

POWER TENSIONS IN HEALTH INFORMATION SYSTEM INTEGRATION IN DEVELOPING COUNTRIES: THE NEED FOR DISTRIBUTED CONTROL

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ABSTRACT

As part of health sector reform, most developing countries are in the process of restructuring the Health Information Systems (HIS) by way of standardizing and integrating various vertical reporting systems. Nevertheless, the pressure resulting from the vertical systems supported by donors renders the integration goal challenging and unachievable. While many studies have argued for the heterogeneity of interests and multiple data needs of the donors as the major cause of the problem, this paper argue for more detailed and critical analysis of the problem. To contribute to this, the paper emphasize the need to understand the main actors involved in the process in terms of the resources and rules available to them; and their implication in the HIS integration venture. By drawing on an empirical case study and Structuration Theory concepts, the paper identified the dialectic power relations between the actors resulting from the asymmetric ownership and control of resources and rules. To alleviate the power tensions, the paper proposed i) the need to build shared meaning of the integration process through communication approaches ii) and the need to distribute the control of the integrated HIS using modularization approach facilitating ‘*the tapping on*’ of the resources available to each group of actors.

Keywords: Standardization, Health Information Systems, Integration, Vertical Programs, Structuration Theory

1. INTRODUCTION

In this era, popularly acclaimed as an information society age, use of information in the service sectors is seen as a factor to improve efficiency and effectiveness of service provision. In the health sector, health information guides mobilization and allocation of resources, prioritization of health programmes and research, and improve efficiency and effectiveness of health programmes (Kanjor et al., 2009). Use of health information in low-income countries with high disease burdens is perceived as a mechanism towards optimization of resources and for the management of interventions geared towards reversing the diseases trends. However, these interventions have attracted multiplicity of so called development partners/donors operating with a condition of ‘proper’ management of their funds through quasi-independent programs called vertical health programs. The programs maintain separate and uncoordinated information systems alongside the national HIS. Consequently, the HIS in most countries is rendered dysfunctional, fragmented and unable to provide the much needed health information (Chilundo, 2004; Braa and Muquinge, 2007; WHO 2006).

As a remedy, most countries are standardizing and integrating the HIS as part of the broader health sector reforms. Whereas some countries have managed to standardize and integrate some of the vertical programs in the national HIS (Braa et al., 2005; Sheikh, 2005; Chaulagai et al., 2005), keeping the vertical programs rely on and use the new system has proved challenging (Chaulagai et al., 2005; Nyella, 2009; Galimoto, 2007). This makes the goal for HIS integration illusive and unattainable with fragmentation creeping back in the picture, even before the closure of the project (Nyella, 2007). Though, there is a number of

research studies on HIS in developing countries, not many of them have critically analysed the issue of fragmentation after integration. Some few studies have argued for the national HIS not meeting the data needs of the health vertical programs, rigidity of the national systems where standards are 'cast in stone', bureaucracy in incorporating new program's requirements in the existing system, multiplicity of data needs posed by donors on the vertical programs (Chilundo, 2004; Aanestad et al., 2005; Braa and Muquinge, 2007). To contribute to this, the paper emphasize the need to understand the two main groups of actors involved in the process (i.e. the national HIS authorities and the vertical programs supported by donors) in terms of the resources and rules available to them; and their implication in the standardization and integration venture.

Our focus being the need to analyze the relationship between the national HIS authorities and the vertical programs in terms of their resources and rules, we find Structuration Theory (ST) concepts relevant for this respect. According to Giddens, actors draw on allocative and authoritative resources to mediate their actions (Giddens, 1984). Allocative resources refer to material objects which actors draw upon to get things done (redesign a new tool, exert control over others). On the other hand, authoritative resources refer to non-material factors (such as status, formal authority or hierarchical position) which enable command over other human beings. The main actors in the context of our study carry with them both allocative and authoritative resources as they engage in the process of standardizing and integrating the HIS. Our argument is that these resources generate power which underpins the actors' ability to effect changes (transformative capacity) in the context of HIS integration which ultimately challenge the whole process, rendering it ineffective (Giddens, 1984). Therefore, our paper strives to meet the following objectives (i) to analyze the power relations that exist between the two main actors resulting from the ownership and control of resources and its implication on the HIS integration (ii) to draw on the case study and propose strategies to deal with the challenges.

The empirical underpinning of this paper is based on ongoing effort to standardize and integrate the HIS in Zanzibar, as part of the broader healthcare system reforms. Supported by the Danish International Development Agency (DANIDA) the HIS restructuring project is done as part of the research network on Health Information Systems Programme (HISP), which operates in many other developing countries (Braa et al., 2005). The rest of this paper is organized as follows: in the subsequent section we present the literature on the healthcare context and HIS in developing countries followed by our theoretical concepts from Structuration Theory which forms the basis for our empirical analysis and discussion. The research context and the methodology employed in the study are presented next, followed by the empirical case description. The analysis and discussion of the research findings is then set forth. The paper ends with a conclusion section presenting the implications of the study and our final remarks.

2. THE HEALTHCARE CONTEXT AND HIS

Health is recognized as an important parameter in achieving the Millenium Development Goals (MDGs). Out of eight MDGs, three relate directly to health (Dodd et al., 2007). Consequently, the health sector of most developing countries is flooded by both local and international partners carrying out myriads of interventions meant to reverse disease trends. Most of these interventions are supported by international aid agencies and NGOs, with the local governments providing the least share of it (Chilundo and Aanestad, 2003; Smith et al., 2008). However, donors often prefer to raise and spend aid "vertically", in order to show a direct link between their monies, and results (Dodd et al., 2007; Smith et al., 2008; Nyella, 2009). This is evident by the formation of the so called Global Health Partnerships (GHPs)

such as the Global Alliance for Vaccines and Immunizations (GAVI) and The Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM).

