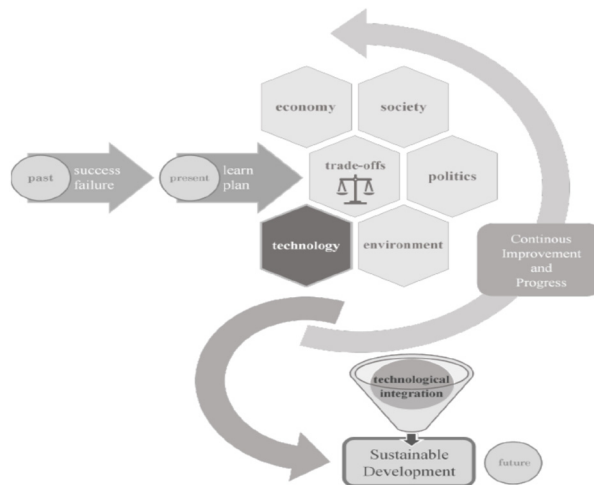


Figure 1: Profile on considering relationships.

We can also identify some limitations that turned up during the research process as well as thoughts for further research. Especially developing countries often lack in sufficient and reliable data that may be used for a trustworthy analysis. Due to a deficiency in dependable information systems or integrated information technology, data might not be consistently managed. This, as a result, leads to difficulties when comparing nations and tracking the status in their sustainable development. Developing countries also being on different continents altogether face various challenges, issues and cultural circumstances.

Certainly, a major part of the relating sources show evidence that there persists inequality in gender where shortcomings occur in the perspectives of women. Since our research investigates upon sustainable development taking the SDGs as the fundamental measure to undertake the research project, selected aligning sub-goals are taken into account. Considering the sustainable development goal No. 5 Gender Equality, it must be noted that a strong emphasis is put on the discrimination and unfairness concerning women. Therefore, our focus goes towards the resulting consequences affecting the female population. Looking beyond the horizon, on the other hand, it has to be disclosed that assessment in regard to inequalities influencing other sexes has been excluded. However, a study on this subject is one of our suggestions for further research.

Another final suggestion for further research arises from the inter-connectivity among the sustainable development goals on their aligning sub-targets. It cannot be denied that several goals are directly or indirectly connected. Therefore, an interesting analysis to conduct would be how the improvement of one goal potentially affects the enhancement of other SDGs.

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