

Evaluating Inclusive Innovative Performance: The Case of the e-Health System of the Western Cape Region, South Africa

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Abstract--This paper presents a theoretical framework for determining the inclusive innovative performance of the eHealth innovation system in the Western Cape region in South Africa. The authors critically reflect on exclusion and inclusion as a process and draws on the innovation systems approach towards developing a possible set of inclusive innovation performance indicators.

The inclusive innovation system literature is still in its infancy with most of the contributions being theoretical and conceptual with a lack of empirical work. Apart from being unclear of what such a system would actually look like in reality, there is also a lack of clear methodologies for the analysis of inclusive innovation systems. The analysis method of the Technological Innovation Systems literature was found to be the most appropriate and was adapted in this research. This entails the nature of innovations required; actors involved and the relations among each other; the type of learning they take on; and the institutional environment they are operating in. From the literature an eight step framework was developed as follows: 1) Define the inclusive innovation system in focus; 2) Identify structural components; 3) Identify functions; 4) System failure approach; 5) Inducement and blocking mechanisms; 6) Phase of development; 7) Assessing functionality and setting process goals; 8) Addressing key policy issues. The framework summarizes and sets out the theoretical underpinning for the empirical stage, on which this framework will be applied, to improve the general understanding of the innovative performance of the eHealth innovation system in the Western Cape region in South Africa.

I. INTRODUCTION

Earlier work on providing solutions for poverty alleviation focused on providing products suitable for use and consumption for those on the lowest income levels (marginal groups), termed the “Base of the Economic Pyramid”, and made famous by the late C.K. Prahalad in 2002. This notion have evolved considerably since then from only viewing solutions for poverty alleviation as end products and the lack of participation of informal citizens in formal markets and value chains to the active involvement of these citizens along the whole value chain. From this a new notion evolved, namely inclusive innovation. “Inclusive innovation is the means by which new goods and services are developed for and by marginal groups” [1]. Inclusive innovation can be seen from two aspects, firstly, inclusivity of the process (the active involvement of the marginalized group in design and development), and secondly, inclusivity of output (end products specifically meeting the needs of the marginalized group with appropriate quality) [2]. There is an ever growing

acknowledgment of inclusive innovation as a central process towards development strategies (ibid.). Inclusive innovation is a means of narrowing the gap between the quality of life of marginalized groups and those established in formal markets. This has led to arguments supporting the reorientation of business strategies and the manner in which innovation systems are understood [3].

The practical implementation of inclusive innovation projects and programs as well as the transformation of innovation systems to systematically develop such innovations is however a very difficult and complex task. Existing innovation system analytical tools are found to be lacking adequate methods to analyze and evaluate inclusive innovation systems (IIS). Adding to this lack of understanding, there also exist a lack of inclusive innovation system performance measures and indicators in literature [4], [1], [5].

This paper therefore argues that there is a distinct need for developing improved analytical approaches towards understanding how inclusive innovation systems should be developed. At the core of such an analysis is the need to also unpack how such systems may create and perpetuate inequalities and poverty. This requires a systems view of not only innovation, but also the process of inclusion and exclusion to be recognized as systemic processes. A lack of analytical foundations for systemic processes, might lead to inadequate research on the direction of innovation policy and application [6].

This is a theoretical paper that documents the development of an analytical framework to analyze inclusive innovative performance of the eHealth innovation system in the Western Cape of South Africa. The healthcare sector is seen as an appropriate area of investigation owing to inclusive innovation having enormous potential for improved access to care, service delivery, and quality of products and may have various positive knock-on effects through improved health of the populace.

A. Application to health systems

To identify the health innovation system of a country or region, an analytical and policy focus is required. This can be formulated from the more generic framework outlined in this paper with a focus on inclusive innovation health systems. The manner in which national or regional innovations systems impact health care solutions for the poor needs consideration. There is a wide range of institutions and actors that have an impact on healthcare and sectoral institutions

such as hospitals and the networks distributing health solutions requiring exploration, as it is well known that without these basic health systems, interventions will be of very limited value. [7]

An innovation health system is seen as more than the sum of R&D Institutions, healthcare organisations, medical scientists and practitioners. It is seen as a system containing ever changing actors, connections and interactions, and the quality of these mutual interactions are governed policies in place[8]. Figure 1 outlines components that make up a health innovation system. These components direct change within a system and it is important to consider the relationships existing between the users and producers of such a system. An example substantiating the importance of these relationships is that policy changes towards financial restructuring or intellectual property have deep consequences on the access to healthcare of the poor as well as building local health system capacities. There exist a gap between social and innovation policies which requires attention towards ending mass poverty and diseases through local capabilities and production in local economies of developing countries. [7]



Figure 1: Influences on the health innovation system (Adapted from Paper and Borr [12])

B. Access to health care and the eHealth inequalities in South Africa

The case for inclusive innovation and its potential to close the inequalities between rich and poor was made earlier in the introduction. The same holds for opportunities in the health care sector of South Africa and especially eHealth. Almost 60% of the health expenditure in South Africa is consumed by 18% of the population with access to medical insurance and private healthcare. Compared to other African countries, South Africa have a good supply of doctors, with 77 doctors per 100,000 people, yet again the distribution is skewed, with

provincial health care being served by 24.4 doctors per 100,000 people and 9.9 specialists per 100,000 people [9], statistics confirming the divide in the country’s provision of health care services [10]. E-government is a high priority issue in the country, but considerable ethical dilemmas exist along with the risk of increasing the isolation of the majority population comprising of poor, illiterate, jobless citizens, living under the world poverty line and carrying the consequences of HIV and AIDS [11].

C. Benefits of eHealth towards inclusive solutions

The potential and benefits of ICT (information and communications technology) in rural communities is well known and holds the potential to improve lives of those in rural settings. Service delivery can be improved by increased use of ICT in the following areas according to the (United Nations Development Program 2006): Improved access to basic services; optimizing service delivery; increased efficiency through increased connectivity and enabling exchange of knowledge [13]. ICT’s neutralize the geographical separation through online communication which enables a linkage of medical practitioners to medical issues and complicated diseases [13]. This makes eHealth, if used right an enabler to close the digital divide between the population groups existing in South Africa [13]. While huge IT expenditure for e-government will be difficult to justify from a social justice point of view, policy makers need to strike a balance between adequate provision of e-government and basic needs of the marginal people.

In this paper, the authors draw on the innovation systems approach towards developing a possible set of inclusive innovation performance indicators. Performance indicators is a method of analysis to measure the inclusive innovation performance of an innovation system and therefore forms a basis from which policies are developed to enhance the inclusiveness of a system. The paper outlines an eight step generic framework for the analysis of inclusive innovation systems and gives a brief outline of the application of the framework in the eHealth innovation system of the Western Cape region in South Africa.

II. PROBLEM STATEMENT

A review of the literature reveals the innovation system analysis framework as an appropriate method of analysis for inclusive innovation systems, but it requires adaption [1], [5], [14], [4], [15]. There exist a gap in literature with regard to providing a comprehensive analytical framework of inclusive innovation systems performance, addressing system weakness, barriers, indicators and performance measurements [1], [16], [17], [5], [18], [19], [4], [15]. Furthermore there is also a lack of empirical data on how the innovation systems literature should be adjusted towards inclusive practices. Van der Hilst [18] is the only paper addressing this issue through the functional-structural analytical approach, outlining some indicators and performance measures. His study was only

conducted on only one case study, and on one sector, namely the agricultural sector. This approach requires a more complete framework as well as empirical validation.