As the results, most of the donors' funds is allocated to these disease specific projects rather than to broad based health system investments such as human resources, health infrastructures such as the countries' HIS, and community oriented primary healthcare services (Maeseneer et al. 2008; Marchal et al. 2009; Levine and Oomman, 2009). For instance the HIV/AIDS budget in most african countries exceeds the general health care sector budget (England, 2007; Maeseneer et al., 2008). Zambia's budget for the Ministry of Health for instance in 2006 was USD136m, while the HIV/AIDS budget was USD150m (Maeseneer et al., 2008). The consequences of these imbalances in resources include internal brain drain where most skilled health workers and managers are attracted by salary top-ups to these programs, dysfunctional sector wide HIS while well funded vertical information systems such as for HIV/AIDS systematically provide information to donors but not necessarily to national HIS (Levine and Oomman, 2009).

There has been efforts to coordinate and pool resources from donor agencies using different approaches such as the Sector Wide Approach (Dodd, et al. 2007; Kamuzora and Toner, 2002) and Direct Budget support in which donors contribute directly to the central budget (Kamuzora and Toner, 2002). However, the current state of most health systems as the literature and our case suggest is rather vertical, leaving recipients little flexibility to reallocate monies according to their priorities or to fund health systems costs. Kamuzora and Toner (2002), argued that donors have differing internal rules and regulations, which impose strains on the operation of the sector support programmes. Health Systems Strengthening (HSS) spearheaded mostly by the WHO is another approach advocating horizontal programming (Singh, 2006; Levine and Oomman, 2009). However, Marchal et al. (2009) asserted that recent HSS strategies are still selective, targeting specific diseases. Yet, another approach is what is so called the 15by2015 campaign which calls for major international donors to assign 15% of their vertical budgets by 2015 to strengthening horizontal primary healthcare systems (Maeseneer et al., 2008).

The diverse approaches advocating broad based health system support by donors paint a picture of the enormous challenges and inherent complexities of the health sector in low income countries resulting from the large number and diverse nature of development partners. As the literature indicates, neither the local healthcare authorities nor development partners are in control in any strict sense. Rather, there is a manifestation of power game emanating from the resources. While in theory the local Ministries of health have full formal authority over the health care sector, their power is weakened by poverty as they are forced to adhere to donors' conditionalities for them to enjoy their support. Take for instance the sheer number of partners in HIV and AIDS, each imposes its own priorities, plans, and reporting requirements, thus massively increasing the administrative burden on countries (England, 2007). The argument of this paper is that understanding the implication of these resources on different sector wide interventions such as the standardization and integration of the HIS is imperative in ensuring optimal success of these projects.

Though some countries have managed to integrate some of the vertical reporting systems into the national HIS as part of the wider health sector reforms (Braa et al., 2005; Sheikh, 2005; Chaulagai et al., 2005), keeping the vertical programs adhere and use the new system has proved challenging (Chaulagai et al., 2005; Nyella, 2009; Galimoto, 2007). As stated earlier, numerous reasons from a number of studies have been highlighted as the cause to this. However, none of the studies have looked into the impact and implication of the resources owned by the main HIS stakeholders (the MoH and the VP supported by donors) to the HIS integration attempts. We draw on Structuration Theory explicated below to analyse

the allocative and the authoritative resources (Giddens, 1984) carried by the main stakeholders and their implication into HIS integration endeavour.

3. STRUCTURATION THEORY CONCEPTS

Giddens developed Structuration theory (ST) as a general theory of social systems. In the information systems (IS) research community, ST has been used in theory development and analysis of empirical case studies on organizational and social issues related to IS implementation and use. Kouroubali (2002) used the theory to study implementation of health information systems in a health care environment; Chisalita (2006) used ST to understand use of IS technology in a public sector and Orlikowski (1992) drew on ST to rethink the concept of technology in organization. While the list can continue, suffice to say that ST has become one of the common social theories in IS research. In this paper, we employ ST in a healthcare environment flooded with multiplicity of vertical health information systems supported by myriad of donors.

Structuration is a social process that involves reciprocal interaction of human actors and structural features of the organization (Giddens, 1984). ST aims to explain social practices across space and time by viewing actions and social structures as linked by their interdependency. Social structures are defined as rules and resources in the human mind. When acting in a social situation human actors draw on the resources and rules between them which facilitate or constrain their actions. Therefore, rules and resources mediate human actions and in their use they are continuously reaffirmed or changed by human agents. Giddens identifies three dimensions of structure, which he terms signification, domination and legitimation linked with corresponding dimensions of agency, described as communication, power and sanctions. The interaction (agency) is however, mediated by interpretive schemes, facilities (resources) and norms respectively (see Figure 1).

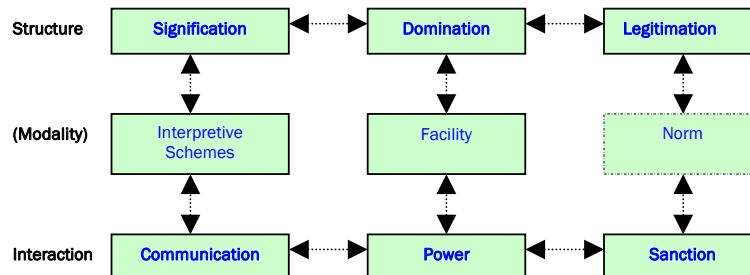


Figure 1: Dimensions of Structure (Giddens, 1984).

When human actors communicate in interaction they draw upon different interpretive schemes, defined as “stocks of knowledge” about what actors are doing and why they are doing it. Actors employ these interpretive schemes in order to make sense of the interactions, to understand them. By employing the interpretive schemes they produce and reproduce structures of *signification* or meaning. Giddens identified two types of resources - allocative and authoritative resources. Allocative resources refer to material objects which actors draw upon to get things done (e.g. design a new data tool standard, exert control over others). On the other hand, authoritative resources refer to non-material factors (such as status or hierarchical position) which enable command over other human beings. These resources generate power which underpins a person’s ability to effect change (transformative capacity) in his or her social environment. Callinicos (1985) defined power as the capability of the actor to intervene in a series of events so as to alter their course. As such it is the “can” which mediates between ‘intentions and want’ and the actual realization of the outcomes sought after (ibid). The ability of human actors to draw on resources to exercise power over other actors constitute to organizational structures of *domination*. Nevertheless, there is always a

possibility for the other actors, to whom power has been wielded to act to change a particular structure of domination, leading to what is referred to as the dialectic of control. With the dialectic of control, Giddens argues that, there is always some resources available to humans with which to act in ways that counteract or offset the effect of a social pressure.

