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## ***Institutional Support and Maternal Health Outcomes – Review of Cross Country Experiences***

Doreen Odame, University of Ghana, Ghana

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### **Abstract**

Pregnancy and its related health outcomes have been identified as a key predictor of human development and therefore can be used as an indicator to measure a country's human development index. For this reason, it is important to put in place strategies and measures that can help improve the maternal health outcomes. The aim of this study is to identify and understand the role institution in strategies and interventions to improve maternal health. The method of this study was a review of published articles. The search was done from online databases and published work that pertained to the aim of the study. From the analysis, three main institutions were identified to work in improving maternal health outcomes. These institutions were government institutions, family and social support systems, Non-Governmental Organizations (NGO) and international partnership agencies. This review finds that, in order for strategies to be successful in improving maternal health outcomes in Ghana, there is a need for immense collaboration and support among all the institutions involved in the maternal health policy implementation. There has been a global improvement in maternal health outcomes. However, in order to optimize institutional efforts and outcomes, there should be frequent research to help keep pace with the emerging dynamics of maternal health. There should also be community involvement in interventions to facilitate localization and acceptance of interventions.

Keywords: maternal health, institutional support

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## 1.0 Introduction

Maternal health refers to the total health of a woman from the period of pregnancy, childbirth and the postpartum. Within this period, there is a lot that happens to the woman, which goes a long way to determine her total health outcome and well-being. It is estimated that about one thousand (1,000) women die on a daily basis, the causes of which have been attributed to pregnancy and childbirth complications with about 99% of these deaths occurring in Sub-Saharan Africa (WHO, 2013, p. 3). Though many countries worked towards achieving the Millennium Development Goal five (MDG 5) of reducing maternal mortality by two thirds, as well as ensuring universal access to reproductive health, maternal health remains a serious concern because of the high numbers of negative outcomes; mortality and morbidity (Hagey, Rulisa, & Pérez-Escamilla, 2014).

This paper is a review of published articles that pertain to institutional support of maternal health and outcomes. The review of literature design has been commended by (Martin, O'Connor-Fenelon, & Lyons, 2010) as suitable for a systematic analysis of existing literature which pertains to a particular issue. The design was therefore considered appropriate for the study since the aim of the study is to understand and analyze studies that have been conducted by various scholars concerning the topic of discussion. The review of literature helped to have a cross-country comparison of how institutions work to improve the maternal health outcomes.

## 2.0 Background

Maternal health is an important indicator of human development because it translates into the wellbeing of the members of an entire household. If we are able to understand well the determinants of maternal health outcomes and how these outcomes interrelate with other aspects of an individual's life, households, communities, and the nation as a whole, then we shall be able to enact the appropriate interventions that will address the issue (Campbell & Graham, 2006). Strategies to improve maternal health are important to nation building and improving the socioeconomic status of a country because it is directly linked to poverty reduction. This is due to the fact that poor maternal health impacts negatively on a woman's productive energy and income earning capacity and this can be catastrophic for any nation because research has shown that, women's income contribution is critical to the family, community, and nation as a whole (Nanda, Switlick, & Lule, 2005). Studies have proved that women are more likely to invest their incomes and earnings in the wellbeing of the family than their male counterparts (WHO, 1999). In this regard, the survival of a woman is very crucial to the wellbeing of every household and nation as a whole.

Apart from the economic gains in improving maternal health, improved maternal health and survival have been identified as a means to an end in itself (Nanda et al., 2005). This is so because improving maternal health and outcomes translate into other aspects of human development and vice versa. Poor maternal health, for instance, does not only affect the woman but the unborn baby as well, by contributing to low birth weights and even stillbirths (Lawn & Newborn, 2005).

In the early 20<sup>th</sup> century, the industrialized countries were able to reduce their Maternal Mortality Ratio (MMR) by about 50% due to sustainable and effective interventions which were implemented through well-structured institutions (Bhutta, Lassi, & Mansoor, 2010, p. 20). Though improved health systems have helped to present a similar picture in low-income countries, the estimated 99% of global maternal deaths occurring in these low-income countries, especially Sub-Saharan Africa (SSA) is said to be due to poor institutional frameworks and inadequate institutional support (WHO, 2004, p. 10). By comparing the outcomes in the developed countries to the outcomes in less developed countries, the literature reviewed identified that institutional support and efforts are the way forward in addressing issues of maternal health and improved health outcomes (Bhutta et al., 2010; Souza et al., 2013; Travis et al., 2004; WHO, 2014).

Institutional support is the presence of active role of authorities and institutions in the form of laws, regulations, financial and non-financial help to effect changes and desired outcomes in any development agenda (Kummitha, 2016). Institutional support from either international or local bodies is very important in every development agenda and in the pursuit of desired maternal health outcomes for that matter. This is because institutional support accelerates the development process and improves the well-being of the entire population (Sabatti, 2010). This support is demonstrated in good leadership, enactment of national policies, elimination of administrative barriers and over-regulation as well as under-regulation of existing systems.

According to North (1993), the institutional framework for any society is made up of the fundamental political, social and legal rules that establish the basis for the development of that society. North (1993) explains further that, for any development, agenda to receive legitimacy that development should conform to these fundamental rules. Because there is a lack of conformity to these fundamental rules, there are institutional “maldistributions” in many countries and this has led to poor development including poor maternal health outcomes (Bhutta et al., 2010, p. 5).

In 2012, the United Nations charged all governments to work to ensure Universal Health Coverage (UHC), with the aim of providing health equity and social justice for all members of the society. Obviously, for any government to achieve this purpose of providing efficient and equitable healthcare, there should be well established and functioning institutions that will work together to push the agenda. The knowledge, interventions, and strategies that can help to reduce maternal mortality and advance maternal health outcomes are widely known, however, for them to be effective and efficient in achieving goals and reaching targets, these strategies and interventions must be specifically designed to suit the dynamics of a country's setting, policies and economic constraints (Nanda et al., 2005).

### **3.0 Data Collection and Analysis Strategy**

The main databases that were used for the search and selection of articles were PubMed, Jstor, and Policy Press Journal. In order to guide the review, selection of articles were guided by the following keywords;



- I. Definitions and scope of maternal health
- II. Maternal health outcomes
- III. Maternal health institutions (national, regional and international)
- IV. Institutional support to maternal health and its outcomes
- V. Best approaches to improving maternal health outcomes

In total, thirty - three articles were thoroughly read to get an understanding of the content, as well as identifying differences and similarities in their findings. The analysis was done solely based on the content of these articles and not from the researcher's personal opinion. Table one presents a summary of the articles that were used for the review and the databases they were extracted from.

*Table 1: Summary of literature search*

| <b>Keywords</b>   | <b>PubMed</b> | <b>Jstor</b> | <b>Policy Press Journal</b> | <b>Number of selected articles</b> |
|---|---------------|--------------|-----------------------------|------------------------------------|
| Definitions and scope of maternal health                            | 20            | 15           | 10                          | 5                                  |
| Maternal health outcomes  | 12            | 24           | 11                          | 5                                  |
| Maternal health institutions (national, regional and international) | 10            | 10           | 12                          | 7                                  |
| Institutional support to maternal health outcomes and its outcomes  | 13            | 5            | 10                          | 10                                 |
| Best approaches to improving maternal health outcomes               | 6             | 13           | 15                          | 6                                  |

#### **4.0 Maternal Health and Outcomes of Key Strategies**

##### *Global Context*

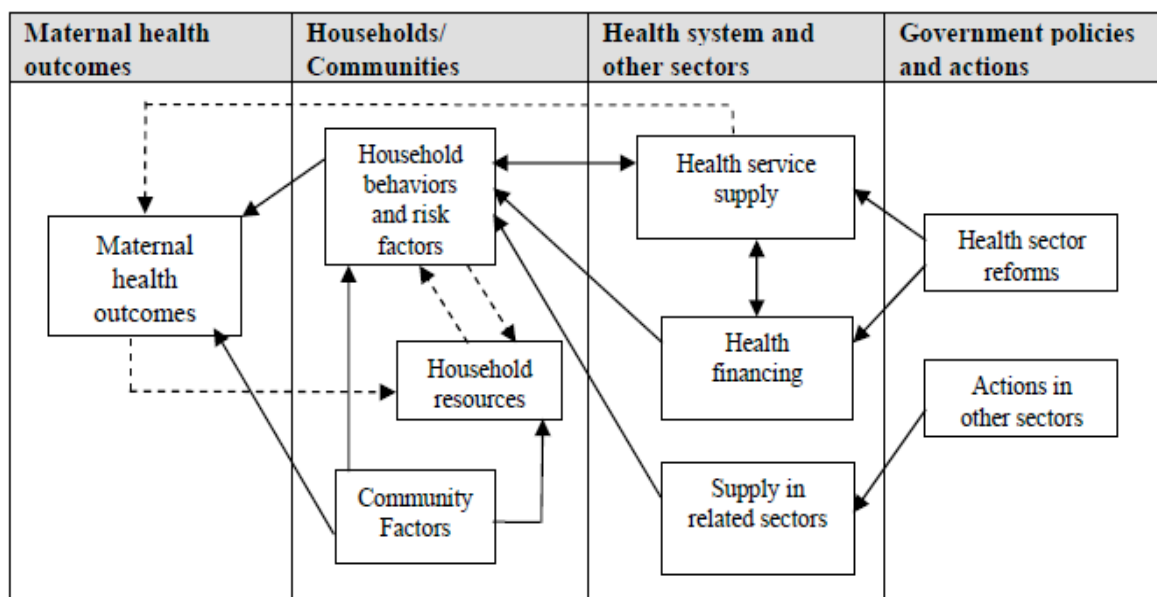
Undoubtedly, there has been a global improvement in maternal health issues since the commencement of the twenty-first century. However, there are still too many women who die and suffer various degrees of complications from pregnancy and childbirth, especially in sub-Saharan Africa and Ghana for that matter (WHO, 2011). The causes of poor maternal health outcomes, including mortality are classified into two main factors namely direct and indirect factors. The direct factors are those induced by the pregnancy itself – haemorrhage, obstructive labour, hypertensive disorders among many others. The indirect factors on the other hand are pre-existing conditions that are only intensified by the pregnancy – malaria, diabetes, HIV/AIDS and many others (Alvarez, Gil, Hernández, & Gil, 2009).

Out of the 33 articles that were reviewed 90% expressed awareness of the global concerns about the issue of poor maternal health outcomes and strategies that are targeted at improving maternal health. Some of the outlined strategies and interventions included the Safe Motherhood Programme, Family Programme, and High Impact Rapid Delivery among many others (Addai, 2000). Graham, Ahmed, Stanton, Abou-Zahr, and Campbell (2008) draws attention that, these global strategies bring to focus indicators that can be targeted to address issues concerning poor maternal health.

The most important question of concern was the cross-country differences in the health outcomes; why some countries are recording lower ratios than others. Acemoglu and Robinson (2010) argues that institutions are the fundamental causes of cross-country differences in human development and advises that in order to bridge the differences in ratios among countries, institutional frameworks should be developed. The development of the framework will also help to bring out analytical tools to facilitate achievement of the desired outcomes – improved maternal health (Skoog, 2005).

The literature showed that global attempt to improve on maternal health outcomes has been from the premise that maternal health outcomes are influenced by several factors that relate to each other – household factors, community behaviors, cultural norms, health systems and government actions and policies (Nanda et al., 2005). Claeson et al. (2001) used the Pathways Framework to conceptualize how these factors relate to each other and how they work together to improve maternal health outcomes. This framework, as shown in the table below is a result- based framework that shows the interconnectedness between factors, bringing out the risks and interventions necessary at each factor to impact on health outcomes.

*Table 2: Conceptual framework for maternal health outcomes*



Source: Claeson, et al., (2001) as cited in Nanda et al. (2005, p. 29)

As demonstrated in the framework above, the solid lines show the predominant linkages to maternal health outcomes whereas the broken lines show indirect linkages between the various factors and maternal health outcomes. With government policies and actions, for instance, health sector reforms (hospital facilities and infrastructure, transportation within the health system like ambulance) directly affect the health service supplies, which also have a direct impact on maternal health outcomes at household and community levels. Again, the framework shows that maternal health outcomes are indirectly determined by household resources in the sense that, these household resources determines household behaviors like health-seeking behaviors. The income of the household, for instance, will determine the mode of delivery of the woman, (whether home delivery or delivery at a health facility). In effect, though household resources may not directly influence the maternal health outcome of the household, it has an influence because it determines the household behavior which directly influences the maternal health outcomes.

For this reason, Nanda et al. (2005) educate that maternal health strategies should not only target health system reforms but rather should target all the other factors that have an influence on maternal health outcomes whether direct or indirect. The literature showed that countries that have implemented multifaceted interventions as has been directed by the framework have recorded very high improvements in their maternal health outcomes.

When Tanzania, for instance, adopted this framework, the number of women who accessed skilled care at delivery increased to 84%. This was made possible because the framework helped to identify that distance and lack of transport facilities were major inhibitions to access to health facilities at delivery. In response, measures were put in place to make transport services available to people in rural Tanzania (Bicego, Curtis, Raggers, Kapiga, & Ngallaba, 1997).