The healthcare and eHealth sector is chosen as an appropriate area of analysis as development of rural South Africa is severely compromised by a lack of backbone infrastructure, services and expertise, especially for enabling technologies in ICT's [11]. Many of the full scale internet service provision in the country is out of the reach of the average citizen [11]. There is a lack of standardization and integration between health information systems in South Africa and provides barriers towards the realization of the benefits that eHealth solutions may hold [13]. Some of the rural hospitals do not have access, or possess very little access to technological resources, which lead to barriers towards the implementation of eHealth solutions.

III. LITERATURE REVIEW

Authors acknowledge that the aim of inclusiveness should move away from the view of only better products and services for marginalized groups i.e. viewing them only as customers [20], [21], [22], [23]. Marginalized groups should be able to share in the benefit of the whole innovation process, or as far as the specific innovation permits it. Such a role for innovation in development is labelled as "inclusive innovation". Inclusive innovation takes a view of development and the active inclusion of those that are excluded from the mainstream of development [5].

In the face of growing divergence between low, medium and high income countries [4], should innovations be used as a vehicle to reduce inequalities. However the challenge remains for developing countries to find appropriate support for such inclusive innovation activities. There exists a need for a framework that takes into account instability, inequalities and the context in which innovation and development takes place in developing countries [4]. Although this is a topic of increasing interest, it has been relatively under-researched and under-conceptualized to date [5]. The United Nations Development Program (UNDP), has the following definition to view development as an inclusive undertaking:

"Development is inclusive when marginalized groups take part in and benefit from the development regardless of gender, ethnicity, age, disability, poverty or sexual orientation. The aim is to address the ever growing gap of inequality that is rising despite exceptional economic growth in certain areas."

There still exist many issues related to which aspect of the innovation process; marginalized groups should be included in. There exists two main stream of thinking, the first, simply address exclusion in terms of innovation outputs and, the second proposes that marginalized groups should be included in the whole innovation process. In order to illustrate this concept, the steps of the "inclusive innovation ladder"

developed by Heeks et al. [17], recognizes inclusiveness to be multi-dimensional and provides a more differentiated view with six levels, where each level represents an increase in inclusiveness [24]. The six levels are defined as, intention of innovation, consumption (if it is adapted to the requirements of the excluded group and used by group to fulfil their needs), impact of the inclusive innovation, if the marginalized group is included in the process, if a structure is in its core inclusive and lastly, post-structure (an innovation is inclusive if it is created within a frame of knowledge and discourse that is itself inclusive).

Edquist [25] point to the fact that innovations are not merely tangible material goods, but also intangible organizational process innovations and services. For instance inclusive innovation may support not only including the poor as consumers and producers, but also in the entire innovation process, collaborating with "conventional" actors to generate and diffuse inclusive innovation. The authors of this paper substantiate the fact that there is not a right or wrong level to focus on, but rather that an endeavour should consider the particular target groups requirements and the level of intention, as particular conceptualizations will have particular implications [6]. This is especially important as groups will have different historical backgrounds and thus the poverty situation they find themselves in will require different inclusive solutions to the particular situation.

It is important to now start building on studies that only deal with the inclusive innovation process conceptually towards more empirical studies, where assertions may be supported empirically. Specifically with the goal of evaluating inclusive innovative performance, a set of performance indicators should exist to gauge the level of inclusiveness and the impact thereof. The relevance of the innovation system concept's ability to understand innovation towards the poor in developing countries is well recognized among scholars [26], [15], [4]. Authors have identified the potential of extending the Innovation System (IS) concept to include some of informal structures and processes distinctive in marginalized communities [27], [14], [5].

Towards an integrated framework

The key aim of the literature analysis was to review inclusive innovation system literature, focusing on analytical methods and approaches, innovation performance measurements, indicators and analytical gaps of the methods. To lay the groundwork for the development of an inclusive innovation performance analytical framework, the authors conducted a literature review on papers that specifically focuses on methods and/or approaches that analyze inclusive innovation systems. Very few papers with an analytical approach exist, with the majority discussing the link between inclusive innovation and innovation systems literature.

Literature focusing on developing countries acknowledges the importance of adapting the innovation system framework towards the requirements of developing countries, as the components, functions and the functioning of these

components differ substantially from developed countries. Policy implications for developing countries are very different from developed countries [4], [28], [2]. Many of the innovations in developing countries take place in informal settings, which is largely understudied and under conceptualized, due to a lack of data and access to these communities.

A few fundamental differences are observed in informal settings [29]. Innovation in informal settings is often initiated by strong demand from users to acquire and improve welfare or quality of life and many of the skills in informal settings are learned outside the formal education/training system. Interactions beyond local networks, such as national, regional or global, benefit greatly from scaling up and improving knowledge diffusion and creation in an informal setting, while currently the interaction of actors from informal and formal setting is still limited [2]. It became evident that the role of intermediary organisations or actors that facilitates knowledge diffusion in informal settings is important [30], [18]; however, very limited knowledge is available on how intermediaries are established and behave in informal settings to diffuse knowledge and scale innovation activities. Another observation is that dominant types of innovation in developing countries are non-technological and are more reliant on incremental and organisational innovations [31], [2].

Lizuka [4] found the innovation systems framework to be a useful platform to analyze innovation in Africa, however work is required to adapt the framework particularly for the informal sector. Altenburg [15] found current research on innovation systems largely to be de-linked from poverty reduction debates and only rarely addresses distributional aspects. Wieczorek and Hekkert [32], although not focused on inclusive innovation provide a very useful and accessible method to analyze how a system is functioning. Their paper argues that two approaches to studying innovation systems namely the structural and functional analyses should be integrated to create a systemic policy framework assisting firstly in identifying the systemic problems; and secondly, to suggest systemic instruments that could address these problems. The rationale of this coupled analysis is that functions cannot be influenced without altering a structural element [32]. Chataway et al. [16] propose a qualitative analysis and scoring method, where for each function the outcomes are directly linked to systemic goals.

Foster & Heeks [5] studied how the structural analysis approach must be adapted towards, inclusive innovation systems consisting of five components (innovation, actors, learning, relations and institutions) of a system. They acknowledge the components placeholders of inclusive systems to be the same, but the contents of each component will differ. This approach however neglects the functional analysis approach as proposed by Wieczorek and Hekkert [32], but provides insights towards a new constellation of actors.

Foster & Heeks [17] identified that there are many competing perspectives on inclusive innovation, which this paper resolves into an integrated 'ladder' model of different levels of inclusive innovation with each succeeding step representing a greater notion of inclusivity in relation to innovation. This is a considerable finding towards identifying the phase in which a current system finds itself in and how the system is orientated to a specific level of inclusiveness towards the marginalized group, or what policies are required to reach a specific level. This raised an important point to take into consideration: the question of whom – from the excluded group – is to be included at the start of the analysis.