“all forms of dependence offer some resources whereby those who are subordinate can influence the activities of their superiors” (Giddens, 1984 p16).

The rules and resources in general mediate and constrain human action, while at the same time they are reaffirmed through being used by the human actors. The role of human actors to reaffirm the structural properties is highlighted by the recognition that human agents are purposeful, knowledgeable, reflexive and active.

“All social actors, all human beings are highly 'learned' in respect of knowledge which they possess and apply, in the production and reproduction of day-to-day social encounters (Giddens, 1984 p22)”.

Social actors as knowledgeable agents account for their reflexivity capacity to routinely observe and understand what they are doing while they are doing it. Braa and Hedberg (2002) presented an example on this regard where health workers attributed institutional trust to the existing routine reporting systems and saw them as means to confirm social contracts. The consequence of that was the tendency of the health workers to resist the new ‘improved’ standards.

The continuity of social reproduction is based on the duality of structure and with the reflexive monitoring of social activity by the agents. Regular actions of knowledgeable and reflexive agents establish patterns of interaction that become standardized practices in organizations. However, the purposive actions by the social actors do not imply perfect control of action. There are also unacknowledged conditions and unintended consequences of action (Jones, 1998). Unintended consequences refers to the consequences that would not have taken place if a social actor had acted differently but that are not what the actor had intended to happen (Giddens, 1984). For any planned organizational change, the consequences that escape the intention of the planned change are considered unintended. For instance, the plan of a healthcare organization could be to standardize and integrate the HIS and unintended consequence could be ending up with more fragmentation.

Our study draws on the ST concepts to analyse and discuss how the main actors as knowledgeable, purposive and reflexive agents drew on the resources and rules available to them as they engaged in the standardization and integration initiative. As we shall show, this spawned structures of domination leading to unintended consequences rendering the integration goal challenging and unachievable.

4. RESEARCH SETTING AND METHODS

The empirical setting of this research is Zanzibar. Zanzibar is a semi-autonomous region within the United Republic of Tanzania, with two main islands, Unguja and Pemba. Zanzibar has an area of 2,332 square kilometres and is divided into five administrative regions, each with two districts, making a total of ten districts in the entire region. Zanzibar maintains her own health system administrated by a semi-autonomous Ministry of Health and Social Welfare (MoHSW). Alongside the health system is an information system called Health Management Information System (HMIS), meant to provide information support to all decision making processes of the entire ministry. In this paper, the term ‘Health Information

System (HIS)' is used to refer to the HMIS and the term 'National HIS authorities' is used to refer to the national level MoHSW department, responsible for the health information system.

Our empirical materials are based on an ongoing effort supported by DANIDA to standardize and integrate the HIS in Zanzibar. The implementation of the project is done within the Health Information System Programme (HISP). HISP is a South-South-North collaborative Health Information Systems Programme comprising of a number of countries from Africa, Asia and Europe (Norway). By drawing on the support from DANIDA, the HISP team in Zanzibar (authors are members of the team) in collaboration with other stakeholders (the MoHSW, vertical programs and donors) started to engage in the standardization and integration of the HIS from 2005. For more information on the project refer to (Sheikh, 2005; Nyella, 2007).

The research was conducted using longitudinal case study methodology based on an interpretive philosophical assumption. Interpretive research aims at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context (Walsham, 1993). The choice of the interpretive study was catalysed by the need to understand the actors in terms of their resources and the implications these resources in the context of HIS integration.

The research was carried out in five health districts; four in Unguja and one in Pemba Island within two main periods - June to November, 2006 and in April 2009. The districts visited in Unguja were Urban, West, and Central district. In Pemba the research was conducted at Chake Chake district. The empirical materials were gathered through actual engagement in the activities of standardizing and integrating the HIS which included customization of the software tool, redesign of data collection tools, trainings and through attendance in meetings and workshops. Use of formal and informal interviews, focused group discussions, document analysis such as the Health Sector Reforms Strategic Plans, formed the major source of the findings.

The first fieldwork forming the great part of the findings, 38 informants were interviewed – 19 from Pemba and 19 from Unguja Island. Among the informants includes the district medical officers, district health officers, vertical programs managers and central level HIS officials. During the interviews different viewpoints in relation to the new data sets and tools were gathered. The second field research was a follow up visit which meant to learn the changes that had taken place after a period of time. In this round data were collected through interviews and attendance in consultative stakeholder meetings discussing the integration of all vertical programs reporting systems in the national HIS. In this round, 26 informants were interviewed from four districts in Unguja Island. The follow up visit formed the basis for understanding the national HIS officers efforts to acquire both material resources and political support to ensure integration of the vertical reporting systems into the mainstream HIS.

5. CASE DESCRIPTION: HIS STANDARDIZATION AND INTEGRATION

In 2002, Zanzibar initiated a health sector reform process, seeking to decentralize planning, prioritization and integration of services to the district level (ZHSRSP II 2007). Supported by the Danish International Development Agency (DANIDA), the government and other partners; the reform process sought to strengthen among many other things the Health Information System (HIS), to provide information support to the decentralized sections of the health system. Hitherto, the HIS was characterised by scarcity of resources, gaps in data collection tools, poor analysis of data, fragmentation towards the vertical reporting systems, poor feedback, lack of motivation and limited information use (Sheikh 2005). The national HIS was in control of only one data set meant for disease surveillance. National level access to the health data collected by the vertical programs was done through ad hoc means. District

and Zonal level access to comprehensive data for monitoring and evaluation of the primary health care services was compromised. The aim of the HIS restructuring was to review existing vertical systems of data collection to remove overlaps, gaps, integration of similar standards, and ensure that all data is captured in a district data repository accessible to all stakeholders.