### *Regional Context – Sub-Saharan Africa*

The MMR is higher in less developed countries, especially SSA than in the developed countries (WHO, 2012) and this is an indication of the weak health systems and intervention in these less developed countries.

In the SSA region, the most common practice to birth attendance is the Traditional Birth Attendance (TBA) and for this reason, most interventions have focused on improving the skills of TBAs and using them to identify women who are at high risk of developing complications. In 1996 however, the WHO challenged this approach and explained that, every pregnant woman stands the risk of having pregnancy complications. Based on this premise, Tweheyo, Konde-Lule, Tumwesigye, and Sekandi (2010) pinpointed that, the TBAs are more effective as social support systems, supporting birth preparedness and community-based referral systems, but not working to improve maternal health in their capacity. This assertion was based on Maine and Rosenfield (1999) input that, identifying women who are at high risk of maternal complications as a strategy to improve maternal health is a failure because the majority of women who die are those of low risk of developing complications.

Maternal health interventions were now made to target the delivery period because that was the period where poor outcomes usually turn up (UNICEF., 2008). There was a great emphasis that this intervention would always fail to achieve desired outcomes if they are implemented as a stand-alone, rather, they should form part of a total package that targets the entire wellbeing of the woman (Jowett, 2000). In effect, some interventions that have been introduced and implemented in SSA include Emergency Obstetric Care (EmOC), Skilled attendance at birth, managing of unsafe abortions, focused antenatal care, detection of early anemia, treatment of malaria during pregnancy and family planning services.

### *National Context*

Though Ghana was able to make progress with most of the Millennium Development Goals (MDGs) one key area that the country lagged behind was maternal health. The country was not able to achieve the MDG target of 54:100,000 live births by the set year of 2015. One may be mistaken to think that the incidence of maternal mortality and its related poor outcomes are only dominant in parts of the country that are found to be poor and deprived. On the contrary, evidence shows that there are as many women in urban areas dying even though they received supervised delivery, as there is in deprived areas without supervised delivery (Abou-Zahr, Wardlaw, & Organization, 2003).

Ghana has witnessed several interventions both from government and international bodies, all targeted at improving maternal health outcomes. The Safe Motherhood programme is one of the interventions that were implemented in Ghana. The focus of this intervention was to improve access to emergency obstetric care (The Population Council, 2008). Others include the Focused Ante Natal Care (FANC). This intervention aimed to improve the quality of care that was provided and this was done through a comprehensive focused individualized care.

In 2003, the government of Ghana implemented a fee exemption policy to increase supervised care by encouraging more women to go to the hospital for antenatal care and delivery. This was followed by a Free Maternal Health Care Policy (FMHCP) within the National Health Insurance Scheme (NHIS) in 2008 (Penfold, Dean, Flemons, & Moffatt, 2008). These interventions have acted positively on some maternal health indicators in Ghana. The intervention for instance has helped reduce fertility rates (Grepin, 2009). A study by the population council (1989) confirmed a reduction in fertility rate increases the chances of improved maternal health. The study used the incidence of pregnancy to explain the correlation, arguing that, the risks associated with pregnancies (example haemorrhage) are reduced, or even eliminated ones fertility is controlled. The interventions have also increased the incidence of supervised delivery among pregnant women (Ekele & Tunau, 2007), as well as an increase in antenatal and postnatal care (Witter, Adjei, Armar-Klemesu, & Graham, 2009). This intervention may have accounted for the decline we have recorded so far in the MMR of Ghana.

Irrespective of the successes that have been recorded, there are still challenges to reducing poor maternal health outcomes to the barest minimum. Equity of access to maternal health services as well as supervised delivery, for instance, is a critical challenge that works against desirable maternal health outcomes. Educated women, as well as women in the urban areas, have easy and better access to quality maternal health care than counterparts in the rural areas and those who are not educated (Ricci & Zachariadis, 2013). A their study conducted by the Ministry of Health revealed for instance that, more women in urban areas have access to contraceptives (18.6%) than their rural counterparts (15.1%) (Odoi-Agyarko, 2003, p. 15)

## **5.0 Institutions that can support maternal health interventions**

Kuruvilla et al. (2016) gave an evidence-based recommendation that improved health outcomes can be achieved through an integrated action between and among institutions. Global maternal health outcomes can be improved by partnerships between institutions who have the requisite expertise to support the implementation of national plans (Grason et al., 2015). These institutions could be local governments, international donor agencies, Non – Governmental Organisations among others.

From the literature reviewed, institutions that can work to ensure improved maternal health outcomes were put into three main categories based on their mode of delivery. These categories are;

- I. Government Institutions
- II. Family and Social Support Systems
- III. Non-Governmental Organisations and International Agencies/ Donors

### *Government Institutions*

From the literature, it is the responsibility of governments to take up the initiative to improve health outcomes. This is because any agenda to improve health outcomes demand some level of financial commitment, policy frameworks, and interventions as well as infrastructural arrangement. Various authors outlined the importance and the need for participation of government institutions in improving maternal health outcomes.

For any intervention to be effective and efficient, it is important for the government to demonstrate the willingness and interest to make the strategy work. The sustainability of any intervention depends on the efforts and the resources that are dedicated to it. Out of the 33 papers that were reviewed, 20 of them revealed that countries that have enacted and implemented effective strategies to improve maternal health combined it with enormous political commitment. In Ghana, for instance, several interventions have been abrogated due to inadequate financial commitment on the part of the government (Addai, 2000). Nonetheless, there is evidence that shows a high increase in desired maternal health outcomes when there is political willpower and commitment (Nanda et al., 2005). Evidence shows that Honduras successfully reduced their MMR from 182:100,000 to 108:100,000 within a period of seven years,



and this success was attributed to the government's commitment to act on the situation (Koblinsky, 2003, p. 5).

The literature recommended that political commitment can be demonstrated through improvement of health systems and enactment and application of policies. Quality maternal health can only be provided within a well-structured and good functioning health system (WHO, 2004). In order for the bridge between quality and accountability to be bridged, it is important to have improved and efficient health systems (Van Lerberghe, 2008). It was recommended that it is important to have national health system reforms that will address inefficiencies in the delivery of healthcare. In order for the reforms to be successful, it should be able to provide equity in the access and provision of quality and sustainable healthcare. The literature showed several strategies that can work together to provide an efficient health system. Some of the strategies outlined included Public-Private-Partnerships to increase and improve on infrastructural deficits, providing efficient and sustainable alternative financing programs, as well as policy changes that will hold people responsible for their actions (Susan Scribner, Shehata, Dmytraczenko, & Nandakumar, 2000).

The government of Bangladesh invested in improving the health distribution system through the installation of logistics management systems, improved forecasting procedures and training of more than ten thousand (10,000) community family planning staff. This resulted in an efficient and sustainable health system by yielding a 95% continuous supply of logistics and other facilities within their health system (Wright, 2004, p. 15). Other countries that have seen improvements in maternal health as a result of political commitment include Rwanda (Dohlsten, 2014), China, Bolivia and Indonesia (Koblinsky, 2003).

#### *Public-Private-Partnership (PPP)*

As mentioned above, the literature emphasized that PPP can be an effective way to improve the health system by way of increasing infrastructure for delivery of maternal health care. Due to financial constraints, governments may be unable to provide an adequate budget that can address issues affecting the delivery of maternal health services. Some of these include expansion of maternal health facilities, availability of obstetric equipment, providing accessible roads and communication systems.

The literature explained that PPP provides an avenue for the health systems to be expanded and improved through support and innovation from private entities (Farlow, Light, Mahoney, & Widdus, 2009). These entities may include profit and non-profit organizations, pharmaceutical companies, transport organizations, producers and suppliers, shop owners and keepers, traditional healers, amongst many others (Nanda et al., 2005). This implies that there are a lot of stakeholders that can be involved in the fight for maternal health. Their participation can be encouraged through training, regulation and standard setting, information dissemination among others. Several countries have used PPP to improve their health systems and maternal health outcomes. Nanda et al. (2005) listed some of these countries as Indonesia, Pakistan, Kenya, India, and Jordan.

The Indonesian government for instance in partnership with the World Bank trained village, midwives to enable them provide reproductive health services to poor women. By so doing the country improved the maternal health status of poor Indonesian women and in effect reduced maternal mortality and morbidity (Koblinsky, 2003).

### *Alternative Health Financing*

Any efficient health system should ensure equity by obtaining improved health outcomes along financial security for the poor. In this sense, people should not be financially displaced because of the cost of their health care. Lack of financial security and fear of financial displacement can cause delays in health care decisions, which can further affect an individual's health outcome. For this reason, it is important for governments to come up with strategies to reduce out-of-Pocket payments. Leuz, Nanda, and Wysocki (2003) have proved that the unavailability of financial resources at the occurrence of obstetric emergencies have negative implications on the health outcome of the pregnant woman.

Apart from the government-owned national health insurance schemes, community - based financed schemes have also proved to be very successful in countries like Bolivia and Rwanda (Jakab & Krishnan, 2001; Preker, Langenbrunner, & Jakab, 2002). The community - based financing is based on the principles of providing mutual assistance through collective pooling of funds within a community (Nanda et al., 2005). This system works well to provide urgent financial assistance, especially to the marginalized. The study by Jakab and Krishnan (2001) showed that this community-based financing has been very effective in improving health outcomes by providing immediate financial assistance to women in the rural parts of Kenya.

The provision of loans has also proved to be very effective in improving maternal health outcomes. The Prevention of Maternal Mortality (PMM) network adopted this strategy in a project conducted in Africa to provide maternal care especially in emergency situations (Fawcus, Mbizvo, Lindmark, & Nystrom, 1996). In this project, women were given immediate loans when in an emergency obstetric situation and this increased access to emergency obstetric care. Though their report revealed that the loans were usually not repaid in full, Fofana, Samai, Kebbie, Sengeh, and Team (1997) attributed the increase in the patronage of maternal health care to this strategy.

### *Strategizing to reach marginalized groups*

The Program for Appropriate Technology in Health (PATH) conceptualized marginalized groups as people who are most disadvantaged and undeserving in society (Skinner, Biscope, Poland, & Goldberg, 2003). A successful maternal health strategy should work at creating opportunities so that no one will be disadvantaged with regard to obtaining maternal health care. In Ghana, disadvantaged groups may include the poor, people in remote and rural areas, pregnant adolescents and even men.

Kwambai et al. (2013) proved in their study that women who have to travel long distances to access maternal care are very unlikely to patronize it all. The literature explained that this is so because in such remote areas there may not be access roads at all, or in instances where there is, the conditions may be very bad. Due to these reasons, there are instances when women have delivered their babies en route to a health facility. This supports Kitui, Lewis, and Davey (2013) study that lack of transportation can prevent pregnant women from accessing a health facility. In Ghana, this makes more women in remote areas patronize the services of the traditional birth attendants because they are easily accessible (Kwambai et al., 2013). It is for these reasons that Leuz et al. (2003) suggested that, for any strategy to be effective, it should be able to overcome the challenges of distance and other accessibility challenges by taking the service directly to the population (in the remote and rural area). There is evidence to show that maternal health outcomes improved in Sri Lanka after government employed midwives and facilitated community outreach programs in their remote areas (Pathmanathan & Liljestrand, 2003).

The literature also considered pregnant adolescent girls to be vulnerable because of their physiological and social factors (Leuz et al., 2003). Physiologically, adolescents may not be developed enough to carry pregnancy and delivery. This makes them more prone to pregnancy-related complications that can affect their maternal health outcomes. They are more prone to complications such as anemia, obstructed labor and obstetric fistula (Lozano et al., 2013). Save the Children 2004 report estimated that about seventy thousand adolescent girls lose their lives every year because their bodies are not ready for child birthing (Nanda et al., 2005).

Strategies that aim to target adolescents should include life skills program in the package (Black et al., 2017), in order to empower them to protect their health and their future.

In a study conducted in India by the Center for Development and Population Activities (CEDPA), adolescent girls were offered some life empowerment models like vocational training, family life education etc. The findings of the study showed that girls who were offered the life empowerment models showed capabilities to make well-informed health decisions than adolescent girls who did not receive any empowerment model at all (Chandra-Mouli, Camacho, & Michaud, 2013).

### *Family and Social Support Systems*

Health outcomes are always better when there is appreciable social support – family, friends, and community (Small, Taft, & Brown, 2011). Haobijam, Sharma, and David (2010) found a positive correlation between social support and a woman's attachment to the unborn baby and her overall health outcome. This explains the importance of the family and social support systems in improving maternal health outcomes.

70% of the literature reviewed shared an equal view that men are important stakeholders in the social support system because they influence women's health-seeking behaviors. WHO (2013) explain that though men are key in the decision-

making behaviors of women they are considered to be vulnerable because they generally do not have the requisite knowledge that will guide them in the decision making process. Strategies, therefore, need to aim at helping men understand the health needs of women as well as being able to identify pregnancy-related complications and the appropriate places to seek help (Raju & Leonard, 2000). Spousal support in maternal health-related issues has been proved by Anyait, Mukanga, Oundo, and Nuwaha (2012) to increase improved maternal health outcomes. Spouses can support in areas such as accompanying their wives for antenatal visits, organizing transportation, providing financial and emotional support.