In the literature, the paper of van der Hilst [18], was the only paper providing a comprehensive analytical framework to analyze inclusive innovation systems. They identified the progress made in conventional systems literature and that it should not be overlooked for inclusive innovation systems. They also noted that analysis frameworks were well validated, but only in technological innovation literature. Their five step analysis framework consisted of defining system boundaries as outlined by Foster & Heeks [5], identifying key informants, perform functional-structural assessment, perform analysis and formulate recommendations. They identified gaps in the sense that the framework should be validated to be appropriate across sectors, as this study focused only on agriculture.

Foster & Heeks [5] identifies the importance of measuring inclusive innovation performances, as marginalized actors underpin the performance of the whole innovation system and will require us to move beyond conventional IS conceptions of innovation components and processes. Foster & Heeks [17] and Chataway et al. [16] identified the existence of many barriers towards inclusive innovation and the need for benchmarks or similar aspects towards the analysis of system performance. Van der Hilst [18] proposed to use their tool as an impact measurement tool, to analyze the performance of a specific innovation intermediary. They identified that the systemic approach is broad enough to incorporate a wide array of identified barriers, and at the same time, guidance of search in terms of functions and structural elements is sufficiently narrow to arrive at systemic weaknesses being context-specific and concrete. Inclusive innovation is a process as well as a performance outcome in its own right [19], and there is a need to expand and improve measurements of inclusive innovation [4].

Measurement of the impact of innovations on the excluded group is not well defined [17]. Impact research could take a relatively conventional line using economic indicators to assess the impact of an innovation on livelihood assets. Similarly, there is a strong need to strengthen S&T (Science and Technology) statistical indicator systems and capacities. Innovation performance is not solely based on the results of quantitative inputs, it is also dependent in large to the activities dealing with innovation generated through interactions existing among public and private institutions. It is clear the difference between developed and developing

countries innovation features lead to differences in priorities and methodologies of innovation performance measures [33]. Measuring the well-being of a community is a complex task: no single measure can adequately assess whether the quality of life of the community is improving. Rather, a range of measures that address social, economic and environmental dimensions are entwined.

Concluding yet again from this brief literature review, that policy makers require more evidence with regards to inclusive innovation evidence/measurements of impact (benchmarks/indicators) and the return on investment it might lead to, to justify future policy or financial investments in inclusive innovation. At present there is a lack of any such evidence existing and it is required to create such measurements [17].

IV. METHODS

The authors of this paper identified four important aspects for when research of any kind is undertaken with regard to the exploration of inclusive innovation and inclusive innovation system performance. The four points to take into consideration are as follows:

- i. What is inclusive performance (services and products)?
- ii. How is it defined in the literature (literature do not align)?
- iii. What does inclusive innovation system performance mean (system goals)?
- iv. Take into consideration the process of inclusion and exclusion and the terms and conditions of inclusion and exclusion.

Very few authors have provided a general taxonomy of the whole set of elements that form an innovation system. In analyzing the performance of a whole system, one has to move away from measuring individual indicators aimed at a product or service. Analysis of a system as a whole is required especially in IIS's, as inclusion must proceed on a systems level throughout the innovation process. From this a new aim of analyzing innovation performance and in particular inclusive innovation performance is proposed.

Inclusive innovation performance is required to take place through the seven system functions performed by the system. Functions are a good representation of system performance, as systems strength or weaknesses are evaluated through system functions, thus how well the functions perform will have a direct influence on the system performance.

What is meant by inclusive innovation system performance?

This is the ability of the system to achieve the inclusive innovation system goals in terms of presence, capability, quality, intensity and capacity related measures defined by the level of inclusiveness.

When evaluating IIP (inclusive innovation performance) through the lenses of the seven system functions, it once again becomes apparent that it cannot be measured through a fixed set of indicators. This will be an extensive endeavour to identify how well these seven functions perform in terms of the inclusion of the marginalised group. Indicators should be identified against which the system goals can be measured.

The functions of innovation systems in collaboration with the structural analysis are descriptive and offer an analytical construct towards the analysis of a system's performance at a given time and the weaknesses within the system. The structural and functional analyses have potential as an analytical method to analyze the performance of an inclusive innovation system.

V. TOWARDS AN ANALYTICAL FRAMEWORK

Van der Hilst [18] developed an analytical framework, assessing an inclusive innovation system through the analysis approach. There exist a need to strengthen the inclusive innovation system and inclusive innovation literature, as this is the first study on integrating innovation system literature with inclusive innovation and BoP (base of the pyramid) literature towards a stronger inclusive innovation system analytical method.

The functional-structural analysis has only been conducted by one researcher, on a single instance namely the agricultural sector in a region of Vietnam. There exists uncertainty if such a tool can be used across different sectors and if indicators, performance measures and diagnostic questions should be sector specific. There is a lack of empirically validated indicators and performance measures for inclusive innovation systems as it has only been apply in this one instance. Van der Hilst [18] calls for such a framework to be more applicable and practical.

This paper seek to develop a more complete analytical framework to measure inclusive innovation performance of a system. The technological innovation system literature, as this research field is adequately empirically validated, and the two papers of Bergek [34] and Hekkert [35] was combined, in collaboration with the paper of van der Hilst [18]. Steps and content for this framework was deductively developed from literature. It should be noted that this is specifically developed for IIP (inclusive innovation performance) measurements, where current literature focus on "conventional" innovation system performance, with a very limited inclusive innovation focus. The paper of van der Hilst [18] identifies system problems and blocking mechanisms, but their analytical framework falls short of including these as steps and providing guidance on how to apply this to the structural-functional analysis. This is essential as the paper develops a set of indicators and diagnostic questions to make such a framework more applicable to users, but falls short of any guidance towards identifying system problems and barriers.

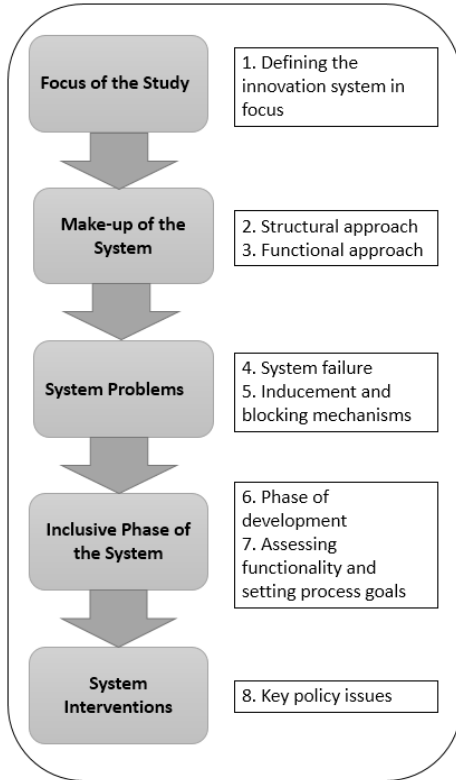


Figure 2: Inclusive innovation system performance analytical framework

Figure 2 categorize the eight step framework into five categories, namely the focus of the study, the make-up of the system (components and functions), system problems, the phase of the system and its functionality and lastly, system interventions towards a more inclusive system. The process is cyclical as some steps might be repeated as the analysis

deepens and the system is better understood. This may be used to evaluate current systems inclusiveness or system capabilities before undertaking an inclusive innovation endeavour within a current system.