To shed light on the contextual conditions looking mainly at the resources available to the main actors and the way they were implicated in the project, the empirical materials are organized as follows: First we present the context of the HIS restructuring focusing on the control of resources, secondly we provide summary of the impact of these resources at the vertical program level and thirdly we embark on the HIS restructuring process focusing on the implication of the resources on the integration initiative.

5.1 The Context of the HIS Restructuring: Ownership and Control of Resources

The healthcare Health services in Zanzibar are delivered through directorates of the Ministry of Health and specialized vertical programs such as Reproductive and Child Health (RCH), Zanzibar AIDS control program (ZACP), the Malaria control program (ZMCP) and Tuberculosis (TB) and Leprosy control program (ZPRP, 2002). The main sources of health sector financing are donor funds and fiscal operations of the government. The government financing is derived from general tax revenue sources. However, according to a study by the African Development Bank (ADB), revenues generated by the health sector itself cover less than a half of one percent of annual health sector expenditures and account for insignificant share of total government revenues (MoHSW, 2003). Furthermore, as per the health sector public expenditure review⁷ - 2006, the government contribution accounted for 29% of spending in the sector in financial year 2004/05, while development partners accounted for the balance of 71% (ZHSRSP II, 2007).

DANIDA is one of the main donors within health sector whose resource support base is large and respected (DANIDA 2007). Other partners in terms of healthcare financing include Global Fund for AIDS, Tuberculosis and Malaria, the African Development Bank, and the United States government. Most of the donors/partners however prefer disbursement of their funds and other resources directly to the specialized vertical health programs to ensure 'proper' management and use of their funds.

Technical health programmes in Zanzibar remain highly verticalised, with some commanding significant external resources. This has resulted in a regrettable situation whereby their planning and reporting activities are in some cases more closely aligned with funders than the MOHSW as a whole (ZHSRSP II 2007 p26).

However, coordination of these donors/partners and the funds provided is problematic. Though there are many activities in the health sector being funded by donors (vertical health programs being part of them), there is near absence of disclosure by donors on disbursement schedules, time frame of assistance, modalities of procurement, etc (PER&C 2003). Allocation of the existing resources in Zanzibar has largely been driven by external, development partner priorities (ibid). As part of the health sector reforms, the government seek to build a framework for coordinating the partner's support, so as to ensure transparency and accountability in addition to directing the resources support to the government priority cost-effective health service delivery interventions.

"The issue of effective management of resources and development partner coordination is critical because implementation success of the reforms will depend to a large extent on development partners' support. It is therefore paramount that

concerted efforts be made as part of the reform process on how to coordinate the inflow of development partner support so as to ensure transparency and accountability in addition to directing the resources support to priority cost-effective health service delivery interventions and activities” (ZHSRSP II 2007 p19).

However as presented in the (ZHSRSP II, 2007), the issue of integration which would enable pooling and well coordinated allocation of the resources is a potentially thorny one, with vested interests working against reform efforts. Nonetheless, as further stressed out in the (ZHSRSP II 2007), the efficiency gains and potential equity gains of rationalisation in certain areas are difficult to ignore, and the coming period will see renewed efforts by the central MOHSW to integrate and coordinate central support activities.

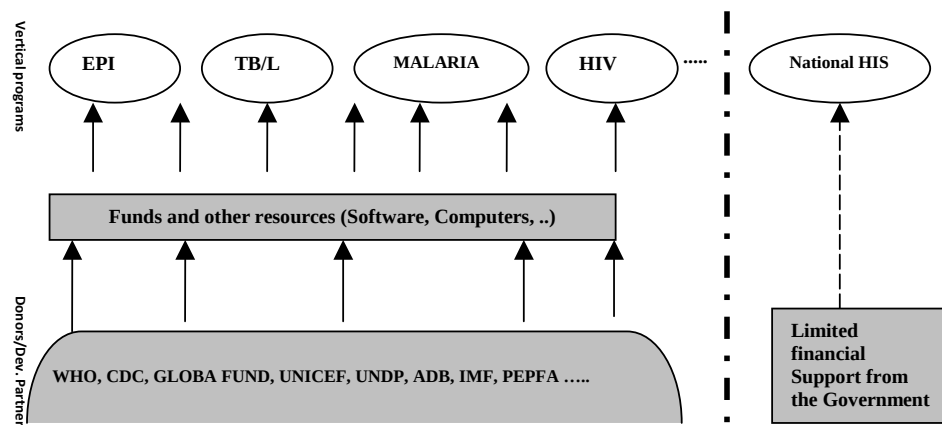


Figure 2: Flow of funds and other resources (Source: Fieldwork)

As shown in Figure 2, almost all the donors' funds go directly to the vertical health programs to support program healthcare activities including the program based information system. The national HIS however, depends on the very limited government funds disbursed through the Ministry of Health. The impact of the resources available to vertical programs for establishment and maintenance of their health information systems is vivid for those with strong donor support. Such programs are characterised by strong management structure which is well resourced in terms of human and material resources (computers and software etc). Examples of such programs in our case include Malaria, HIV/AIDS, EPI and TB & Leprosy. We briefly describe two of these programs information systems to shed light on the significant impact of the resources at the program level information systems.

5.2 Impact of the Resources on the Program Level HIS

The Expanded Programme on Immunization (EPI) is one of the vertical health programs tasked with providing vaccinations to children and mothers as a preventive measure to communicable diseases. The program maintains information system providing information for planning, control of antigens, monitor vaccination coverage and the quality of the services in general. The reporting system which was paper based at the periphery and district levels, and computer based at the national level; has two full time data officers, one in Pemba and one in Unguja. The officers ensured that EPI data is collected from all Health facilities and submitted to the district, compiled to form district immunization report and submitted to the national level program's offices on a monthly basis. The management of the information system had very strong follow-up mechanisms and incentive structure. The incentives came in form of offsite trainings where participants are given allowances, provision of transport support to districts in the supply of drugs and equipment. The provision of the incentives was

conditioned on the timely submission of their reports. This made EPI perform relatively well in terms of data collection and reporting.