### *Non - Governmental Organisations (NGO's) And International Partnerships*

The struggle for improved maternal health is a global one and therefore implies that there is a need for international collaborations and support in order to get the desired outcome. Donor agencies, NGOs, and international health providers can act as key players by providing skills, strength and financial support. These notwithstanding, these NGOs and international bodies can act as advocacy groups to create awareness about the menace and in the process hold governments accountable to their obligations.

In 1996, the government of Uganda with support from UNFPA launched the Rural Extended Services and Care for Ultimate Emergency Relief Project to establish an effective referral system. This resulted in a dramatic increase in the number of referrals and improved health seeking behaviors in the country (Murray, Davies, Phiri, & Ahmed, 2001; Starrs, 1998).

## **6.0 Lessons for Ghana – Working towards Achieving Improved Health Outcomes**

The UN target for MDG 5 was to reduce MMR by 75% by 2015. Though a lot of countries made some progress a lot still could not make progress, especially in SSA, including Ghana (WHO, 2015). The review of the literature brought to light that achieving the MDG 5 in these countries was not possible because the approaches were fragmented and did not encourage collaboration between the other sectors that have a direct or indirect link with maternal health. In a nutshell, the various approaches have failed because they lack efficiency innovation and coordination (Dora et al., 2015).

Review of the literature brings to understanding that effective strategies to improve maternal health must have a collaboration and cooperation among all sectors at every stage of the implementation process (Omi, 2007). This lesson can be linked to the Pathways Framework which explains the direct and indirect interconnections between and among maternal health and other sectors. The Framework concludes that for any maternal health strategy to be effective, it should target all the other sectors because they are linked to each other in one way or the other, and their outcomes affect each other.

Another lesson that was identified was that the various strategies so far have paid little attention to the fundamental principles of development. Some of these principles include human rights, poverty reduction, gender equality and empowerment of women and girls. As a result, the strategies only focused on easy-to-reach cohorts of the population without taking extra efforts to eliminate health inequalities and to reach vulnerable and marginalized groups. Inculcating these basic principles of development will ensure equal access to resources and information and an all-inclusive education between the rich and the poor (WHO, 2015). Such an approach will enhance women to be responsible for their own health choices and facilitate them to make informed decisions to improve their health outcomes.

## **7.0 Conclusions and Recommendations**

The review has revealed that success in improving maternal health outcomes depends largely on involvement from all the stakeholders, including the women themselves. The biggest challenge to achieving improved maternal health outcomes is the implementation of programmes and strategies in the face of inadequate resources. This calls for national commitment and immense donor support to implement programmes and strategies on a large scale to be able to observe significant results (Donnay, 2000).

Because Maternal health is a human and social phenomenon, the likelihood of its dynamics changing are very high. For this reason, to ensure effective and sustainable institutional efforts, it is important for measures to be put in place so that research can be carried out on a frequent basis. This will help to always unearth and understand emergent dynamics that affect the phenomena and can have implications for policy.

Frequent and rigorous research through methods like systematic reviews will help to identify strategies that are evidence-based and can help improve maternal health outcomes, instead of just having strategies based on theory, which may not be locally applicable (Miller, Sloan, Winikoff, Langer, & Fikree, 2003). Research can also serve as an informative tool for caregivers and recipients about trending maternal health issues and the best choices to make with regard to choice of care on the part of the recipients.

From the review, the ability for any institution to have an effective intervention is to be able to identify key indicators and targets (Goodburn, 2002). In order to come up with objective indicators, there should be a good information system to produce data. Some of the information systems may be antenatal attendance register, hospital referral records, maternity register, maternity surgery records among many others (Emilia A. Udofia Samuel A. Obed, 2013).

Unfortunately, in most developing counties, there are no such comprehensive data that can help develop such indicators. The data may be inaccurate, nonexhaustive or not available altogether (Nanda et al., 2005). Because the data is not accurate, any indicator that will be made from the data will as well be inaccurate (Abou-Zahr et al., 2003). The review brought to notice that some alternative methods have been



developed to measure maternal health issues as accurately as possible. WHO and UNICEF, for instance, developed a model to measure estimates for maternal mortality. This model uses country data but has adjustments for under-reporting and misrepresentation of data (Abou-Zahr et al., 2003). The flaws identified with these types of models that adjust for data inaccuracies is that they cannot be used for short-term measurements due to the data adjustments.

An important tool for effective institutional support is to be able to monitor and evaluate the progress of the intervention or strategy being implemented by the institution. This will help to identify loopholes that can work against the success of the intervention, as well as strengths that can be an asset to the success of the intervention.

Monitoring and evaluation (M&E) also help programme planners to understand the success of a programme and its actual impact on the survival and health of the woman. For this reason, M&E should not only include data of women who died but rather should include data that interprets the total well being of the woman; causes of death, severe morbidity as well as preventive measures that could have been applied (WHO, 2013).

Sixty Percent (60%) of the literature pinpointed that strategies to improve maternal health outcomes could be more effective if it is complemented with activities that will involve the community through community mobilization and behavior change interventions. The behavior changes should focus on resocialising the community from cultural practices and believes that does not enhance the health of the pregnant woman. When the community is educated and socialized from such believes and practices, it will help improve the maternal health outcomes (Kwast, 1995).

Again, an innovative means to involve the community in improving maternal health outcomes should be to localize technical interventions to suit the community in which the intervention is being implemented. In this way, the people will identify themselves with the intervention, this will make them accept the intervention quickly and be ready to adapt to it more easily. Fishbein (1995) explained further that interventions that inculcate the target behavior changes are very effective in improving health outcomes. When behavior change strategies are well implemented, it empowers the community to take ownership of the desired outcome (Nanda et al., 2005).

An example of interventions and projects that demand community involvement are those supported by international donors. These projects are scheduled within a specific time frame and for that matter, they are time bound. The community must therefore be involved in the implementation process in order for the strategy to be sustained beyond the time limit of the funding agency (Black et al., 2017).

Also, as much as there are recommendations from best practices to achieve improved maternal health, in order for low and middle-income countries like Ghana and other SSA countries to attain significant target levels, their strategies and interventions

should be made to suit their local needs and contexts (WHO, 2014). This will help to achieve strategies that will lead to comparable targets between low, middle and high income countries.

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## ***Toward an Optimal Theory of Translation***

May Al-Shaikhli, Amman Arab University, Jordan

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### **Abstract**

Ambiguity is a natural feature that exists in all languages. Stylistically, it varies in degree from one domain to another. It simply means a state of having more than one possible meaning. Lexical and cultural ambiguities are interrelated phenomenon since lexical ambiguity is sometimes culturally determined. Thus, what is lexically ambiguous in one society may not be such in another. This study will tackle the close relation between language and culture because language reflects the ideas, attitudes and other cultural aspects of a community. In addition to that the lexemes of a language manifest many cultural significant areas whether religious, aesthetic or social etc... This study will focus also on the impact of these two important features (lexical and cultural) on translating English and Arabic texts.

Keywords: Optimal, Translation, culture

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## Theoretical Studies

There are many theories preceded our field. Against the Source-Oriented approaches, there are target-oriented and norm-based descriptive approaches. Focusing on the importance of social constraints, these approaches tried to ignore the translator as thinking being. Thus, social factors are important, but the translators, anonymous though they may be, who make choices and manufacture and decide the result of the translations. Our approach tried to realize how translators achieve their translations.

Pym (1992) describes translation competence as follows: “generating and selecting between alternative texts” This means that translation competence is applicable to intralingual translation, however he but others have approached this matter such as Chesterman (1997) when he pointed out that translation is a “shift” via “strategy”. But this strategy is label to a criticism because it is based on. Ambiguity simply means the state of having more than one possible meaning. This state can be clue to the presence of a certain word in the sentence itself. Moor’s (2000:4) said: “ambiguity occurs when a language element has more than one meaning”.

I go for a run every morning.  
The tail-end batsmen added a single run before lunch.  
The ball player hit a home run.

Saeed says these different meanings of “run” denote ambiguity if each expresses a different sense. If they share the same sense, then “run” is merely vague between these different uses.

Saeed, one the other part distinguishes between vagueness and ambiguity. The context in the example of vagueness “can add information that is not specified in the sense, but in the example of ambiguity the context will cause one of the senses, to be selected (saeed, 1997:61).

Let us have other example. The lexeme ‘العصر’ in the Qur’anic verse  
“والعصر ان الانسان لفي خسر , الا الذين امنوا وعملوا الصالحات وتواصوا بالحق و تواصوا بالصبر  
(سورة العصر: 1-3)

May denote the following senses:

- Afternoon.
- Time (in the general sense).
- Age (or era).
- The afternoon payers (Cited in Ilyes, 1981:174)

This lexeme poses problem for translators. Let us consider the following renderings by different translators from different cultures:

- 1-Sale (1877) (By the afternoon)
- 2-Rodwell (1978) (I swear by the declining day) palmer (1942) (by the afternoon).

- 3-M.Ali (1963) (consider the time).
- 4-Picthall (1982) (by the declining day).
- 5-Bell (1937) (by the afternoon).
- 6-Arberry (1980) (by the afternoon).

Sale adopts sense (1) in his translation, but mentions (2) and (3) as well in his footnote. Rodweel, Palmer, Pickthal, Bell and Arberry opt for option (1). M.Ali employs (2) in his rendering.

The commentators' expositions are different. Katheer and Tabari support sense (2). Zamakhshari

Is in favour of (4). Jalal Al-Deen and Abi Hayyan (cited in Ilyas, 1981:174) mention (1), (2) and (4). Baidhawi mentions (2), (3) and (4). Razi suggests (1), (2), (3) and (4), cited in (Ilyas, 1981:174).

(Frequently abbreviated OT) is a linguistic model proposing that the observed forms of language arise from the interaction between conflicting constraints. Moreover, Optimality theory is usually considered a development of generative grammar, which shares its focus on the investigation of universal principles, linguistic typology and language acquisition (source). It is often called a connectionist theory of language, because it has its roots in neural network research, though the relationship is now largely of historical interest. It arose in part as a successor to the theory of Harmonic Grammar, developed in 1990 by Geraldine Legendre, Yoshiro Miyata and Paul Smolensky.

If we apply all the above mentioned on translation, thus, the input is the text (the translator has to translate) and the process of translating is achieved by evaluating and generating candidates (the generating component produces candidate TTs) and the evaluating component assesses the problem-solution process.

### **Universals and Units of Translation**

Optimality Theory is taken to be universal. Universal of translation can be described usefully on a basic theoretical consideration saying that constraint violation indicates a marked state of affairs. Laviosa (1998:288) stated that universals of translation are "Linguistic features which typically occur in translated rather than original texts and are thought to be independent of the influence of the specific language pairs involved in the process of translation" This description corresponds with the notion of recurrent dominant constraints in this approach. But Laviosa pointed out that these universals are not 100% sure because there seems a certain violability of these universals.

### **The nature of constraints**

The basis for constraints is that faithfulness constraints demand a certain relationship between input and output features, and that markedness constraints demand a certain feature in the output, regardless of whether or not it is present in the input.

Faithfulness constraints clearly prohibit the relationships that Pym identifies between textual quantity and semantic material: deletion, abbreviation, addition and expansion (Pym 1992). It must be noted though that, in context, constraints are violable (to satisfy more highly ranked constraints), and so in effect they keep these relationships under control, ensuring that there is the lowest deletion, addition etc. possible to achieve the TT's aims. Markedness constraints on the other hand, do not explicitly provoke deletion, abbreviation, addition and expansion since these are ST-TT relationships, and markedness constraints take into account not ST features, but rather TT structures.

## Issues

Context is usually classified into two types: linguistic and non-linguistic. The linguistic context or co-text usually refers to sentential relations that help clarifying what is vague or ambiguous. It is defined by Yule (1985:98-9) as the set of other words used in the same phrase or sentence. A familiar example is:

I went to the bank

The meaning of bank can be clarified by adding a phrase like to cash some money.

The meaning of bank can be clarified by adding a phrase like to cash some money.

It seems that Yule is not quite exact in stipulating that such additions appear in the same sentence:

I went to the bank. I was in need of some money.

## A brief case study

Lexical ambiguity has many connotations. As for Katz (1966, 300), it is called (vocabulary ambiguity), while Chomsky (1977:67) it is (idiosyncratic ambiguity)

Saeed (1997:67) also talks about lexical interesting example:

Duffy discovered a mole.

This lexical ambiguity results from the fact the word mole means either (that small animal) or that (dark brown mark on the skin) or (a unit of measurement).

Lexical ambiguity is sometimes culturally determined that is what is lexically ambiguous in one society may not be paid attention to in another society:

He visits his cousin every Friday.

Such a sentence may not an English man to check whether this cousin is male or female. An Arab listener or this sentence on the other hand will not remain quiet: he will try to investigate whether this cousin is male or female and whether he comes through the father or the mother. In other words this type of lexical ambiguity is culture-bound.