VI. FRAMEWORK DEVELOPMENT

This section outlines the ‘what’ and ‘how’ of every step of the framework. It provides a brief introduction towards every step and a guideline towards the analysis of each step.

Step 1: Defining the innovation system in focus: A clear and explicit starting point towards the analysis and focus of inclusive innovation systems is essential. The choice will be influenced by the purpose of the study and the interests of policy makers and other stakeholders involved. The choice will determine what particular innovation is captured, and the components to be included.[36]

The study should be built around a particular product or service, industry, sector or region. The system boundaries are important to consider towards the decisions of ‘who’ and ‘what’ to include, and can be formed around any of the named objectives. It should be noted that actors included should specifically and actively focus on inclusive innovation diffusion and development. There may be actors that have an influence on the system but make new technological products, focusing on the general public, but not the marginalized group [18]. Actors that are outside of these boundaries, but are actively providing innovation solutions to the marginalized group within the system boundaries, should be included in the study. [36] Figure 3 provides a summary of aspects to consider.

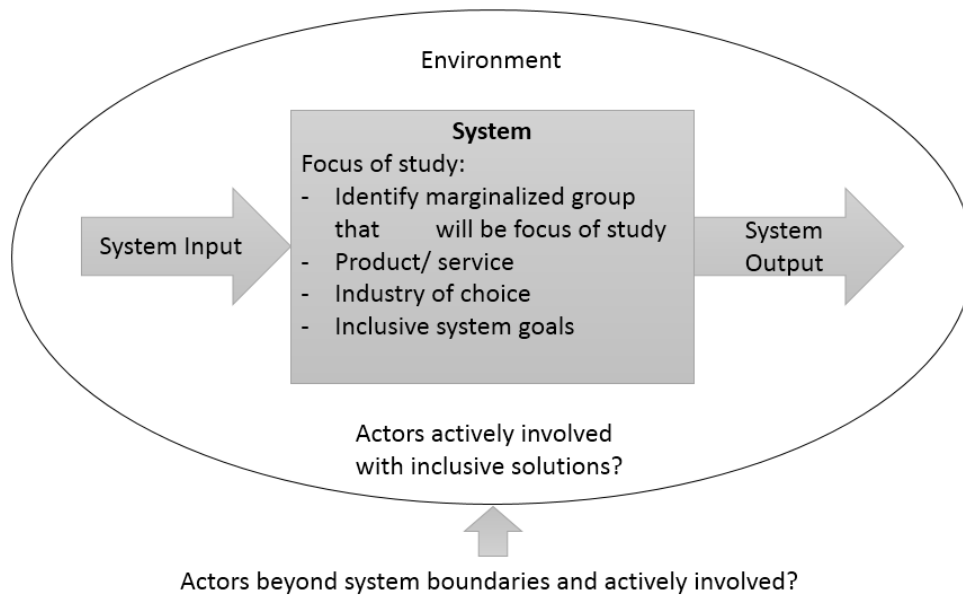


Figure 3: Defining the innovation system in focus

TABLE 1: IDENTIFYING THE STRUCTURAL COMPONENTS

Components	Indicator/ Performance Objectives [20], [21], [22], [23], [18]	Inclusive innovation systems comments [5]
Actors	Marginalized actor's involvement Local need orientated Demand- Driven Demand –Side Actors Intermediaries existence and involvement	The main focus toward the marginalized group: i. the need of a new constellation of actors; ii. low-income (marginalized group) consumers; iii. non-traditional, less formal demand-side innovators; iv. Intermediaries enabling others to innovate with and for the poor.
Interaction	Informal relations Marginalized and conventional actors collaboration Private sector collaboration towards inclusive solutions	The presence or quality of the interactions among the new constellation of actors and the private sector. Require to take into account limitations of informal and socialised relations.
Knowledge and learning	Local knowledge orientated Learning of wider social processes Diffusion of inclusive technologies Scaling opportunities	Contextualised (supply and demand) learning through interaction, using and action [5]: i. creating knowledge and learning on the subject of diffusion, absorptive capacity and use; ii. creating knowledge and learning on wider social procedures; iii. sustainability and utility focus; iv. guidance of the learning process;
Innovation	Marginalized specific Quality, intensity and presence of inclusive innovations Increased income, livelihood and job creation. Local need orientated Demand- Driven	Incremental innovation are required focusing on the diffusion of the inclusive innovation processes: i. Innovations must be local needs-oriented and as suitable as possible towards use variation, driven by demand and context of the marginalized group; ii. Innovation must be scalable and sustainable.
Institutions	Policies, objectives, governance, rational, drivers and aim inclusive focused. [1]	Complex institutional terrain of informal and formal: i. formal core institutions have indirect impact; ii. importance (including potential negative impact) of informal institutions at local level.
Infrastructure	Processes, platforms and mechanisms through which technology providers/ users could create opportunities for commercial exploitation.	The presence and quality of the infrastructure supporting inclusive growth and innovations. Adequate physical, knowledge and financial infrastructures focusing on inclusive innovation.

Step 2.1: Identifying the structural components of the IIS: The components based approach provides a better understanding for inclusive innovation systems in terms of the actors, learning, networks and linkages, infrastructure and institutions required [36]. This approach should purposefully involve including non-conventional actors in knowledge networks and conditions to foster new interactions towards inclusive solutions [29]. The six structural components to consider are actors, interaction, knowledge and learning, innovation, institutions and infrastructures. Table 1 outlines this approach with a set of indicators and guiding comments found in literature to serve as a starting point towards the analysis of an inclusive innovation system and enrichment of the inclusive innovation system literature. This list is not exhaustive and requires further empirical studies. This will serve as a building block for the empirical stage.

Step 2.2: Functional approach: System functions are more evaluative than system structures as they state the performance and functional patterns of the system. Literature provides evidence where the functions based approach take into account different components and enable evidence of attributes shaping functions to support inclusive notions [18], [36], [22]. System functions are performed differently between systems as well as in different stages of a system [27], suggesting that the “ladder of inclusive innovation” is a good mechanism to consider in this stage of the framework.

Van Mierlo [37] identified seven system functions namely entrepreneurial activity, knowledge development and

learning, knowledge dissemination, guidance of search, market formation, mobilization of resources and creation of legitimacy. Goals, mechanisms to achieve these goals, indicators to guide the analysis and questions for guidance in these areas should be analyzed for each function. Table 2 provides a guideline towards the mapping and analysis of system functions. It should be noted that this is not an exhaustive list, as very limited research is available and marginalized group settings will differ from regions, countries and historical backgrounds.

Step 3.1: System failure approach: System problems are revealed in the functions of a system [18], where problems of an inclusive innovation can be seen as not delivering effective inclusive innovation solutions to marginalized groups [1]. This is similar to identifying insufficiencies in the functioning of the system causing the comparative performance to be insufficient. Innovation systems fail when unable to transition to new modes of operation and require interventions as these systems are inadequately diverse; lack formal and informal linkages; lack of capabilities, especially relevant among informal actors; and traditional historic institutions and structures tend to be favourable towards traditional “exclusive” innovations [36]. Innovation studies widely recognise that when technology change in uncertain circumstances and within firms, no optimality or equilibrium may be reached, making it unattainable to refer to a failure, weakness or imperfection, and rather referring to it as a system problem [32] [38].