Though EPI may be a special case in terms of performance, other programs do not differ much in terms of resources and management structure. For instance, supported by Global funds, TB & Leprosy HIS uses a different administrative structure with two districts in Unguja and One in Pemba compared to the national HIS which has six in Unguja and four in Pemba. The program's HIS is paper based at health facility level and electronic at the district and national level. During the restructuring of the national HIS, the TB and Leprosy was involved in the process but their data sets were not included in the new national HIS data sets. As explained by the District TB & Leprosy Coordinator (DTLC):

It is not possible to integrate our data with HMIS because first, our reporting frequency is quarterly while HMIS is monthly; two we don't think if they can meet all our data requirements. (DTLC, June 2006)

He further stressed:

They summoned us to attend a meeting to discuss HMIS issues. By then the TB&Leprosy manager was in a holiday, so I had to attend the meeting. In the meeting I didn't understand much of the issues discussed. For instance they were talking about monthly reporting of data while in our programme we normally report quarterly. Also our administrative structure is different from theirs. For us, Unguja has three districts and two in Pemba while HMIS has six districts in Unguja and four in Pemba. (DTLC, June 2006)

The subsequent section presents the HIS standardization and integration initiative, covering some of the programs which were involved and the way they responded to the new system. The gist here is to show how the programs managers drew on their resources and respond differently to the new national HIS. Furthermore, we show how on the other hand the national HIS drew on the resources available to them to counterbalance the programs move.

5.3 The HIS Restructuring Process

As explicated earlier the HIS restructuring initiative aimed at standardization of the existing data sets to remove overlaps, gaps and irrelevant data elements and integration of some data sets collecting similar data. Furthermore, the project aimed at creating a common integrated database (data warehouse) at the district level where data from all health facilities converge and thereafter diverge to all stakeholders, including zonal and national level, and the vertical programs. As part of the health sector reform activity, the HIS restructuring was supported by DANIDA.

By drawing on an incremental and participatory approach the HIS restructuring process started by revision of existing datasets and definition of new ones. Based on that approach, the following datasets were included in the integration initiative: Expanded Programme on Immunization (EPI), Disease surveillance, Reproductive and child health (RCH), Sexually Transmission Infections (STI) & Human Immunogenicity Virus (HIV) data set, and Maternity dataset. EPI had mainly two main data sets, one for monitoring provision of vaccination services and another one for disease surveillance. The vaccination data set saw some minor changes during the revision process, leaving it more or less as it was but with a mandate that its data should be captured in a common electronic database at the district level. In terms of control and support of this data set by the EPI program, it was more or less vertical but with one important change – the data is captured in the common database giving

access to all other stakeholders. However, the disease surveillance EPI data set, being similar to the national Disease Surveillance data set, were both standardized and integrated to form one data set. Unlike the vaccination data set, the mandate to integrate the surveillance data sets made EPI translate it as losing control to their data set. Though the integrated dataset was running for a period of time (eight months) the EPI program kept on collecting data using their own data set. As asserted by one official:

“.. Until we are sure of getting our data from the national HIS, we can not abandon our system” (Manager, July 2006)

Malaria program is another health program with keen interest with the disease surveillance data set. With a very strong donor support working towards reversing the malaria trends in the country, the program had a great need to monitor the various malaria interventions on the ground. The disease surveillance being the main source of the malaria data, the program was involved in the design and implementation stages. For instance, the program's data manager was involved in conducting training for the new disease surveillance dataset (that included the malaria data). However, despite of the involvement the data manager designed a separate data collection tool behind the scene and rolled it out in some districts. When enquired of it, he stated:

“They have taken out almost all the age group categories and left what they feel will satisfy their needs, but what about us?. So we designed it to show them how it should look like” (Manager, August 2006).

However, when the national HIS officers learned of the practice, a decree was issued requiring the program to adhere on the agreed national data tool for disease surveillance. During the follow up field research (April 2009), the program was using the national surveillance tool.

The Zanzibar Aids Control Program (ZACP) is another health program which despite of being involved in the process of designing new dataset for the program's services (HIV & STI), kept on using their previous dataset tools separately. ZACP is one of the strong programs funded by different donors such as the Global fund, Centre for Disease Control (CDC), United Nations Development Programme (UNDP) and the World Health Organization (WHO). The program maintained its own fragmented information system, one for VCT and another one for STI services. These subsystems were integrated into one dataset forming an 'STI and HIV/AIDs' dataset. The dataset was functional for more than six months with data routinely collected and collated from almost all health facilities providing the two services. Although most of the data was submitted to the districts and transmitted to higher levels, the data was not fetched and used by the ZACP. Instead, the program kept on depending entirely on their previous systems. The reason given was that the new dataset did not fulfil data requirements for program management and that it was not designed for the ZACP but for the national HIS.

“The new tools are for the higher levels only; they can not help us in any way. We need more information compared to what is on the national HIS form. It is not designed for us” (Manager, July 2006)

Though the program officers participated in the design process of the dataset, the participation as explained by one officer was meant to help the national HIS authorities get HIV/AIDS related data. As explicated by one national HIS officer, lack of trust by the

vertical program of the capacity of national HIS to maintain and sustain the information system was envisioned as one of the reasons:

“..... we rely on donors in almost everything which sometimes lead to mistrust by the vertical programs of our capability to maintain and sustain the information system. For instance EPI are performing well because they have enough funds (from donors). Also HIV/AIDs have many donors which imply enough funds, unlike HMIS which has very scarce resources both physical and human resources”. (National HIS officer, July, 2006)

This is further reinforced through a follow-up field visit (in April, 2009) by one of the authors

The national HIS initiative has been funded mainly by DANIDA for more than 90%. They (DANIDA) are not funding the HIS initiative alone but almost everything relating to health sector reforms in Zanzibar (National HIS officer, 2009).