Furthermore lexical ambiguity is divided by some scholars like Su (1994:31-2) into categorical lexical ambiguity and pure lexical ambiguity.



The first type occurs when a certain word is used as different parts of speech:

-He will go to Mosul tomorrow.

-He wrote his will yesterday.

Needless to say will is auxiliary in the first sentence and noun in the second sentence.

Pure lexical ambiguity is more semantic than the previous one. It appears when the concerned word function more than once within the same part of speech:

-She spoke about the import of this matter.

This sentence can be distinguished through its context:

A) She spoke about the import of this matter from Japan.

B) She spoke about the import of this matter to our present.

Like the context of situation the concept of lexical field can be helpful in solving the problems of ambiguity to a limited extent at least:

The word peak is lexically ambiguous by itself but it is nearer to summit when we are talking about a hat.

From these entire examples one may realize that lexical ambiguity takes place because certain words in the sentence are either polysemous or homonymous.

Homonymy results in sharper ambiguity than polysemy does. Lexical ambiguity however is either intentional or unintentional. Unintentional ambiguity results from having polysemous or homonymous words quite casually and spontaneously. A pun however is usually intentionally built on lexical ambiguity.

#### Purely technical terms:

| Original                              | Translator (A)   | Translator (B)  | Translator (C)  |
|---------------------------------------|--|---|---|
| (بموجب وكالة)<br>منظمة لدى كاتب العدل | Vide a power of attorney duly regulated by the Notary Public | According to power of attorney authenticated by the Notary Public | According to power of attorney with Bethlehem Notary Public |
| من البناء القائم على قطعة الأرض       | Of the building erected on the plot                          | Of the building instructed on a land piece                        | Of the Building raised on the lot of land                   |
| وقف نوع                               | endowment  | Kind of endowment   | Of type: "endowment"  |
| إبراء ذمة                             | Lessee shall be discharged                                   | The lessee must get a discharge                                   | Discharging the tenant                                      |

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***Equity, Social Justice and Economic Policies (Case of Study: The Taxes Systems)***

Zoheir Tafer, University of Bechar, Algeria  
Mohamed Abbar, University of Bechar, Algeria  
Fadhila Meziane, University of Bechar, Algeria

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**Abstract**

All economic doctrines, ultimately aspire to one thing: reducing inequalities that exist in the population. By doing so, they would enhance the welfare of the most disadvantaged. However, the search for what is referred to as "social justice" or natural equity is often blurred, tedious and sometimes leads to paradoxes and raises many questions: what is the degree of inequality acceptable in a society? From what threshold should we act? And how to do it? Philosophers, sociologists and economists have always tried to answer these questions. They relied on concepts that are in the same time close as different, i.e Equity, Equality and Justice . The paradox is that this attempt to answer the questions has over time resulted in a truncated conception of the problem. The solutions undertaken to reduce social injustices, sometimes, deepen them or create injustices in other respects. The purpose of this paper is to provide a philosophical and sociological reading of some of the key concepts underlying (in theory) policies aimed at establishing social justice, namely horizontal and vertical equity. It will attempt to identify the elements of similarity and dissimilarity and to demonstrate through some practical examples, the paradoxes and dangers that arise from the mixture of concepts. It will also overview the social economic and political consequences of measures taken in the name of a pseudo social justice. It will be concluded by a quite telling case of the taxation system practiced in some countries, especially in Algeria.

Keywords: Equity, Equality, Social Justice, Wealth Redistribution, Taxes, Algeria.

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## Introduction

The word *Fisc* have for origine the Latin word *fiscus* (wicker basket, intended originally for the collection of fugues, and secondarily used to collect money from the tax), the tax is paramount for any country: on the one hand it allows to finance the public and spending projects of General utility and on the other hand, and on the other hand it allows at least in theory to operate a redistribution of wealth. However many are reluctant to carry out tax and more to equate it to a regulated flight, and for good reason, they believe it pays the State a lot and they receive little in return in terms of services and assets public, or else that they work more than others and they pay more than them. In other words, they suffer an injustice in the name of justice, fairness and legality. And even the Government, often use these expressions as synonyms to justify such or such new tax. In fact, taxation has really like sitting his concepts there? These same concepts are really substitutable one for the other? Social justice would not be just a decoy in addition to the hand of politicians to justify more punctures? We will try to answer these questions addressing the following:

- A presentation of the concepts of social justice and law justice;
- Equity equality and points of likeness and unlikeness;
- The object, the goal and the legitimacy of the taxation of the philosophical and economic points of view;
- And finally, we will take as an example the Algerian tax system that we will try to demonstrate through the concrete of the conclusions we have reached previously.

## I. Justice, Social Justice and law

The word *Justice* comes from latin *juice* (right) or *Judicar* (say the right). It designates sometimes the institution in function is to apply the law and sometimes the value that it attaches to the judgment and to laws she expresses a value or an institution. Ulpian is defined as " *a constant and will constantly to each what is due to him* ." Justice is in fact a need for justice that is a fair distribution of resources and equal treatment in the form of rewards or sanctions.

For Plato the right is not morality as for Aristotle in the *Nicomachean Ethics*, the law acquires autonomy of morality as it is not synonymous with justice because it is a moral virtue. Aristotle distinguishes two types of justice, *General Justice* and *Particular Justice* themselves subdivided in *Retroactive Justice* and *Distributive Justice*: *General Justice* is based on the principle that the citizen makes to society what she claims of him, in other words a contribution to the common good. *Retroactive Justice* is to treat everyone the same way finally *Distributive Justice* is equity in the sharing of goods and loads where each receives according to his needs. In summary, the *General Justice* aims to achieve the common good and *Distributive* and *Corrective Justice* in the sharing of the common good (Casteigts, 2012).

Subsequently in justice is in two types: a natural justice arising from the observation of nature is a positive issue justice of the laws enacted by the legislature (Doyon, 1995).

Rawls and in his book *A theory of Justice* (1971), sets out that justice is the fair principles of social organization that would be chosen by citizens called to conform

their conduct if they were placed in a situation which would ensure the impartiality of their judgment. Rawls, an institutional set is just if the rules but are willing to work to the benefit of all the citizens and not a part of it (Spitz, 2011). Finally, for him, the society must be fair (just) before being egalitarian, so he implicitly makes a distinction between equality and equity (La-Philo, .

Social justice is the set of principles that define a division of natural resources or symbolic fairer or more egalitarian five groups to increase not collective well-being and cohesion of the group through an action oriented towards individuals or social groups

Back to Aristotle, he also operates a distinction is made between the particular law and common law: by special law, one that, for every people, has been defined relatively. and this law is sometimes not written, sometimes written; common law it refers to natural law, who relieved of the being of things, that distinguishes right from wrong (Clément, 2011). As for Hobbes his *Leviathan* of 1651, there may be other rights than the law and law is similar to the Act of the legislature.

In modern times, the law in the broad sense, is defined as a normative provision declares and abstract posing a legal rule of mandatory application. In the formal sense, it is a provision taken by a deliberation of the Parliament as opposed to the regulations that is issued by administrative authorities (Braudo, 2001). Moreover the right is defined as the set of the interpretative provisions of directives which at a time and in a particular State, rule the status of persons and property as well as the reports that they maintain (Braudo, 2002).

## II. equity and equality

*Equity* of the Greek *epieikeia*, is a subjective concept that is not associated with any standard but corresponds to the common idea of the sense of justice. It is the character of which is equal, in line with the idea of justice, a natural justice higher than justice determined by Act positive and more flexible than she (Maheu & all, 2017). It allows to legitimize certain social inequality contests are in favour of the most disadvantaged or so-called positive discrimination. Equity is by nature, to correct the law later the inadequacy of this one because of its general nature (da Silveira, 1993). In this regard Aristotle described fairness as follows: “...is to be lenient on human weaknesses, it is considered no law but the legislature, not the letter of law but the spirit of the one who made it, not the action but intend, not the part but all..”. So according to Aristotle, it has aimed to limit the force unfair law, and according to Rawls, equity is to compensate as much as possible all the inequalities of social origin (Pouzin, 2016). Equity and is sometimes considered to be an instrument of a law developed by an aristocratic elite, which is intended to mark the power of judges and sometimes as a legal instrument, stated following the sentencing to death of Socrates by Plato by the democracy and on behalf of the Bill. It was a response to the decline of democracy and the crisis of the Act (Sarfati, 2010). She is also related to natural justice, natural law and natural law, and is so universal and apply to all, and is not a positive law; It is limited in space and time.

As for *equality*, it is in the strict sense, it is an equivalence between two terms or more, rated on a scale of values on criteria of preference, or in simpler terms, equality

and made it not run difference significant or even two substitutable realities to the other (Hutmacher & al, 2001). Go from there; There are several concepts revolving around equality: *legal equality* which is a principle that the prescriptions, defenses and legal penalties are the same for all citizens without exception of birth, status and Fortune (we can talk here as civil equality). *Political equality* is the principle according to which political rights (the right to vote), and the extent of their abilities, accession to public service, rank and dignity belong to all citizens without distinction of class or Fortune, or still *substantive equality*, which is the fact that two or more men have even wealth, same education, same State of health, etc. In this category, it's more equal rights, but equal material kind, in which you can store *the property equality* and *social equality* in a more holistic way (Mercier, 2009).

It is therefore obvious that despite appearances, equity and equality are distinct from the other and cannot replace one with the other: 1 + 1 equals 2, cannot become 1 + 1 is fair at 2!

### **III. The taxation under the gaze of moral philosophy and economic necessity:**

#### **III.1. purpose and goal of the tax:**

Taxes is defined as involuntary fees levied by a government or regional entity there transaction, product or activity in order to finance government expenditures (Encyclopedia.com, 2010).

With the time since has become synonymous with the authority to levy taxes. By extension tax policy taxation and one of the dimensions of the fiscal policy (Kharroubi, 2001). It concerns all the decisions and directions that determine the characteristics of a tax system (Cliche, 2010). The latter is a set formed of three choices a goal, a technique and an organization (Fellah, 2008):

#### **1. Objectives :** actually the objectives are fourfold (Chiha, 2012):

- a. Revenue from tax payers generation.
- b. Redistribution, to reduce inequalities and the equal distribution of utilities by the game of taxes and public spending.
- c. The internalization of externalities, i.e. the use taxes and subsidies to regulate prices and make them more adapted to the reality of the market.
- d. A fourth objective can be the behaviors changes: incentive to consumption or reduction of this one (tobacco, alcohol, etc.), protection of the environment, limitation of birth rate, etc.

#### **2 .Technique:**

it differs according to the overall objective of taxation: If the State promotes social balance (redistribution), he will make sure to soften the tax burden on the low income (exemption, reduction (, abatement at the base, etc.) And impose parallel hard high incomes. But the goal and the economic balance, it will use processes that hit the mass of expenditures and ensures a stable financial performance and constant without taking warned the social consequences (Fellah, 2008).

### 3. Organization:

confuses first the basics of the tax levy (nominal income, transaction, consumer, capital, fortune.), then it is the regulations and legal provisions. Finally it comes to the tax bodies responsible for the collection and recovery of taxes.

### III.2. taxation between theory and practice:

Tax system generally use generally three tax bases: income, expenditures, heritage, and aspire to work according to what is meant by horizontal equity and vertical equity. Horizontal equity assumes equality before sampling, in the sense that has equal ability to pay, a tax levy equal (same income, same tax). Vertical fairness she expresses the contributory differentiation: has unmatched ability we pay differently (they pay according to their income, the more it more we pay more).

The degree of appreciation of the idea of tax levy differs from one society to another, and from one era to another. The legitimacy of the tax system is to make the levy is a way to bulk of public funding, whether compensation directly or indirectly of the services rendered by the State, but who must respect the principle of equivalence between services renderings and samples collected. This argument of the legitimacy of the tax system is actually that of economic efficiency: the situation where some people cannot be made better off by reallocating the resources or goods, without making others worse off (businessdictionary.com, 2011). Second current is also trying to legitimize taxation is based on the principle contributory itself based on the principle of equity, which boils down to the following questions: how to fairly distribute the tax burden between citizens? Thus a separation is made between the tax system and the public user: is not he who uses the services most who pays the most, but the one who wins the most.

Back by economic efficiency: the latter means also that samples should interfere as little as possible with the system otherwise it prices, will cause either inflation is therefore a reduction of purchasing power, called in this case a tax distortion, is a decline in corporate profits and therefore less investment, less work created, etc.

Of what came before we come to the following conclusions:

- According to the theoretical background that governs taxation, it assimilates sometimes more in compensation for the benefit of the State of a redistribution for the benefit of the less fortunate: who wins the most pay the most but really uses the services provided by the State than others? In other words this vision is certainly fair to the poor but it isn't towards the rich.
- It is clear that it is illusory to reconcile these two objectives (economic efficiency and contributory principle or equitable redistribution) they are contradictory by their very nature or at least not the consequences she generate. VAT is a striking example: she bails out of Treasury funds but is also seen as a reduction in the purchasing power that can be quite substantial if we do the sum of the VAT that consumers must pay each of their purchases.
- The principle of equivalence room tax system hinge problem in practice: here there is a confusion between the concept of equality and fairness: horizontal equity is more

similar to equality as we the defined above while vertical equity is more akin to the concept of equity in the proper sense of the term. But the concept of equality extolled by the defender of excessive taxation, is inadequate in this case, because people who receive the same income do not necessarily have the same loads, the same needs, the same characteristics in other words the same capabilities. It is because of a fairness confused with equality that unfairness is committed.