The process of “inclusion” and “exclusion” is useful to consider for identifying a system problem, by considering the system functions. The process of “exclusion” and “inclusion” can be seen as a system problem, referring to the terms and conditions of inclusion. Du Toit [39] point to the responsibility of system dynamics of inequality, impoverishment and disagreement within and among institutions, systems and networks towards excluding some groups of the population[40]. The terms and conditions of inclusion resulting from closer integration of systems may drive wealth creation more skewed [41], [42]. Processes and institutions serves as mechanisms through which marginalized groups should be integrated into “developed” circuits and networks.

In the analysis of exclusion as a system problem, attention has to be paid to both the vertical and horizontal links. Vertical links refer to linking the livelihoods ‘upstream’ and ‘downstream’ to formal networks of economic production, and horizontal links referring to the impact and nature of integration and inclusion in the system [39], [43]. Social exclusion presents a functional framework for understanding broader structural factors having a direct influence of the functioning of the system that produce and reproduce human removal from formal systems. The benefit of such a relational approach is the emphasis placed on drivers of inequality rather than the state of affairs experienced by particular ‘deep-rooted excluded’ groups.

Step 3.2: Inducement and blocking mechanisms: Blocking mechanisms are strong and manifold and have an influence on many functions, as functions are not independent, but reinforce each other. The obstacles “blockages” caused by the system functions (system problems) may be of origin in the structure of the innovation

system, as poorly fulfilled system functions are a manifestation of problems in the structures of the system [32] [18]. It is important to identify linkages between system functions and structures in order to remove system barriers (blocking mechanisms). From a policy perspective, is it important to understand the blocking mechanisms that shape the nature of system dynamics, as “the path to achieving a higher functionality may, be littered by a range of ‘blocking mechanisms’” [36]. Guiding questions are shown in Table 4, where each of the system function problems should now be examined through each of the six structural components to identify the blocking mechanisms within the structural components.

An integrated approach: Functional-structural approach

A possible approach towards creating opportunities to include the marginalized group in a system is to find a relationship from the findings of this analysis to systemic instrument goals (tools to improve the functioning of the system) intended to improve the operation of an inclusive innovation system, or a system striving towards more inclusiveness [32]. Systemic instruments take the form of detailed interventions, altering and addressing significant system imperfections [44].

It is insufficient to analyse functions or structures on their own to identify system problems or barriers instead of following an integrated approach. Once the functions and functional pattern are established, each function should be analysed through the system structures for exploratory, explanatory and policy reasons, because as outlined in step 3.2, a change in the structural components can change the functioning of a system. [32]

System Functions and Problems	Structural Elements	Systemic Problems	Type of Systemic Problems	Goals of Systemic Instruments
F1: Entrepreneurial activity F2: Knowledge development and learning F3: Knowledge dissemination F4: Guidance of Search F5: Market Formation F6: Mobilization of resources F7: Creation of legitimacy	<ul style="list-style-type: none"> Actors Interactions Knowledge and learning Innovation Institutions Infrastructure 	<ul style="list-style-type: none"> Actors problem Interaction problem Knowledge and learning problem Innovation problem Institutions problem Infrastructure problem 	<ul style="list-style-type: none"> Presence? Capabilities? Capacity? Quality? Intensity? 	<ul style="list-style-type: none"> Stimulate and organize participation of inclusive and marginalized actors Create space for actors inclusive capability development Stimulate occurrence of interactions Prevent too strong and too weak ties (Process of inclusion and exclusion) Secure presence of hard and soft institutions Prevent too weak and too stringent institutions (Process of inclusion and exclusion) Stimulate physical, financial and knowledge infrastructure Ensure adequate quality of infrastructure

Figure 4: Stepwise approach in identifying system problems, the type of problems, blocking mechanisms and goals of systemic instruments (Developed from the paper of Wiczorek and Hekkert [34]).

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TABLE 2: FUNCTIONS OF INNOVATION SYSTEMS

Function	Inclusive innovation instrument goals [18]	Indicator [1], [18]	Diagnostic Questions (adapted from [32], [1] and [18])
F1: Entrepreneurial activity Functions through which opportunities may be created for the private sector to exploit ideas towards inclusive solutions, and providing opportunities to the marginalized group.	Involvement with and by marginalized actors and actor entry points. Business plans aimed at inclusive innovation solutions	Extend of involvement (ladder) Entry points Inclusive business plans and models Exit and entry rate of marginalized entrepreneurs.	Is the marginalized group involved? If so to what extent? Are there specific entry points giving opportunities to the marginalized group? Existing business plans, are they sufficient quality and quantity wise? What is the method of engagement of companies with the marginalized group? Are there markets for marginalized entrepreneurial activity?
F2: Knowledge development and learning Describes the processes of knowledge development and learning through formal R&D or informal knowledge production activities.	Sources of knowledge (directly involving marginalized group). Focus on marginalized group. Research capacity and collaborations efforts. IP protection.	Sources of knowledge embedded in the specific target group. Focus of knowledge development. Adequate research capacity and collaboration. Competitiveness (conflict of interests from different stakeholders) IP protection of inclusive innovations.	Who is the biggest knowledge producer? Is the marginalized group actively included as knowledge producer through collaborative linkages? Top-down/push vs bottom up/pull? Knowledge creation directed to the needs of marginalized group? Marginalized group profit from it in any way? Is there knowledge sharing that is taking place among companies? Or are companies possessive over acquired knowledge? Is there IP protection for the marginalized group by law / agreement / trust? Projects, research, patents and articles being produced for and by the marginalized group? Does an inclusive innovation technology receive attention in national research and technology programs?
F3: Knowledge dissemination Support the diffusion of ideas and innovations through supply and demand-side support mechanisms / diffusion.	Focus, capacity and methods for dissemination. Absorptive capacity for local knowledge creation.	Focus on dissemination of inclusive knowledge. Adequate methods of dissemination.	Knowledge diffused through top-down/push or bottom up/pull and aimed at poverty alleviation? Are there knowledge diffusion mechanisms in place among marginalized and conventional actors? If so what methods? To what extent is knowledge diffused? The knowledge that exists, does it correspond to the requirements of the inclusive innovation system?
F4: Guidance of Search Guidance towards correct investment in inclusive technologies and developments.	Opportunities for inclusion of development, concern in policies hindering inclusive innovation, constraints in business planning, assist strategic knowledge development.	Structured approach Recognized constraints Governmental focus Private sector focus	What are the inclusive targets? Are they achievable? Are there strategies on how to achieve these targets? Is there a structured approach (sectoral, regional, and national)? Do policies focus on marginalized groups? Does it include poverty alleviation strategies? How does the private sector contribute to poverty alleviation and what is their strategy? Is there a clearly expressed and common goal for the inclusive innovation system? Are these goals generic or specific? There is existing legislation; does the articulated vision correspond to the legislation?
F5: Market Formation Mechanism through which to create a space where inclusive innovations can be developed and also diffused to market.	Support of market formation where benefits (most benefit, and sustainability) may be achieved through inclusive innovations. Supporting the creation of spaces for innovations to become market-ready and gaining access to markets.	International/local trade agreements. Institutional barriers and incentives for inclusive innovation. Market premium opportunities and certification. Instruments for market formation.	What institutional incentives exist to market formation? E.g. Tax benefits, subsidies etc. Are there any benefits for poverty reducing activities? Is there any space for market premium opportunities, when participating in inclusive activities? What instruments for market formation exist and are they focused specifically pro-poor? What does the market look like, are there opportunities for forming markets for the marginalized group or are there current markets to accommodate them? What is its size (niche/developed)? Are there enough knowledge users of the technology to make it sustainable in the long term? (especially important to scale inclusive innovations in order to make it sustainable to guard against more exclusion)
F6: Mobilization of resources Access and availability of resources towards inclusive innovations.	Access to capital, and growth of human resources. Appropriate financing and business models for inclusive innovation.	Cost of money lending and access capital. Investments security Business plan assessment tools and guidance.	Is there sufficient knowledge and capabilities to assess and adapt business plans towards inclusive innovation? Are there financial backing for inclusive innovation knowledge creation from government? Do they correspond with the system's needs? What are the resources main uses (research/application/ pilot projects etc.)? Risk capital will be important in inclusive systems, is there sufficient risk capital? Companies promoting the inclusive system, do they have easy access the resources?
F7: Creation of legitimacy Supporting mechanisms in place to legitimize resources and commitment from government and the private sector to support inclusive innovations?	Commitment of engagement with marginalized group and the sustainability of relationships.	Consumer confidence in inclusive innovations. Commitment of government and private sector. Coalition formation among all the different stakeholders.	What is the reputation of the specific sector, such as food safety and quality concerns? Does the government and show private sector commitment to the advancement of the sector? Is there alliances formed to bring about positive change?