The follow-up visit further revealed some efforts done by the national HIS to ensure all the vertical programs become part of the integration initiative. One of such efforts is consultative meetings by the national HIS which meant to enrol fully all the programs such as the Zanzibar AIDS Control Programme (ZACP), TB/Leprosy, Home Based Care (HBC) and the Preventive Mother to Child Transmission Programme (PMTCT) into the initiative. The national HIS management has a top level political support for integration of these vertical systems into the national HIS. This is based on the order issued by the national health principal secretary to all health programs requiring their health information systems be integrated on the same data pool – the national data warehouse. Based on that the programs mentioned above appeared in the two days meeting which saw the revision and harmonization of the different data collection tools whose implementation is continuing up until the time of writing this report.

We are done with the data review with all vertical programs with exception of TB-HIV data. We will soon be done with it once we get time (National HIS officer, 2009).

As stated earlier the national HIS integration initiative depends almost entirely on DANIDA support, however according to one official, the support has been halved since 2009. She further observed that:

.... if they will withdraw their support we will not be able to move alone and so many things will crumble (National HIS officer, 2009).

However, the national HIS has different strategies so far in place to acquire support from different donors as asserted below:

We have a new donor (Italian cooperation) who has signed a two years support for health information system especially on capacity building and training (National HIS officer, 2009).

Furthermore the national HIS expect to mobilize and receive support from the vertical programs to sustain the integrated HIS:

The fact that all programs will be integrated within national HIS, and the fact that each program has a component for information system, then, we will be receiving some support from vertical programs that will facilitate activities relating to the national HIS (National HIS officer, 2009).

Whether the vertical programs will remain 'faithful' to the new system after the implementation process; remains to be seen.

6. ANALYSIS AND DISCUSSION

In this section we draw on the Structuration theory to analyze the empirical materials. We start by the analysis the two main groups of actors (national HIS authorities and health programs / donors) in the light of the resources available to them. The impact of the resources as they are drawn upon by the actors mediating their responses to the HIS standardization is subsequently explored. Finally, this section ends by the discussion of the strategies to counter the effect resulting from the ownership and control resources as they are implicated in the standardization and integration initiatives.

6.1 Analysis of the Resources Controlled by the Actors

Zanzibar, the context of our study is a low income country, highly dependent on donors for social and economic development. The big share of the health sector budget is contributed by donors (ZHSRSP II 2007). However as seen from our case, most of these resources are controlled by the donors (one of the main HIS actors) in terms of allocation and use (ZHSRSP II 2007). These resources generate power which underpins actors' ability to effect changes in their operating social environment – health sector. For instance with a condition of 'proper management' most of the allocative resources (Giddens, 1984) are directed to vertically organized health programs (Figure 2). Though this can also account for the actors knowledgeable, reflexive and purposive characteristics, in terms of their decisions for proper management, this however does not imply perfect control of their actions. For, there are also unacknowledged conditions and unintended consequences of actions (Jones, 1998). For instance, as an unintended outcome of the vertically organized allocation of resources, is the deprivation of other health care services in terms of resources, which sometimes may paradoxically be the one to be given the first priority.

Malaria health program as described in (ZHSRSP II, 2007), utilized huge amounts of allocative resources compared to other health programs and services which are of equal or even more significance. These resources directed to these health programs have significant effect on their health information systems and on the initiative to integrate them in the mainstream HIS. More often, these vertical HIS as described in our case consist of well organized management structure with both human and other allocative resources. These management structures are sometimes in conflict with the national HIS. This is exemplified by the TB & Leprosy program which maintains a totally different administrative structure upon which their HIS is built. As the result, this was taken as the reason for the TB/leprosy HIS to run separate from the mainstream HIS.

The MoHSW authorities characterized by the meager allocative resources, is embarking on a process of coordinating the donor support to ensure proper allocation of the resources by targeting on the most priority areas in the healthcare system. Though the MoHSW authorities may be considered resourceful in terms of its authoritative power accounted for by its political mandate to coordinate the donors support, this is weakened by its meager allocative resources. As pointed out in (ZHSRSP II 2007), coordinating donors support is a potentially thorny issue, with vested interests working against the health sector reforms efforts. However, the MoHSW authorities as knowledgeable, purposeful and

resourceful (political mandate) actor reaffirmed its position by arguing that the efficiency gains and potential equity gains of rationalization in certain areas are difficult to ignore, and the coming period will see renewed efforts by the central MOHSW to integrate and coordinate central support activities.

The asymmetric ownership and control of resources depicted above shows how actors draw on resources to exercise power over other actors which ultimately constitute to organizational structures of domination. These structures of domination enacted in such a context of healthcare reforms initiatives which includes the health information system standardization and integration renders the reform goals challenging and difficult to attain. We use the term asymmetric to emphasize a situation where one group of actors have more and different type of resources compared to another. The challenging part of such a context is the fact that each main actor has resources and knowledgeable enough to wield power over the other actor leading to the dialectic of control (Giddens, 1984). It is argued that there is always some resources available to humans with which to act in ways that counteract or offset the effect of a social pressure (ibid). This further explains the failure of the effort by different countries to pool resources from the categorical health programs to the integrated HIS (Land et al., 2002). We concur with the argument that managerial approaches of 'control' by the top HIS authorities will hardly yield desired results (Aanestad et al., 2005).

In the subsequent section we look at the effect of these resources carried by the actors as they engage in the effort to restructure the HIS by way of standardizing and integrating the vertical health information systems.

6.2 Transformative Capacity of the Actors - Resources Mediated Power Tensions

The standardization and integration initiative took place in such a context characterized by the asymmetric ownership and control of resources and rule system. The national HIS could be envisioned to have much of the authoritative resources depicted by their political will and mandate to standardize and integrate the HIS. On the other hands, the vertical programs seem to have more of the allocative resources (e.g.: funds, human resources, software and paper tools) available to them. Actors draw on these resources to exercise their power and get things done (Giddens, 1984). The decision taken by one of the program officers to design a separate data collection tool behind the scene clearly depicts the transformative capacity of actors as they draw on the resources available to them. A lot of factors mediated such a decision and action, including funds and human resources to design and circulate them, stock of knowledge of how to design and implement the tool. The decision and the action of the program officer underscores the reflexive, purposeful and active trait of human actors; highlighting their frequent monitoring of their own actions and that of others.