- In addition, and since the idea of taxation depends among others on philosophical precepts, it would make sense to deal with the issues that revolve around it through the prism of philosophy: the tax rules in practice are established on the basis of descriptive elements: such category, or such person such position, or who is suffering from such infirmity, which must pay such tax rates, leading to "tax standards".. This is perfect against a law the most important philosophical: the law of Hume, impossible to infer a normative conclusion from a set of descriptive beginnings. Finally, laws and tax provisions are proposed by the competent authorities, in this case the Department of finance, to the Parliament for adoption however the parliamentarians have the knowledge required to discuss all the laws very techniques? They have enough data to judge their relevance? Will they be evidence of objectivity? Equity or equality? One of the most striking examples, and the tax on capital in Algeria to which we will return later.

- There is also the presence of horizontal equity in restorative justice and vertical equity in distributive justice. It's like saying that taxation is based on the notion of justice as reported by Aristotle. A finer analysis also allows to conclude that tax laws are ultimately a result transcript of justice known as positive, while they are based as mentioned on from concepts of Justice Aristotelian principles but also of Social Justice. This which may explain the impossibility of reconciling economic efficiency and social justice in a taxes system.

#### **IV. The Inequity of the Algerian tax system**

To further illustrate the previous findings, we will take as the Algerian tax system. Without going into the details we will focus on the common elements of this system with other systems around the world already that the basic principles are almost identical and the differences are only the tax rates and in some cases the categories subject to the tax.

##### **a. VAT**

Outside the VAT included in the price of the final goods and services, VAT applies to the operations of an industrial, commercial or artisanal activity carried out by a taxable person on a regular or occasional basis. A striking example is that of the automotive industry in Algeria: in recent years several international firms like Renault, Volkswagen or Hyundai settled in Algeria. In order to encourage foreign investment the State had decided to exonerate them of VAT. In theory this would have resulted in affordable for ordinary citizens however it turned out that prices of cars out of its factories are still more expensive than those imported from abroad, a flagrant case of unfairness, insofar as the wealthy investors indirectly appropriating what needed to go back to citizens in the form of lower prices. This situation has led to the launch of a campaign to boycott these cars under the slogan "let the rust"



widely followed by the Algerian population. In the face of this injustice, the 2018 complementary finance law will force these firms to pay 19% VAT, however investors have threatened to postpone on prices. With or without VAT it is the consumer who will pay for the consequences of these ill-considered measures so boycott campaign might take more size and cause the long term of the plants and so thousands of jobs lost.

### **b. Income tax**

Which is the tax on the total income and who comes third in terms of tax revenue after oil tax and VAT. In Algeria the income tax is withholding so picked directly from the salary and went on a sliding scale:

**Table 1: Rate of Income Tax in Algeria in 2018.**

| <i>Annual salary</i>          | <i>Rate of I.T</i> |
|-------------------------------|--------------------|
| < 120,000 DA                  | 0%                 |
| 120 001 to 360 000 DA         | 20%                |
| Of 360 001 DA to 1 440 000 DA | 30%                |
| > 1 440 000 DA                | 35%                |

Source: MFDG, Algeria, 2018

Are exempt from tax volunteers, unemployment benefits, severance pay, among other foreigners. However if we take for example the second category that pays 20% so someone who perceives 360,000 DA and subject to the same rate as someone who sees 3 times less the salary (120,000 DA). Similarly, an annual salary of 1,440,000 DA per year, 4 times higher than 360,000 DA and subject to the same rate of 30%. A more telling example: someone who sees 1,440,000 DA per year pays a tax on the income of 430,000 DA, and someone who sees 360,000 DA pays only 72,000 DA, in other term, the first win 4 times more than the second but pays in WRI 6 times more! He is a committed against iniquity who receive high salaries, and in theories of individuals with heavy loads... it's like it encouraged people to pay less tax or to do less work, and if it wasn't a levy at the base, it would encourage misrepresentation, tax evasion and tax exile... too much taxes kills tax.

### **c. The wealth tax**

The 2018 wanted a Finance Bill will introduce a tax on fortune by defining the type of subject heritage, the scale and the destination of the revenue from this tax. Heritage subject to this tax must have a value greater than 50 million of DA (a little more than 300,000 euros). However the National Assembly through its Finance Committee, and Algerian rejected bill following the intervention of employers and wealthy personalities, several have member status. Politics and business don't mix, because those who have the money have the power to weaken the Government by imposing only the rules that manage them. What then if it are the same ones that amending the laws? Welcome to the third world!

#### ***d. Tax abatement***

Article 66 of the code of taxes benefits certain categories of tax abatement between 12,000 and 18,000 DA per year (57 and 85 euros), are between 1,000 and 1,500 DA per month (5 to 7 euros). Which is paltry as long as the minimum wage in Algeria and 18,000 per month! In other words a reduction equal to its peak in the 10e of the SMIC for the benefit of people already in physical situation precarious.

#### **Conclusion**

*« We find happiness by looking at equity »*

The inscription engraved on the tomb of the Egyptian Priest Ptosiris, 300 - BC.

No one disputes the need for taxation and social economic interest. But it would be illusory to believe that she has for goal the realization of a utopian, and equity even more dangerous to hide behind these concepts of Honourable equality and social justice to justify economic policies inefficient and failures of officials, unable to improve the quality of life of citizens otherwise than on taking their pockets, made there could be social contract if trust is lacking between Governor and governed, there is no y have confidence without honesty both practices than speeches.

It is clear that the tax system as it is thought today is based in theory on the idea of close justice that Rawls. But on paper, it is more akin to the utilitarian view of justice, where the purpose of the institution and the consequences of his actions are the maximization of satisfaction or the overall utility average society (to the greatest happiness of the greatest "number), even if it means sacrificing the rights of marginal categories if it is in the interest of the greatest number. While in practice it oscillates between two visions, he tried to reconcile no matter what they are by nature irreconcilable; the moment that one aspires to strengthen the cohesion of the group, and the second is by its very nature, likely to create ditches between the members of the group, and to expand existing ones between the different groups. In the light of these elements, it would therefore appear that more sensible to establish the rules of taxation according to the theory of the capabilities to Sen, which is based on the premise that the disparities between individuals as equal amounts proposed to different individuals don't not provide the same satisfaction, so the capability or the ability to achieve the goal, it was she who should be placed so that the distribution of taxation to reach may not the fairness perfect, but at least a State better than the one that currently exists.

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**Contact email:** Tafer Zoheir: zedtaf@gmail.com  
Abbar Mohamed: abbar\_mohamed@yahoo.fr  
Mme. Meziane Fadhila: meziane.fadhila@gmail.com

***Restructuring of the System of Storage and Dispatch of Portuguese Air Force  
(PAF) Material***

José Miguel Aragão Celestino Soares, Universidade de Lisboa, Portugal  
Fernanda Maria de Almeida Santos Mendes, European University/Laureate  
International Universities, Portugal

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**Abstract**

Given the current economic conjuncture, organizations have the need to become more flexible and to follow more efficient practices, in order to adapt to this new environment and take advantage of their available resources. The Portuguese Air Force (PAF) is aware that the logistic component is crucial to improve effectiveness in its mission accomplishment. The objective of this work is to analyze the warehouse system, the reception and expedition of material, and to study solutions based on new technologies, in order to outline procedures based on new tools capable to adapt to the integrated system already implemented. In fact, the PAF has already some tools that allow for implementing a computerization of these tasks, namely the warehouse management system, which is currently being implemented at the *Depósito Geral de Material* of the PAF. This work proposes the adoption of a centralized acquisition system in order to restrict the number of procedures carried out, and the variety of items acquired. In addition, it also proposes the use of the tool SAPConsole in order to make possible the reception and expedition of materials using bar code scanners. With the proposed improvements, the current procedures of the warehouse system will be more efficient, leading to lower costs and a better use of the available resources.

Keywords: Logistics, Warehouse Management, Centralized Acquisitions, Bar Code, Portuguese Air Force

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## Introduction

The Portuguese Air Force (PAF) was created on July 1, 1952, constituting itself as an independent branch, together with the Army and the Navy and integrating the aviation incorporated in those branches. It is a constituting part of the national forces system and its mission is to cooperate, in an integrated way, in the military defense of the Republic, through air operations, and in the air defense of the national space. It is also responsible for the fulfillment of missions in the framework of international commitments, as well as for missions of public interest specifically assigned to it.

The Air Force Logistics Command is one of the bodies belonging to its structure, having the mission of managing the Air Force's material resources, information systems and infrastructures. It has under its jurisdiction the General Deposit of Material of the Air Force, which, in turn, has the mission of receiving, storing and distributing the material subject to centralized management.

The logistics component is decisive for increasing the efficiency in the fulfillment of the mission, contributing to the activities of maintenance and sustenance of aircrafts, to the effort made in the multiple logistical aspects that cover the conservation of goods, fuels, food, clothing, and the acquisition of diverse material for services operation.

The PAF is aware of the need to modernize its weapons and equipment systems and, in this sense, has been developing programs that require a rational management of its human and material resources. There are areas where this evolution has been faster, among them the logistics area, where there has been a significant evolution in the last decade, especially with the implementation of the Integrated Management System (IMS), which provided the PAF with a system of integrated provisioning, providing an increasingly dynamic response both in terms of time and in terms of rigor.

However, the implementation of the IMS alone did not make the tasks of the logistical process fully computerized, and there were still some gaps in this regard. The Organization is facing a problem that needs to be solved in order to adapt its logistics system to new management concepts, supported by new technologies, thus enabling a timely and safe response to the problems that have arisen.

Based on this scenario, it becomes increasingly urgent to adopt new management methods that allow greater optimization of existing resources. Recognizing that existing procedures, methods, and circuits, are out of step with the current reality, the Organization considered necessary, and appropriate, to study solutions based on new technologies that enable PAF's Supply to be effective and efficient, in order to contribute to the total fulfillment of its mission.

The objective of this work is to analyze the current PAF supply system and to study solutions based on new technologies, in terms of storage, in order to delineate procedures based on new tools that adapt to the integrated system already implemented.

Because it is impossible to study the whole Organization, it was decided to analyze a small part of the Supply System, namely Storage and Material Expedition, taking as a

reference the procedure adopted in the GDMPAF (General Deposit of Material of the Portuguese Air Force). However, the solution found for the GDMPAF could be adopted by the existing warehouses in the various units of the PAF, since the procedures are overall identical.

## **Literature review and research questions**

### **Logistics**

Long before the businessperson realized the size and centrality of logistics in the business world, the military strategist already used it to move armies (Carvalho, 2017).

The wars were long and distant, requiring constant displacement of resources. In order to transport troops, arms and war cars to combat sites, it was necessary to plan, organize and carry out logistical tasks, which involved the definition of a route, not always the shortest one, as it was necessary to have a source of nearby drinking water, transport, storage and distribution of equipment and materials (Dias, 2005).

At the corporate level, logistics became more pronounced at the end of the 19th century, having undergone several changes in its context up to the present day. Nowadays, it assumes a fundamental role in the business environment, as it allows companies to obtain competitive advantages and enables the increase of their productivity as well as their profitability (Carvalho, Vilas-Boas & Neill, 2014; Soares & Mendes, 2016).

Briefly, logistics is the process of managing the flow of products, services and information, between suppliers and customers or vice versa, bringing customers, wherever they are, to the products and services they need, under the best conditions (Ballou, 2004; Moura, 2006).

### **Location of Warehouses**

The location of factories, points of sale, warehouses or other infrastructures can be calculated using very similar methods and, in all cases, an optimal location implies minimizing transport costs, and at the same time the cost of construction or rental of the infrastructure (Carvalho, 2017).

In order to obtain an optimal location, formulations that imply greater centrality to the sales outlets, or customers they serve, should be used, and should not be dependent on marketing principles. It is important to do a cost/service sensitivity analysis to decide the location of a storage facility.

Next, only two localization methodologies will be presented, one using a gravitational modeling (gravitational model), the other using a detailed analysis of weighted costs in relation to the location alternatives (scores model) (Carvalho, 2017).

### Gravitational Model

Technique used to locate individual installations, such as storage. It considers only as starting data the locations of existing facilities and the volume of goods to be transported. The center of gravity is determined by calculating the 'x' and 'y' coordinates that minimize the associated transport costs (Carvalho, 2017).

$$C_x = \frac{\sum d_{ix} V_i}{\sum V_i} \quad \text{and} \quad C_y = \frac{\sum d_{iy} V_i}{\sum V_i}$$

Being:

$C_x$  – Coordinate x of the center of gravity;

$C_y$  – Coordinate y of the center of gravity;

$d_{ix}$  – Coordinate x of the existing i-th installation;

$d_{iy}$  – Coordinate y of the existing i-th installation;

$V_i$  – volume of goods transported to or from the ith facility.