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Figure 4 outlines a step-wise approach for step 3.1 and 3.2 in identifying system problems, type of problems, blocking mechanisms and goals of systemic instruments through which to view these problems. It can be argued that if an innovation system is not functioning well, one or more of its seven functions are absent or weak. The root cause behind the system problem is then analyzed through the system structures in terms of the properties (attributes) of components which again refer to the process of inclusion and exclusion which can be expressed by the presence,

capabilities, capacity, quality or intensity issues manifested through system components in a positive or negative sense (inclusion exclusion). Lastly the goals of systemic instruments serve to address systemic problems, to address these problems systemic instruments should focus on at least one of the systemic goals. These goals also serve as a building block towards systemic policies, which is briefly outlined in the last step. It should be noted that Table 3 should be consulted to guide these steps towards inclusive system components. [32]

TABLE 3: STRUCTURAL BLOCKING MECHANISMS

Key factors to consider in the this analysis step [5]
Actors
<p>Intermediaries linking 'distant' supply and demand, intermediaries present to facilitate and collaborate between "conventional" and "marginalized" actors.</p> <p>Formal innovators focus insufficiently on the poor [1].</p> <p>Informal actors are delinked from innovation systems [1].</p> <p>Capacity related - actors (marginalized and conventional) may not have the necessary:</p> <ol style="list-style-type: none"> i. competence to identify and articulate the requirements of the marginalized group and to develop goals and strategies towards more inclusive practices. ii. capacity to develop knowledge or make use of existing resources for inclusive innovation; <p>The presence or capabilities of the actors:</p> <ol style="list-style-type: none"> i. information deficiencies of enterprises supporting inclusive innovations; ii. transition problems, from conventional innovations to inclusive innovations; iii. poorly expressed demands from the marginalized group;
Interaction
<p>Requirement (taking into account limitations) of informal, loose but socialised relations [5].</p> <p>Presence related - interactions are missing because of:</p> <ol style="list-style-type: none"> i. differing objectives, lack of adequate interactions leading to a misunderstanding of objectives of the marginalized group; ii. assumptions, leading to inadequate solutions to the marginalized group or lack of trust. <p>Quality related:</p> <ol style="list-style-type: none"> i. difficulty with quality/ intensity of the interactions; ii. strong network problems (leading to exclusive practices as there are inadequate entry point for the group). <p>Internal orientation of an organization, blocking the necessity to open up to external forces (marginalize group).</p> <p>Processes and mechanisms in existing business processes do not support inclusive practices, level and nature of engagement (target of the ladder), networks and partnerships and strength of these partnerships. [1]</p>
Knowledge and learning
<p>Contextualised (supply and demand) learning through interaction, using and action lacks [5]:</p> <ol style="list-style-type: none"> i. creating knowledge and learning on the subject of diffusion (sales and support), use and wider social procedures which may be made up of non-instrumental processes; ii. sustainability and utility focus and guidance of the learning process; iii. education policies, knowledge areas of relative advantage and absorptive capacity.
Innovation
<p>Incremental innovation are required focusing on the diffusion of the inclusive innovation processes [5]:</p> <ol style="list-style-type: none"> i. innovations are not local needs-oriented and appropriate towards use variation and not driven by demand and context of the marginalized group. ii. low-income users lack capability to use innovations effectively [1]. iii. social systems of sales and support are lacking. iv. reverse innovation, sustainability of innovation and scaling-up ability weak.
Institutions
<p>Complex institutional terrain of informal and formal [5]. The lack of presence and/or quality of institutional set up might hold back innovations.</p> <p>Capacity related issues may be manifested as a problem with capacity/quality.</p> <p>Presence capability related issues:</p> <ol style="list-style-type: none"> i. poorly functioning technology transfer institutions, ii. legislative problems and hard and soft institutional problems. iii. Government-subsidies systems and support systems towards inclusive development. iv. Tax system supporting the use of inclusive development insufficient. v. IP rights, laws and regulations supporting inclusive development inadequate.
Infrastructure
<p>Processes must be in place for the development and improvement (stimulate physical, financial and knowledge) of infrastructure to support inclusive innovation. There is often a mismatch between basic and applied research. Stimulate and organise participation of relevant actors (marginalized actors, NGOs, companies, government etc.).</p> <p>Create space for actor's capability development (innovation platforms).</p> <p>Infrastructure for actors' capability development. (e.g. through learning and experimenting).</p>

Step 4.1: Assessing functionality of the IIS and setting process goals: The functional pattern of an IS does not reveal whether a system is functioning well or not. The fact here is that a certain feature that is weak does not necessarily pose a problem and a function that is strong is not necessarily important. The functional patterns that are strong may be the patterns that lead to more exclusion of the marginalized groups. The functionality of a system should be analyzed on how well the system is functioning, in terms of the “inclusiveness” of the functional pattern under analysis and not how. [36]

The seven functions and system problems in the functional analysis make it measurable to systematically address issues of “inclusiveness”. Here the question should be raised if the functionality of the system matches the requirements of the step of the ladder that the system finds itself in, and if the system will possess the requirements to be able to advance to another level of the ladder as required. Poor functionality of the inclusive innovation system can be described as the exclusion process, leading to groups of people becoming more marginalized.