Similar action is represented by the decision of some program managers to run their old data tools alongside the standardized tool. This was attributed, partly by the allocative resources (funds to maintain their tools, excel based software tool etc) available to them and the knowledge of the vertical program managers of the economic status of the national HIS. The answer provided by the manager, of the need to be sure of continually getting their data from the national HIS, clearly depicts the reflexive and knowledgeable character of human agents. The HIV/AIDS program (with a number of donors behind it), is another program whose managers drew on their resources to mediate their response towards the national HIS standardization initiative. Though the managers were involved in designing and implementing a dataset tool for HIV, the program opted to rely on their previous systems. The response provided by the manager depicted their capacity to maintain their own systems, with an argument that the new dataset was meant for the national HIS data needs.

The varied responses to the HIS standardization process by the vertical program managers, mediated by the resources available to them spawned structures of domination.

However, according to Giddens, there is always a possibility for the other actors, to whom power has been wielded to act to change a particular structure of domination. To counteract or offset the power relations, the national HIS drew on the authoritative resources available to them. Using its authoritative power the national HIS officials resorted on participatory approaches such meetings and workshops to summon their rivals to resolve some of the problems related to their lack of allocative resources. This was evident by the mechanism used to solve lack of data collection tools problems. The national HIS immediately called a meeting summoning all the vertical programs including donors to deliberate and resolve the problem. Therefore, the national HIS tried to change the structure of domination by drawing on the authoritative resources available to them leading to the *dialectic of control* (ibid).

The dialectic of control can further be explained by the renewed effort by the national HIS authorities to have all the programs integrated in the national HIS despite of its meagre allocative resources by striving hard to get support from donors to achieve her main goal. The decree issued by the national health principal secretary to all health programs requiring their health information systems integrated on the national HIS further depicts the political pressure towards HIS integration. The dialectic tensions resulting from the asymmetric ownership and control of resources render the integration goal challenging and sometimes unreachable. Neither the national HIS nor the vertical programs seem to have control of the whole process. For instance, when the vertical program managers are summoned to discuss integration issues they comply to the authority of the national HIS but when it comes to implementation which depends largely on allocative resources the national HIS authorities is found wanting. Instead, the control is automatically taken by the vertical programs as they drew on their resources to implement their own agenda.

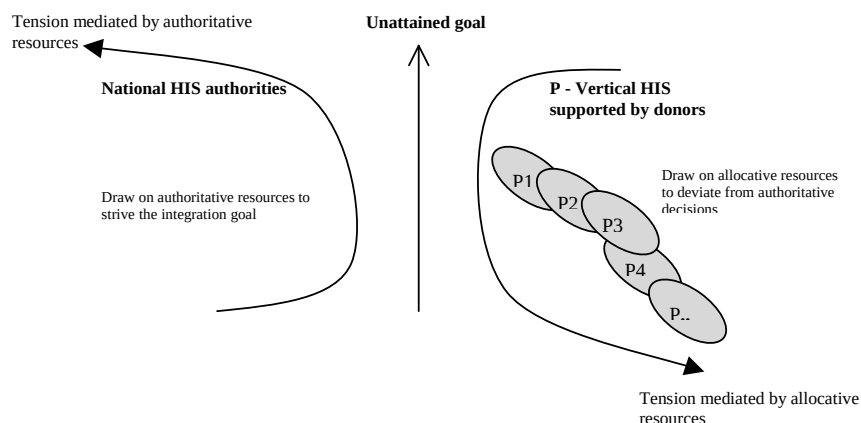


Figure 3: Power tensions leading to unintended consequences of unattained goal

The ultimate result is the divergence from the main goal resulting to unintended consequences of even more fragmentation and duplication of efforts, data and tools standards. Running the old data and tools standards of the vertical programs alongside the new integrated system is a manifestation of more challenges and frustrations to practitioners at the local level as they are now confronted by both the new and the old standards all at once. Figure 3, indicates the tension between the two main actors as one strive for standardization and integration by drawing on the authoritative resources and the second actor backed by allocative resources in striving to maintain the vertical HIS. The ultimate result is unintended consequences of unattained goal (Jones, 1998).

Unlike most of the studies on the issue of power in Information Systems' discourse which perceive power as stable, zero-sum and somehow negative (Kling and Iacono, 1984; Markus 1983), our study conquers with Rolland and Aanestad (2003) who through the study

of information infrastructures development in two different organizations showed that power is performed, dialectic, distributed, implicit and inscribed. Using our case, we have shown how power is performed based on the capacity of the actors as knowledgeable and reflexive subjects to make a difference as they draw on the resources available to them. Furthermore, we have shown that other than power being wielded from a single actor to others, it is rather distributed and dialectical where every actor has some resources (authoritative or allocative) through which power is / can be wielded dialectically. Inline with the concept of power as distributed we draw on our case in the subsequent section to propose an approach towards HIS integration of the vertical program systems which is based on flexibility and distributed control of the integrated HIS. Further, we argue for the HIS standardization and integration initiative to be re-conceptualized as a process of creating new structures of meaning between the main actors where communication plays an important mediating role.

6.3 Proposed Approaches for HIS Integration

The complex contextual realities of the health sector in low income countries as in our case provoke a lot of challenges in any efforts to change existing systems. These challenges results from the poor state of local authorities and the multiplicity of actors, rendering the context *a battle ground* where different competing and overlapping interests by the various actors are at play. This is epitomized by the tensions between the two main groups of actors in the HIS integration resulting from the asymmetric ownership and control of resources. Paradoxically, neither side is in control in any strict sense. This calls for a more pragmatic approach in ensuring a workable solution.

As shown from our case, lack of proper communication between the actors led to creation of structures of meaning which were in conflict with the main goal of integration. The argument by one of the HIV/AIDS officers that 'his participation was meant to help the national HIS authorities get their data' or 'the new tools are for the higher levels only' indicate a partial understanding of the whole aim of the integration process. Our first proposal therefore, is the need to build meaning of the HIS standardization and integration process between the actors. From the outset of the project, actors have myriad of interests and agendas. Consequently, we argue for the need to re-conceptualize the harmonization of these interests as a process of reshaping and creating structures of meaning. To achieve this, the interaction between the two main actors through communication processes such as meetings and workshops where the clear meaning of the dynamics and the outcome of the integration process is strongly built is of paramount importance. Furthermore, the communication should be mediated by the stock of knowledge of what can be considered as the possible solution necessary to achieve an integrated HIS supported and shareable to the parties involved. This sets forth the stage for our second proposed solution.