### Scores Models

These models allow taking into account other costs, or other factors, that may be relevant to deciding what is the best option concerning the location of the warehouse. They can take two distinct forms, the additive model and the multiplicative model (Carvalho, 2017).

The additive model is calculated as follows:

$$S_j = \sum_{i=1}^m W_i F_{ij}$$

Being:

$S_j$  – total score for location j;

$W_i$  – total weight for factor i (in %);

$F_{ij}$  – score for factor i at location j;

n – number of locations;

m – number of factors.



The multiplicative model is calculated as follows:

$$S_j = \prod_{i=1}^m F_{ij}^{w_i}$$

Where the variables have the same meaning as those of the additive model.

### Warehouse Layout

A well-structured warehouse with a coherently defined layout can lead to significant reductions in operating costs and process agility. There are several important things to consider when organizing a warehouse layout, namely:

- the popularity of articles, where those with the highest number of inbound and outbound transactions must be stored in places such that the distances to be made are minimized;
- the similarity, which is justified by the fact that the products received and / or sent together should be stored together;
- their size, where products should be stored in appropriate spaces according to their dimensions.

According to Carvalho (2017), we can have two types of warehouses (Figures 1 and 2):

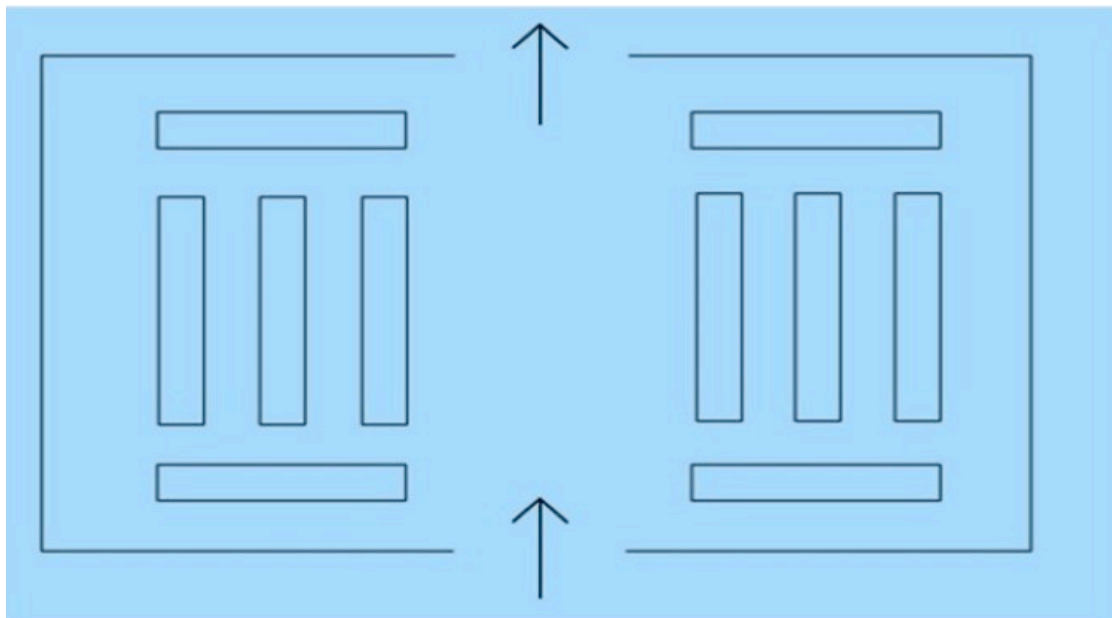


Figure 1 - Broken flow or U-shaped warehouse  
Source: Carvalho (2017)

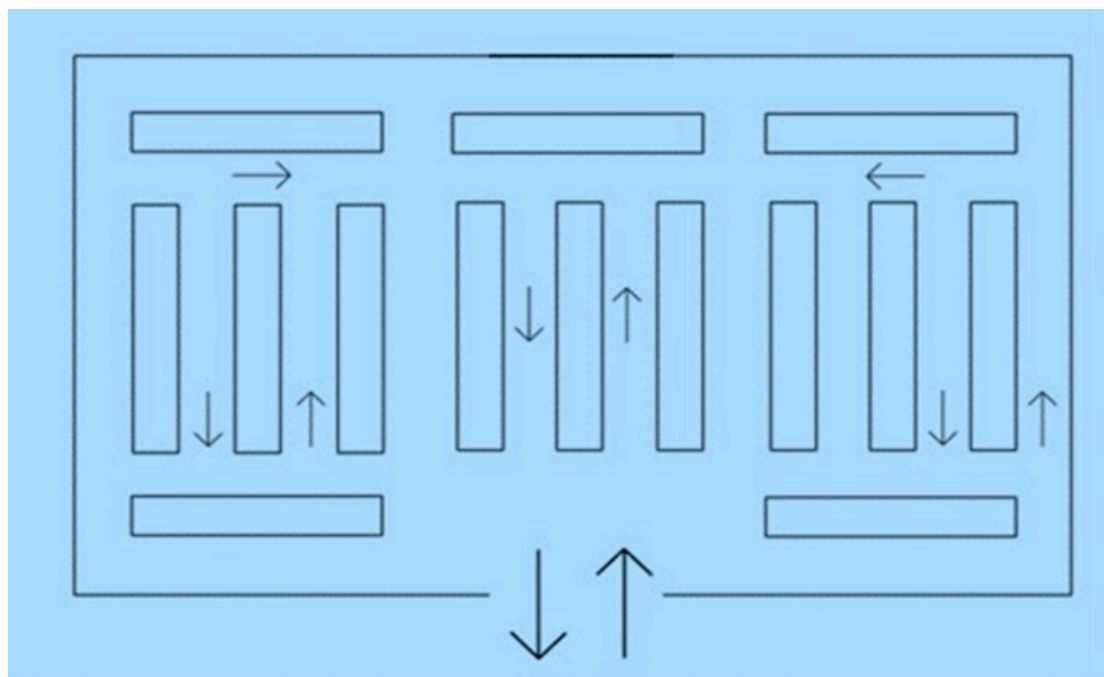


Figure 2 – Directed flow warehouse  
Source: Carvalho (2017)

These two models provide different ways of accommodating the materials, and though shelves are the most used form, there are other forms, such as floor marking. The advantages and disadvantages of each criterion and its application depend on a case-by-case basis, always aiming to achieve greater cost reduction and greater efficiency. According to Carvalho (2017), an ideal warehouse is one in which the distances are reduced and where the access of vehicles to the proper areas for products / materials of greater use are facilitated.

### Stock Management

Nowadays, for those in charge of companies, strict control of all logistics activity is essential. Stock management is included in this area and, if carried out in the best way, greatly contributes to the profitability of a company.

A stock is a forecast of products intended for consumption and must be able to respond to customer orders in an economic manner. However, there are costs associated with it, such as order processing costs, stock carrying costs and stockout expenses. In order to achieve a good stock management, it is necessary to minimize these three categories of expenditure (Zermati, 2000).

Despite its disadvantages, a stock is useful, but it has a very high associated cost, so it is advisable to manage it well, in order to use it as efficiently as possible (Bertaglia, 2016).

Today, storage requires much more than simple automated procedures; it needs information systems that allow quick and intelligent decisions (Banzato, 1998; Guarnieri, Chrusciack, Oliveira, Hatakeyama & Scandelari, 2006).

According to Chopra and Meindl (2016) information technology systems (IT) are very important at all stages of the logistics chain, because they allow companies to gather and analyze all the information they have.

ERP (Enterprise Resource Planning) systems have as antecedents the MRP and DRP systems, developed in the 60s and 70s of the last century, and provide information on the overall activities of organizations. ERP allows appropriate and timely decision making at different management levels, overcoming the limitations of traditional applications (financial management, human resources management and others), each with its own software and databases, which are sometimes incompatible (Moura, 2006).

The existence of a common database is one of the most important aspects of ERP systems, as it ensures the consistency and comparison of data regardless its origin, eliminating bureaucracy, repetition and redundancy of operations (Alves & Silva, 2001).

## **Transport**

Ballou (2004) considers that, in terms of costs, physical distribution is, for most companies, the most important activity, accounting for about two thirds of logistics costs.

Transportation is the operational part of logistics that geographically moves the goods. Due to its fundamental importance and the associated cost, transportation has deserved considerable attention from companies' managers. Transportation needs can be essentially satisfied in three different ways:

- a company's own fleet;
- contracts establish with transportation companies;
- the contracting of several companies, which offer different transport services, which can serve the contracting company more efficiently when combined.

From the point of view of the logistics system, there are three fundamental factors for transportation performance: cost, speed and consistency (Bowersox, Closs & Cooper, 2010).

## **Research questions**

Therefore, the objective of this work is to analyze the warehouse system, the reception and expedition of material, and to study solutions based on new technologies, in order to outline procedures based on new tools capable to adapt to the integrated system already implemented, and one can now present the two research questions of this study:

- To what extent is it possible to improve GDMPAF warehouse management, in particular the tasks of receiving and shipping material?

- How should the PAF reduce the number of articles acquired in order to make its cataloging feasible?

## Methodology

In this work, the research method presented by Macedo, Zacarias and Tribolet (2005) was used, being composed of three stages: first, the purpose and orientation of the investigation is defined, then the method of collecting data and, lastly, the technique applied in the analysis and treatment of the data collected in the previous stage is defined.

These stages do not translate into a complete investigation process, but merely an interaction of a research process. In practice, an investigation process is characterized by being incremental, as shown in Figure 3.

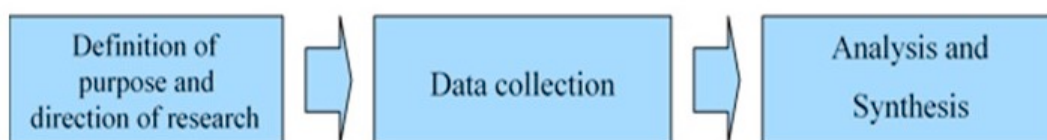


Figure 3 – Stages of a Research Methodology  
Source: Macedo et al., (2005)

Despite the existence of three interactions in the method just presented, in the current work only the first two were performed, as it was not carried out the validation of the obtained results, nor the change to the informational model.

**1<sup>st</sup> Interaction** - Definition of the question to be answered during the investigation process.

**Step 1** - Definition of the general scope and methodology.

Assumptions defined at the beginning of this paper:

1. Area of study: Logistics Chain Management.
2. Element of study: General Deposit of Material of the Portuguese Air Force.
3. Initial focus: Receiving and shipping material in a warehouse.

**Step 2** - Data collection.

1. Bibliographic research in the area of Logistics to make the theoretical framework of the study. Applied technique: Documentation analysis.
2. Collection of information about the Organization, including the mode of operation and the procedures used in the reception and dispatch tasks in the warehouse, in order to obtain more detailed information about the object under study. Applied technique: Analysis of documentation and observation.

3. Research of ERP tools, in order to determine which is best suited to achieve the proposed goal. Applied technique: Documentation analysis.

### **Step 3 - Analysis and Synthesis.**

With the analysis of the information and documents collected in the Organization, the following problems and issues are analyzed:

1. The Organization under study has very bureaucratic procedures, which limits the implementation of new methods.
2. The procedures for receiving and shipping material are carried out manually.
3. The purchasing system is decentralized, which implies the need for a greater number of human and material resources.
4. Lack of articles' cataloging, which makes it impossible to manage them automatically.
5. How can the method of receiving and shipping material be improved?

## **2<sup>nd</sup> Interaction – Execution of operational objectives.**

### **Step 1 - Definition of the operational objectives of the work.**

Once the problems are presented and the questions asked, it is necessary to specify the objectives that allow us to answer the main question of the present work, which are the following:

1. Adoption by the Organization of a system of centralized purchasing, in order to restrict the number of procedures performed, as well as the variety of items purchased.
2. Use of the SAPConsole tool in order to receive and dispatch material using optical barcode readers.

### **Step 2 - Data collection for the execution of the main objectives.**

Collection of data on the Organization, including more detailed information on the supply circuit, mainly on the procedures performed in the reception and dispatch of material. Obtaining this information was done in manuals issued by the organization, as well as with the persons responsible for the areas under study. Techniques used: Analysis of documentation and observation.

More detailed search of the SAP tools in the area of Logistics, namely at the level of warehouse management.

**Step 3** - Analysis of the collected data and proposal of a possible solution to the problems under study allowed to identify the main gaps in the supply circuit in what concerns the reception and dispatch of materials. This work aims to propose new methods for current procedures, in order to streamline processes and obtain accurate information in real time.

## Results analysis and discussion

### Location of the central warehouse

The PAF already has its own infrastructure, located in Alverca, with the capacity and means to ensure the functions assigned to a central warehouse. However, with the application of one of the methods mentioned in the literature review, it was intended to verify if this is a viable solution to remain as a logistics platform, in order to minimize transport costs, or if it would be more advantageous to think of an alternative location.