Step 4.2: Phase of development: For inclusive innovation systems the phase of development will be adjusted to incorporate the “inclusive innovation ladder” as defined earlier in the paper. The different levels refer to different maturity levels, as each level is a deepening of the involvement of those marginalized groups. This is an important consideration in moving towards system interventions through inclusive policy creation. It is important to notice here that the historical background and the setting that they find themselves in will differ substantially and play a major role in choosing the appropriate level of inclusiveness of the current community as well as the future aim in the ladder of inclusive innovation.

Step 5: Policies for inclusive innovation: As more inclusive development requires increased inclusive innovation, a broadening of policies that move beyond traditional innovation and innovation systems is required [27]. This will entail the expansion of policies horizontally and vertically. Horizontal expansion to include the sectors that matter most to the marginalized groups, consisting of the health, education and agriculture sectors and vertical expansion bringing in innovators, entrepreneurs and consumers of the marginalized groups [45],[46]. [1]

It is well known by now that the goals, actors, processes and relations differ for inclusive innovation systems. Innovation takes a wider view to meet social needs and improvements in the diffusion processes. This fosters a need to consider the whole lifecycle of invention, innovation, diffusion and how actors in the system learn, when establishing policies [1]. For each policy the major challenges are to measure (i.e. objectives), how it is implemented (i.e. instruments) and towards which actors it is targeted (i.e. institutions). Policies are orientated towards several objectives, instruments, and/or institutions [47]. For objectives and policy goals a clear set of instruments and

institution should be available to achieve the objectives through implementation of policies.

VII. FRAMEWORK OUTLINE AND CONCLUSION

The authors of this paper found current analytical methods lacking in quality and empirical data and validation. There exist a gap in identifying inclusive innovation system weaknesses, performance measures and indicators. This paper addressed these issues through the creation of a more complete framework derived from current literature, to serve as a base for future empirical studies.

The analytical approach towards the analysis of inclusive innovation system problems and barriers in this paper was developed mainly from the functional and structural approaches in literature. System literature is sometimes criticised for being a study where everybody works with everybody. However through literature papers focusing on the functional approach towards identifying system problems through systemic instruments makes the analysis of systems more measurable. This approach also serves as a useful tool to arrive at policy interventions and building inclusive innovation capacities of a system.

The functional and structural analysis methods formed the base of the analysis method and were enriched with conventional system literature as well as a set of inclusive innovation literature papers. Major contributions in this framework includes: acknowledging inclusion and exclusion as a process; guidelines towards identifying system problems and barriers; and viewing system capabilities from the six step inclusive ladder to determine the functionality and phase of inclusiveness of the system. The functional and structural analytical approach was used as the main analysis method, with a strong focus on performance indicators and system performance of an inclusive innovation system. The functional approach is served through a set of diagnostic questions, which is not an exhausted list, adapted from literature with a focus to identify system weaknesses of inclusive innovation systems.

Analytical guidelines of the eight steps framework formulated in the previous chapter are summarized briefly in Figure 5 as guidance towards an analytical performance framework. It should be noted that this framework was derived from current literature and serve as a stepping stone for the empirical analysis of an eHealth system, which is briefly outlined in the following section. The empirical studies will also serve as empirical validation for the current framework. The eight steps identified build on each other and the categories cannot stand on their own in the analysis as they support the analysis of the following category. This will guide the analysis towards the level of inclusiveness in which the current system is functioning as well as the “inclusiveness” of the system. To effect change in a system a set of interventions are required, and will be achieved through the development and diffusion of inclusive innovation policies.

Focus of the Study	Make-up of the System	System Problems	Inclusive Phase of the System	System Interventions
<p>1. Define the innovation system in focus</p> <p>Focus industry and current level of inclusiveness.</p> <p>Study breadth or depth Choose some, or all applications.</p> <p>Define system boundaries.</p> <p>Inclusive innovation system goals?</p> <p>Mechanism available to achieve systems goals?</p>	<p>2. Identify structural components</p> <p>3. Identify functional components</p> <p>Actors, Interaction, Knowledge and learning, Innovation, Institutions, Infrastructure</p> <p>F1: Entrepreneurial activity, F2: Knowledge development and learning, F3: Knowledge dissemination, F4: Guidance of Search, F5: Market Formation, F6: Mobilization of resources, F7: Creation of legitimacy</p>	<p>4. System Problems</p> <p>5. Inducement and blocking mechanisms</p> <p>Four main categories of system failure Functions, Organizations, Institutions and interactions between these elements may be inadequate or absent</p> <p>Indicators towards identifying innovation system problems Development, Design, Diffusion and Use Failure</p> <p>Legal/Policy, Institutional, Human, Financial or Technological Infrastructure Drivers/Demand</p>	<p>6. Phase of development</p> <p>7. Assessing functionality of the IIS</p> <p>Level 1 - Intention Level 2 - Consumption Level 3 - Impact Level 4 - Process Level 5 - Structure Level 6 - Post-Structure</p> <p>Process of inclusion Process of exclusion "Inclusiveness of system functions"</p>	<p>8. Policy</p> <p>Policy Aim Policy Drivers Policy Rational Policy Worldview Policy Objectives Policy Governance Policy Goals/Instruments Policy Impact</p>

Figure 5: Guideline of the inclusive innovation system analytical framework

VIII. INTRODUCING THE CASE STUDY

The Western Cape region is served by 50 provincial hospitals, of which three are academic hospitals, and 140 provincial healthcare clinics. The province is also served by a number of Regional (level 2), District (level 1) and specialist hospitals. The province is served by approximately 53 IT resources listed in the Health and Social Development Directorate of e-Innovation. Many difficulties exist within the province in providing eHealth solutions, some of the challenges among others are very poor service delivery from SITA, very low bandwidth to health facilities, very expensive cost of bandwidth upgrade (monthly rental), low levels of computer literacy at facilities, low levels of motivation to use

system correctly at some institutions Insufficient resources (Health) to proceed with the rollouts at fast pace. The hospitals are served by two in house services namely the Hospital Information System (HIS) serving the provincial hospitals and the PHCIS service serving the Provincial Healthcare clinics. Figure 6 indicates the location of the Western Cape region of South Africa.

A. Component map of a eHealth system

Inequalities existing in healthcare are almost always associated with some form of social exclusion. There is a need to consider the link between innovation and inclusive development, to gain an understanding of the role of inclusive innovation as a mechanism for social inclusion in the healthcare sector. This in turn will shape the foundation from where an understanding of the local system can serve as a starting point towards more inclusive healthcare services [48].