Coupled with the need to build meaning is the need to agree on how the integrated system should be constructed by taking the contextual particularities as a point of departure. As seen from our case study top level managerial control in a context of asymmetric ownership of resources confer little hope for integration. Alternatively we argue for a distributed control of the integrated HIS built on a modularised and flexible approach. By distributed control we mean a HIS system organized in such away that specific strong health programs HIS are built as separate modules in the integrated HIS. For instance, HIV/AIDS, EPI and TB & Leprosy can be implemented as separate modules. This approach gives the program control and ownership of their module without compromising the accessibility of the data from these modules by other actors. This is because all the system modules will be integrated in one HIS.

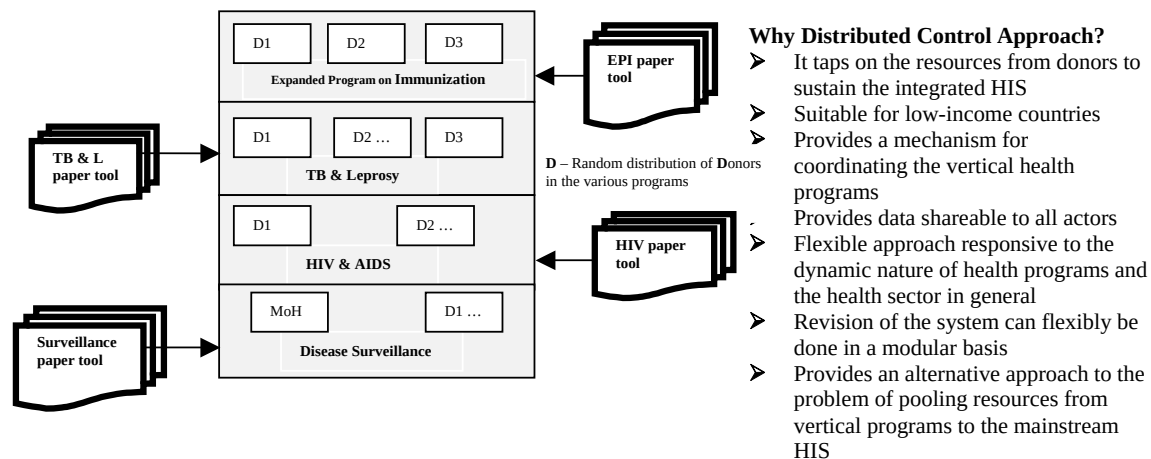


Figure 4: Modularized Integration Approach

An example from our case which worked very well based on this approach is the Immunization data set which is under the EPI program. The immunization data set was revised with strong collaboration with the EPI program managers. The EPI program managers were given leading role in the process of redesigning, testing and implementing the data set in the health districts. Drawing on their own resources they conducted training on the new data and tool standards for EPI and in the provision of supportive supervisions to the health data officers in the districts and in health facilities. Furthermore, the program ensures that the data is captured in the integrated district data warehouse making it accessible to other actors including the national HIS authorities. In contrast to the HIV data set where from the onset of redesigning the tool, the control was under the national HIS authorities. The ownership and control of the data set was in a sense pre-empted from the HIV management. Their involvement during the redesign phase was not clear as what was anticipated of them in terms of running and control of the new data set. As the result, the data set received very limited support from the HIV program management as they continued to use their previous data sets in parallel with the new ones. Our argument is that since these strong health programs are quasi-independent operationally, the distributed control conforms to their operational nature by providing a partial control of the integrated HIS based on a modular structure.

The distributed control approach provides a coordinating role to the national HIS authorities and control of other modules which are not under the strong vertical programs. By drawing on policy HIS guidelines built based on the distributed control approach and agreed by the two main actors, the national authorities can accrue lots of benefits such as *tapping* on the resources controlled by the vertical HIS to sustain the integrated HIS. The approach provides an alternative solution to the problem of pooling resources from the categorical health programs to the integrated HIS (Land et al. 2002).

7. CONCLUSIONS

Though HIS integration in developing countries has been recognized as the basis for coordination and linkage across health programs, achieving that goal is quite a challenge. The complex contextual realities of the health sector in these countries as in our case provoke lots of challenges in the efforts to change existing systems. These challenges as the paper showed, results partly from the poor state of local authorities and the multiplicity of actors, rendering the HIS context a *battle ground* where different competing and overlapping interests by the various actors are at play. In our case, this is epitomized by the tensions between the national

authorities pushing for HIS integration and vertical programs supported by donors resulting from the asymmetric ownership and control of resources.

Using the Structuration theory concepts we have shown how actors drew on resources to exercise power over each other, which ultimately constituted to organizational structures of domination. The fact that each main actor has resources and knowledgeable enough to wield power over the other actor leading to dialectic of control (Giddens, 1984), paradoxically means neither side is in control in any strict sense. Unlike the common held view in information systems that treats power as stable, zero-sum and somehow negative (Kling and Iacono, 1984; Markus, 1983), our case shows power as performed, dialectic and distributed (Rolland and Aanestad, 2003). We have shown power as being performed based on the capacity of the actors as knowledgeable and reflexive subjects to make a difference as they draw on the resources available to them. However, other than power being wielded from a single actor to others, it is rather distributed and dialectical where every actor has some resources (authoritative or allocative) through which power is exercised in a dialectical fashion. The paper proposed the need to strongly build meaning of the HIS integration using communication processes and the use of modularized distributed control approach of the integrated HIS to facilitate the 'tapping on' of the resources available to the various actors. This is a pragmatic approach in low income countries with myriad of donors with very strong quasi-independent vertical programs. However, further research on the proposed approaches is needed to unravel the practical dynamics involved.

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