At the time of data collection to perform the calculations, it was found that it would not be possible to carry out this study, since the PAF does not have records of the quantities of material that are transported by the GDMPAF to the different Units, or vice versa.

With this limitation, it was accepted in a simplified way that the central location of the GDMPAF, in relation to the other PAF Units, is a good option for the Organization as a logistical base, as can be seen in Figure 4.

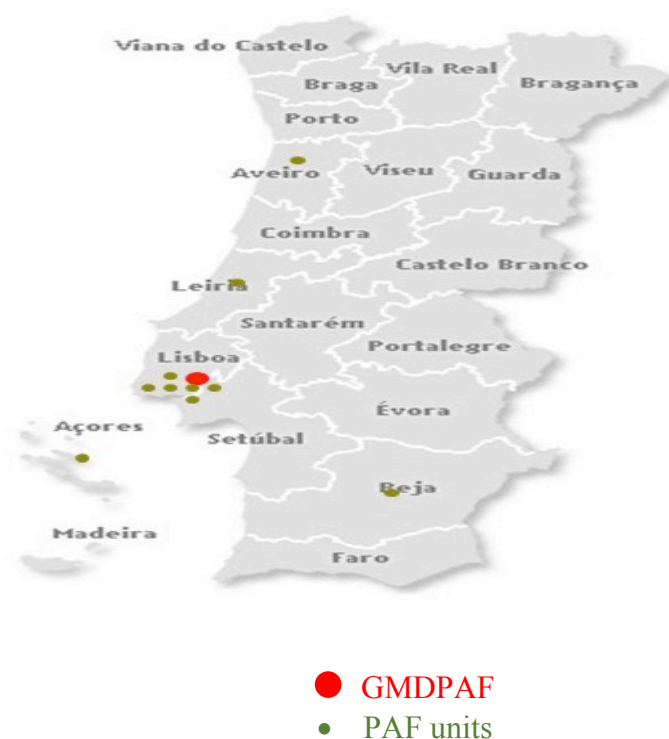


Figure 4 – Location of GDMPAF  
Source: Authors

## Current layout of warehouses

Currently the GDMPAF has 11 warehouses with a storage capacity of 2,000m<sup>2</sup> each. The layout used in the PAF warehouses continues to be the one foreseen in RFA 415-1 (B) - RAMFA, whose last version dates from 1994 (RFA 415-1 (B), 1994), according to Figure 5.

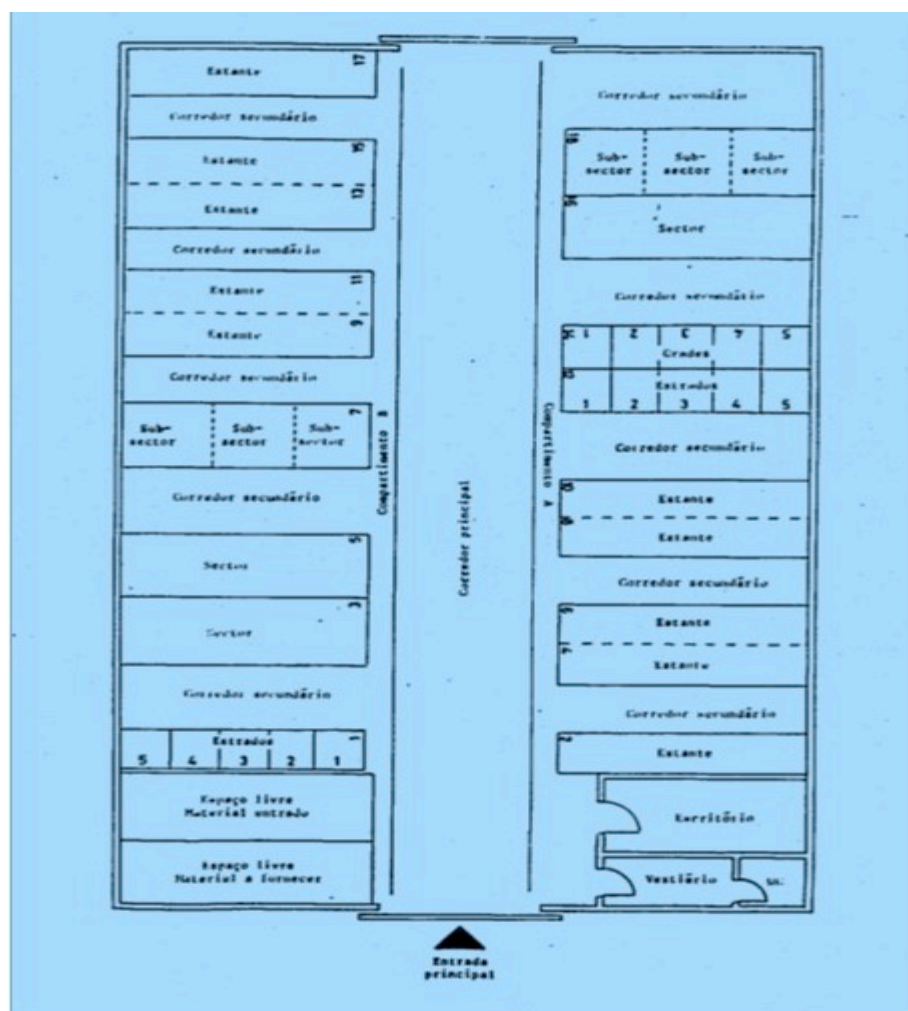


Figure 5 – Example of compartmentalization of a warehouse  
Source: RFA 415-1 (B), (1994)

## Solution to reorganize the current layout of warehouse

The layout currently used is provided in RAMFA dated March 1994, so it is easy to see that it is already outdated.

This layout has several shortcomings and is not in line with the efficiency requirements that are currently required. PAF has already realized these constraints and is currently testing alternatives to this layout, in order to make it more efficient in the handling of materials.

The most obvious change is the way the shelves are arranged in the warehouse. Instead of a main corridor and several secondary corridors in which the shelves are arranged perpendicular to the main corridor, the proposed solution is one with several corridors along the warehouse in which the shelves are placed parallel to these corridors, thereby facilitating the movement of people and materials (Figure 6).

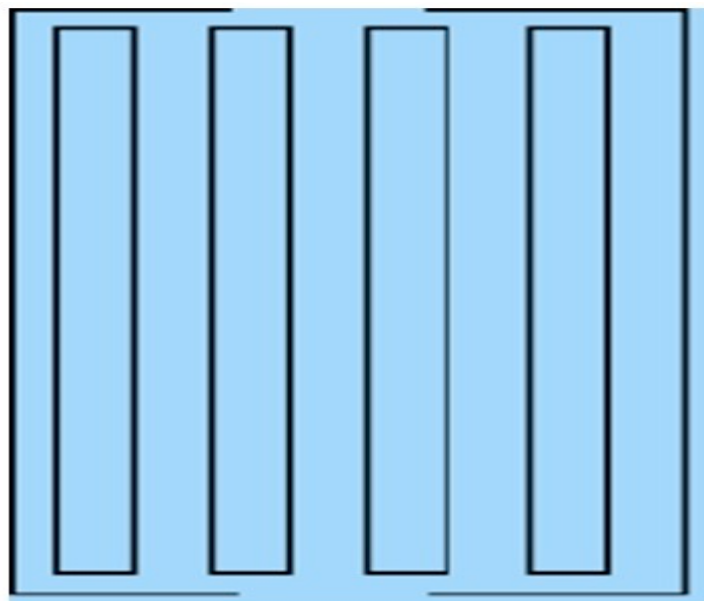


Figure 6 – Example of a new compartmentalization of a warehouse

Source: Authors

With this new organization of space, it becomes easier to access people and machines throughout the warehouse. It is also possible to gain storage capacity, as the area of the placed shelves is slightly higher than it previously was.

### **Warehouses and Stock Management Systems**

The profitability of the space in a warehouse, the management of stocks, and the quality in the service provided, are factors that influence companies to invest more and more on technology and computer solutions.

A warehouse management system allows to optimize processes, to monetize available space and to perform a better inventory control, that is, it is an information system that plans, schedules and controls all the operations carried out in a warehouse.

The GDMPAF, through the Supply Group, is responsible for receiving, storing and distributing to all Units Air Force material subject to centralized management.

In GDMPAF, material shipment occurs when there is an order for material by a unit or service. Currently, the counting and insertion of data in the GIS is done manually, whereby a delivery note that accompanies the material to the destination Unit is automatically created.

By the end of 2010, the PAF had only the SAP R/3 system with the Sales and Distribution (SD) and Materials Management (MM) modules for purchasing and sales



control, as well as warehouse and stock management. In this way, the management of materials is carried out in a non-automatic way.

This situation presents several obstacles in stock management, namely in the entry, transfer and dispatch of material, which are carried out a posteriori and manually. Consequently, there is no real-time information, and there will be a greater probability of errors occurring when the operators enter the information.

The PAF started the implementation of the GIS project, which aims to operationalize a computer system in the SAP environment. This project uses a common technology platform (ERP), which allows for the standardization of financial, logistical and human resources processes, according to the best practices recognized for each area. This ensures reliable, timely, aggregated and comparable information for use at the various levels of responsibility of the Defense Bodies, and at the same time inducing a significant reduction in IT costs.

Initially it was defined that its implementation would be carried out for all areas simultaneously (financial area, logistics and human resources in all National Defense agencies, within a year). However, the adoption of unique and cross-organizational processes could not be carried out as planned because of the lack of objective conditions of both the agencies and the project itself.

The complexity of the project led to the adoption of a new phased implementation strategy, taking into account the different realities and degrees of preparation of the involved organisms. This situation has also occurred in all the countries whose Armed Forces have implemented ERP, since the strategy has always been implemented in stages, proceeding prudently to the next phase only when the previous phase is properly consolidated.

### **Conclusions and recommendations**

The Portuguese Air Force is becoming increasingly aware of the need to minimize costs and to monetize the means at its disposal. Due to this fact, it is important to adopt tools that are capable of responding to the needs of the Organization in what concerns the reception and dispatch of material, in order to make this procedure more efficient and with a lower cost.

At the time of data collection, a number of procedures and tasks that could be improved were identified, and with which the Organization does not need to spend much more resources than it currently uses. In some cases, it may even reduce the operating costs, even if some initial investment is necessary, and the gain may be obtained in the short term.

The PAF has already a large part of the tools that will enable it to perform a computerization of the tasks of reception and dispatch, namely the Warehouse Management (WM) system, which allows it to perform a more efficient warehouse management.

As a response to the first research question, it is proposed the acquisition of the SAPConsole tool, thus making it possible to perform the tasks of receiving and

dispatch in a more efficient and cheaper way, allowing making resources profitable and facilitating the performance of the PAF mission.

However, in order for the PAF to take full advantage of this new tool, it would be necessary to implement the WM component with SAPConsole, thus enabling the automation of the entire logistic process as well as the optimization of the warehouses. The interaction between the WM modules and the SAPConsole makes it possible to perform all processes in real time and allows achieving improvements in various tasks and processes.

With this system, it is possible to receive material automatically, through the optical reading of the bar code issued by SAP, as well as the transfer between warehouses, shipping, and inventories, or even thrashing and returns.

The implementation of this system also makes it possible to assure greater autonomy of warehouse operators, using terminals that, through bar code readers, can exchange information with the central system in real time.

Concerning the second question, it is recommended that the PAF adopt a centralized purchasing service, considering all its advantages and limitations presented throughout this work.

With the centralization of purchases, the PAF is able to reduce the number of procedures performed, and it also manages to reduce the number of certificates and digital signatures required. It also reduces the diversity of the acquired goods, facilitating their processing and cataloging at the level of Supply, and enabling the implementation of an automatic warehouse management system.

The creation of a central department responsible for all PAF's acquisitions could have its advantages not only in reducing costs but also in the centralization and rationalization of competences by those responsible for purchases.

With the use of the GDMPAF as a central warehouse and the warehouses of the remaining PAF's units as peripheral warehouses, the introduction of an article identification system through the optical reading of the bar codes allows to obtain a solution that completely changes the logistics process implemented by the PAF.

This solution allows the simplification of tasks, minimizing the use of paper and, consequently, reducing bureaucratic processes, as well as the costs with personnel. With the computerized tasks and the automation of procedures there is also a reduction of errors in data entry, which contributes to increase the efficiency of the logistical process, allowing several tasks to be carried out in a more agile and centralized way.