Traditional boundaries of the health innovation system framework must be overturned to consider a new constellation of actors (formal and informal) that explicitly focus on the marginal group's perspective. Structural data analysis must have a focus on service providers consisting of formal and informal hospitals, clinics, private health care practitioners and traditional healers, patients and members of the marginal community, knowledge providers, social organisations and organizations with policy functions to only name a few. A example map of the eHealth sector as shown in Figure 7, will comprise of leadership and governance, strategy and investment, services and applications, eHealth infrastructure, standards and interoperability, legislation, policy and compliance and eHealth enablers and workforces. [48]



Figure 6: Location of the Western Cape region in South Africa

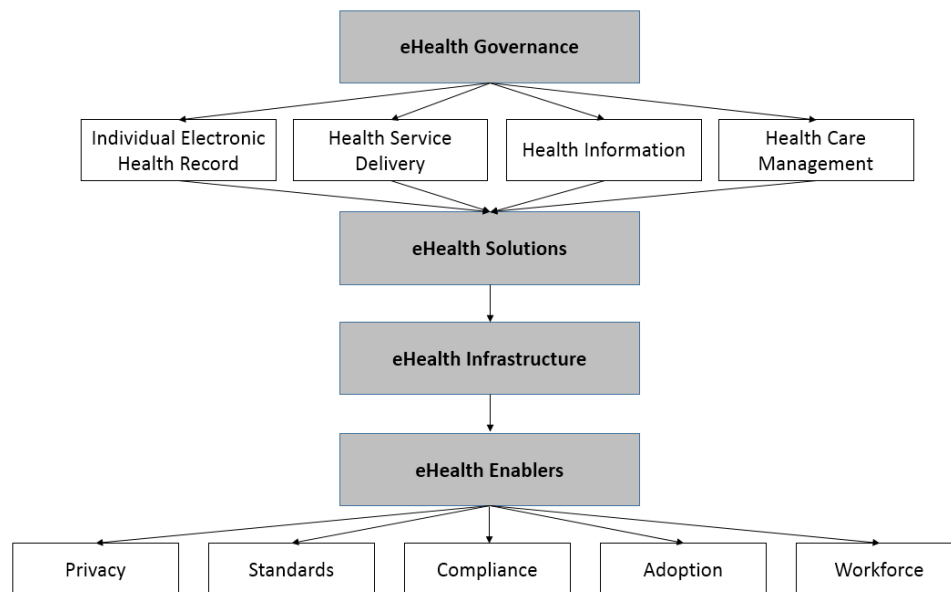


Figure 7: Sample national eHealth component map (Adapted from Chataway and Hanlin [7])

There is a need for a holistic view of knowledge generation and skill formation in the inclusive innovation health sector. Solutions towards inclusiveness and sustainability ought to build from a thorough understanding of local dynamics. There is a need to consider new kind of scientists, researchers and engineers, who have a good understanding of the dynamics within a society and to identify the role players who has the necessary understanding to manage the societal aspects of knowledge and development. [48]

All of these components will be evaluated in terms of the relationships that exist among them. This will be achieved through identifying the seven system functions outlined earlier in the paper. The current healthcare environment should be evaluated thoroughly with a set of diagnostic questions referring to the components and functions. This will serve as valuable input towards identifying the system weakness and barriers, providing a description of the current inclusive eHealth system across the components and functions.

B. System failure approach and inducement and blocking mechanisms

These steps will combine the information obtained of a current eHealth system to identify opportunities and gaps to address, barriers that exist and system failures in terms of inclusiveness. This is an important step as it will determine the decisions towards a more inclusive eHealth system. Outputs in terms of the re-use of the existing eHealth system and the eHealth components not existing, but should be developed requires consideration.

The inclusive innovation eHealth indicators and performance measurements identified will be used as a guide to evaluate the system problems in terms of the system

functions and the blocking mechanisms through the system components. These indicators and performance measurements should seek to provide benefits for the six domains of healthcare quality identified by the Institute of Medicine (IOM) with a focus on improved access to inclusive healthcare. These six domains are made up of [49]: Safety, effectiveness, patient-centeredness, timeliness, efficiency and equitability. The six domains can provide eHealth benefits in access to services, efficiency gains in health service delivery, quality and safety of care, health monitoring and reporting, access to health knowledge and education, operations planning and management, the empowerment of individuals and in terms of inclusive innovations and growth.

C. Assessing functionality and setting process goals for eHealth systems

The ladder of inclusiveness outlined how the inclusive process deepens as one moves up the ladder. With health systems and especially eHealth care it is firstly important to take into consideration the maturity of the system and then secondly combining this maturity with the level of inclusiveness. This can be done in collaboration with the functionality of the system. Here aspects such as the integrated system of healthcare delivery (informal systems of provision of health services strongly linked to culture and traditions), a broader approach to supporting innovation (beyond formal organisations, including innovations in the sphere of institutions and social sectors), effective ways to transform the needs and interests of the poorest and marginalised actors into effective demand, and to connect this demand to the supply side of innovative activity are important to consider.

IX. DISCUSSION AND CONCLUSION

Poverty is present all over the world and there is a need for support from governments, private sector and other organizations to serve these markets, not only in providing services and products, but actively enhancing the capabilities, knowledge and learning and sustainability of thereof. Inclusive innovation and inclusive innovation system literature aim to find solutions to these problems, but lack a sound methodology through which to analyse such systems. There is also a lack of indicators and performance measures through which innovations and innovation system can be strengthened to provide solutions towards context specific solutions.

This paper firstly, addressed the issue of a more complete framework by deductively analysing current literature and by using the technological innovation systems literature to develop a more complete framework. Secondly this framework will serve as an outline for future research to strengthen the inclusive innovation system knowledge base. The method however requires adjustments to adhere to the specific requirements of marginalized populations. A lack of analytical foundations for systemic processes, might lead to inadequate research on the direction of innovation policy and application [6]. This paper brought together the functional and structural analysis approaches along with systemic weaknesses and barriers and policy guidelines to arrive at an eight step analytical framework through which to identify and address system problems and blocking mechanisms. The structural and functional approaches serve as the main guide towards such an analysis endeavour.

The identification of weaknesses and barriers of a system serve as a knowledge base from where interventions and guidelines towards a more inclusive system can be developed. The structural characteristics of system weaknesses guide the analysis towards the functional pattern (functionality) which is responsible for the level of inclusiveness of the system. It has been shown that the blocking mechanisms can be expressed in the presence of systemic weaknesses and their capacity to accommodate inclusive innovations.

The authors acknowledge that this is only a theoretical framework from limited empirically validated research. This however provides a solid foundation from where empirical studies can follow; firstly to validate and adapt the generic framework and secondly to derive an analytical framework for eHealth, and more specifically the eHealth landscape of the Western Cape region in South Africa. We chose this sector as the healthcare sector is an area where inclusive innovation has enormous potential for improved access to care, service delivery, and quality of products and may have many positive knock-on effects through improved health of the populace. Within the South African context huge inequalities exist as far as access to healthcare is concerned.

Building on this theoretical framework steps going forward will specifically focus on enriching the inclusive

innovation system literature through empirical studies. Case study research will be used as it contains explorative and evaluative aspects. The study going forward will focus on the explorative aspect as the research field of inclusive innovation and innovation systems has received very little attention, and there exist gaps in the performance measures and indicators. Another aim will be to determine to what extend indicators and performance measures are generic or sector specific. The evaluative stage will focus on the analysis of the eHealth system and serve as empirical data and validation, which will be a major contribution towards the inclusive innovation system analytical methods literature. A single case study method will be followed, which regard quality more important than quantity. The rationale behind this decision which is different than multiple case studies, is due to the sheer size and complexity of any innovation system, calling for an in depth search and due to the lack of current data to focus the study. Another reason is the fact that this tool still lack empirical validation, and the authors believe that through this case study research framework weaknesses and strengths will be shown towards further refinement and development of the framework. This will provide valuable insights towards a more complete framework for future studies.

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