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**Contact email:** [josesoares@iseg.ulisboa.pt](mailto:josesoares@iseg.ulisboa.pt)

***Bureaucracy of Power-Dependence in Domestic Politics, and Diplomacy of Linkage, Interdependence and Soft Law Between U.S., U.K., EU and Japan***

Yoshihiro Nagata, Nagoya University, Japan

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**Abstract**

This paper investigates the Bureaucracy of Power-Dependence in Domestic Politics and Diplomacy of Linkage, Interdependence and Soft Law between U.S., U.K., EU and Japan. This paper consists of three parts. First, this paper explores the similarity of power-dependence in domestic politics and interdependence in diplomacy. I consider the power-dependence theory in central-local government relations by Rhodes and the interdependence theory in international relations by Nye and Keohane have common factors. The power-dependence is political dependence between central government, bureaucracy, interest groups and local government in common regime. Interdependence is mutual dependence relations between different regimes. Second, this paper investigates the role of bureaucracy and central government which coordinate the politicians, Diet, parties and local government. In negotiating Japan-EU Economic Partnership Agreement, EU and Japan has agreed on July 2017. Negotiations are determined by not only central government and bureaucracy, but also politicians and interest groups. Japan central government and bureaucracy have difficulty in coordinating the demand from the domestic politicians and interest groups who have influenced politicians. Third, this paper investigates linkage, interdependence and soft law between U.S., U.K., EU and Japan. The relations between U.S., U.K., EU and Japan become stronger. The partnership between U.S., U.K., EU and Japan includes Soft Law. This paper investigates the degree of linkage and interdependence between U.S., U.K., EU and Japan.

Keywords: Bureaucracy, Power-Dependence, Interdependence, Linkage, Soft Law, Domestic Politics, Diplomacy

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## Introduction

I investigate how bureaucracy coordinate power-dependence of domestic politics, and how bureaucracy and government strengthen U.S.-UK-EU-France-Austria-Japan relations.

I hope U.S.-UK-EU-France-Austria-Japan Interdependence, Linkage become stronger.

## Power-Dependence of Intergovernmental Relations and Interdependence of International Relations

I consider power-dependence theory and interdependence theory have similarity and common factors.

I describe my idea of comparison between power-dependence and interdependence.

First, actors of the power-dependence are organizations composed of the central government and local governments within the same regime of the state but different evaluation systems, while actors of the interdependence are states some of which belong to one regime but the other of which belong to different regime. The legislative rule in the power-dependence relations is the statute and common law, while the legislative rules in the interdependence relations are the international law including treaty and soft law, especially manipulating on the balance of power and collective security. Second, common factors between the power-dependence theory and the interdependence theory are linkage, asymmetry and cost of change. Concept of the linkage is essential both in the power-dependence in the intergovernmental relations and the interdependence in the international relations. The power-dependence itself is the concept of linkage between the central government and community of the local authorities. In the framework of the power-dependence in the UK there exist four kinds of linkages. Example of the linkage between the national government environment and the national local government system is a connection between Department for Communities and Local Government and the Consultative Council on Local Government Finance (Rhodes, 1986b, p. 101). Example of the linkage within the national community of local government is a connection among Association of County Councils (ACC), Association of District Councils (ADC), Association of Metropolitan Authorities (AMA), Greater London Council (GLC) and so on (Rhodes, 1986b, p. 255). Example of linkage between the national community of local government and the single function policy community is a connection between Police & Fire Committee of AMA and Central Fire Brigades Advisory Council (Rhodes, 1986b, p. 310). Connection between Education Committee of ACC and Advisory Committee in the Department of Education and Science is also above example (Rhodes, 1986b, p. 330). The linkage plays an important role in the international interdependence theory. Nye pointed out that much of the political conflict over interdependence involves the creation or prevention of linkage, and economic sanctions are often an example of such linkage (Nye, 2007, pp.216-7). Asymmetry is also common factor in the power-dependence and the international interdependence. Asymmetry is a concept of unbalanced power between two organizations or states. Rhodes recognizes asymmetry in the intergovernmental relations (Rhodes, *The National World of Local Government*, p. 20). Nye pointed out that asymmetry is at the heart of the politics of international interdependence. He

analyzed its reason that if two parties are interdependent but one is less dependent than the other, the less dependent party has a source of power as long as both value the interdependent relationship, and concluded that manipulating the asymmetries of interdependence can be a source of power in international politics (Nye, 2007, p.215). Cost of change is also common factor in the power-dependence and the international independence. Rhodes pointed out that unilateral action is not cost-free; as the cost becomes visible, the government either intensifies the attempt to direct local authorities or employs different strategies by recognizing its dependence on local authorities (Rhodes, 1986a, p.6). The cost of international interdependence corresponds to sensitivity and vulnerability, respectively. Due to Nye's definition, sensitivity means amount and pace of the effects of dependence: scale and quickness which change in one part influences to another part. Vulnerability means the relative costs of changing the structure of a system of interdependence (Nye, 2007, pp. 213-4). Difference between power-dependence and interdependence exists in sanction. Within the intergovernmental relations in the UK, the discretionary power of the local authority is conferred by the Parliament. Although the local authority can implement policies using conferred discretion, the local authority must comply under the principle of *ultra vires*. Therefore, the sanction does exist even if the local authority acts beyond the statute. In the interdependence relations, the bilateral treaty or multilateral treaty and many trade agreements or environment protocols never provide sanction based on the legal force. However, if the compliance is not maintained, stronger state sometimes maneuvers political sanction or economic sanction. For maintaining peace and stability, the balance of power and collective security sometimes require the political sanction. The states seek alliance, the balance of power and the collective security. NATO (OTAN) is the typical collective security. The Britain and the United States special alliance and Treaty of Mutual Cooperation and Security between the United States and Japan are typical alliance. Japan-UK Foreign and Defence Ministerial Meeting is a linkage.

I also discuss degree of dependence in the power-dependence of the intergovernmental relations and interdependence of the international relations. The political agenda in the intergovernmental relations is featured by the bargaining between the state strategy and the local interest. The political agenda in the international relations depends on the regime of states. As pointed out by Krasner, the regime is defined as a set of principles, norms, rules and decision-making procedures around which expectations of actors converge in the given area of international relations (Krasner, 1982, pp. 185-7). The interdependence relations also exist between different regimes by considering balance of power. The financial policy seems the most uncompromising agenda between centre and local in the UK, that is, the financial policy is featured by the unilateral decision of the central government, while the local government is discretionary in the decision of the rate. However, the bargaining between centre and local exists in the form of the grant negotiation, where the grant is provided by the central government to the local authority. The financial policy motivated by the big company and National Bank is featured based on the national interest. Sometimes states within the same regime attempt coordinated intervention to avoid financial crisis issued from the critical state. The agenda of the global environment is featured by almost all states. Although the purpose of the global environment is decided as the international protocol, this decision is an objective to be complied with sanction-free. The public policy is the agenda with sanction-free in the intergovernmental relations within the state and the Member

States under the EU.

(Yoshihiro Nagata, Power-Dependence of British Central-Local Government Relations and Interdependence of International Relations in the EU, ACPEL2016)

**Table 1 Comparison between Power-Dependence Theory and Interdependence Theory**

|                            | Power-Dependence Theory   | Interdependence Theory                                    |
|----------------------------|---|---|
| Representative Researchers | R.A.W. Rhodes   | Joseph Nye<br>Robert Keohane                              |
| Research Area              | Administration Politics   | International Relations                                   |
| Objective                  | Intergovernmental Relations between Centre and Local                                  | International Relations among States                      |
| Common Concept 1           | Linkage between Centre and Local<br>Connection between Organizations, Policy Networks | Linkage between States                                    |
| Common Concept 2           | Asymmetry between Centre and Local  | Asymmetry between States                                  |
| Common Concept 3           | Cost<br>Unilateral decision is not cost-free.   | Cost<br>Short-term sensitivity<br>Long-term vulnerability |
| Law                        | Law, Statute  | Treaty, Soft Law  |
| Sanction                   | Law with sanction   | Treaty and Soft Law without sanction                      |
| Stability                  | Principle of <i>Ultra Vires</i>   | Collective Security and Balance of Power Alliance         |

This Table is made by the author based on Rhodes(1986a, 2006), Nye(2007), and Keohane and Nye(1977).

(Yoshihiro Nagata, Power-Dependence of British Central-Local Government Relations and Interdependence of International Relations in the EU, ACPEL2016)

### Linkage Diplomacy

I think that Diplomacy and Domestic Politics are related each other. Diplomacy influences Domestic Politics, and Domestic Politics influences Diplomacy.

I have researched Linkage, Linkage Diplomacy and how Diplomacy and Domestic Politics are related each other. I describe my idea about Linkage, Linkage theory.

James Rosenau created “linkage” theory connecting with domestic politics and foreign policy in 1960s (Rosenau 1969). Linkage theory means how domestic politic affects foreign policy. Afterwards, in 1970s, the concept of “linkage” has been reconstructed by Henry Kissinger. The concept of linkage by Kissinger is the revolutionary idea such that when state conducts diplomacy and foreign policy, the states should not carry out diplomatic negotiations at odds with one of issues, but



carry out diplomatic negotiations in the package of several issues. By using the concept of linkage, Kissinger challenged negotiations between the United States and the Soviet Union. When Kissinger reconstructed the concept of linkage, the linkage strategies were used as the concept to alleviate the conflict relations between the United States and the Soviet Union (Kissinger 1979, 1994). After that, in 1980s, the concept of linkage has been used as the relationships between the allies and the friendly nations, for example, the relations between the U.S. and Japan, the relations between the U.S. and the UK, the relations between the U.S. and the EU, and the relations between the U.S. and Canada. Joseph Nye Jr. have defined linkage strategies in association with trade and security between the United States and Japan (Nye 2007). So, Japan has been guaranteed security and peace by the United States through the U.S.-Japan Security Treaty, the Treaty of Mutual Cooperation and Security between Japan and the United States of America. Nye defines that Japan has to accept asymmetry, imbalance of trade instead of benefits of national security. This is the matters of sensitivity and vulnerability. This is essential for the cost of interdependence. Keohane and Nye referred these matters to “interdependence” or “complex interdependence.” The concept of interdependence by Nye and Keohane has been based on the liberalism and constructivism, in a sense, as antithesis of realism, traditional diplomatic idea. The concept of interdependence is crucial in modern domestic politics and diplomacy (Keohane and Nye 1977).

The policy-making actors in domestic politics are bureaucracy, party and parliament. This paper will discuss how bureaucracy affects foreign policy. This paper studies bureaucracy by the two reasons; first, as Rhodes pointed out, all the services in the domestic policy network are a mixture of bureaucracy, market and network, especially, bureaucracy is the most influential actor in policy-making, second, what bridges between domestic politics and foreign policy are government and bureaucracy (Rhodes 2006).

There exists a preoccupation that domestic politics and foreign policy are absolutely different matters. Kenneth Waltz regarded the cause of wars as one of three images: within individuals; within the structure of individual states; or within the structure of the interstate system. The third Image depends on the sovereign state by rational and unitary actor (Cohen 2008, p.120, Waltz 1959). The relationship between domestic politics and foreign policy is not found in Waltz’s concept in 1959. Later, however, Waltz pointed out importance of domestic determinants of state action, such as leadership and bureaucracy (Waltz 1979), (Katzenstein, Keohane and Krasner 2004, p. 653). On the other hand, from the end of the 1970s, new political theory emerged that the domestic politics is deemed to relate with the foreign policy. Representative scholars of this new political theory are Katzenstein and Putnam. The connection between domestic politics and foreign policy come to be captured in the international political economy, whose issues are free trade on car, agricultural product and oil because of tariff reduction.

In 1978, Peter Katzenstein presented a theory that domestic policy influences the foreign policy. In the preface of Katzenstein’s literature, “it was to understand how “domestic structures” shape political strategies in the international political economy” (Katzenstein 1978, p. □). Katzenstein described “The action in society influencing the definition of foreign economic policy objectives consist of the major interest groups and political action groups. The former represents the relations of production

(including industry, finance, commerce, labor, and agriculture); the latter derive from the structure of political authority (primarily the state bureaucracy and political parties)” (Katzenstein 1978, p. 19). In contrast to the statist regarding states as actors, the domestic structure privileged state-society relationship in Katzenstein’s theory (Katzenstein, Keohane and Krasner 2004, p.667). Robert Putnam also insisted that domestic sphere and foreign sphere are interwoven more than previously assumed (Putnam 1988). Putnam presented concept of two-level games to integrate domestic structures, systematic opportunities and constraints, and foreign economy policy. Putnam’s two level games consists of domestic level where the game is played between public authorities and social actors, and of international level where the game is played among governments (Putnam pp. 427-460), (Cohen 2008 p. 128). Putnam pointed out that the bargaining power of a state could be enhanced, if its rules can demonstrate that their domestic supporters would only accept a narrow range of outcomes (Katzenstein, Keohane and Krasner 2004, p. 668). Putnam also studied entanglement of domestic and international politics. Putnam takes a case of Japan in which the Ministry of Trade and Industry (MITI), the Economic Planning Agency, and some politicians within the Liberal Democratic Party attempted to promote business interest agenda, using U.S. pressure against the resistance of the Ministry of Finance (MOF) (Putnam 1988). Peter Gourevitch also pointed two ways in which the world economy could influence politics; the basic institutional structures of politics including governing norms and capabilities and strategic opportunities of different interest groups (Gourevitch 1978), (Katzenstein, Keohane and Krasner 2004, p.668), where the norm is one of the important elements of the regime.

(Yoshihiro Nagata, Bureaucracy in the Power-Dependence of Domestic Politics and Linkage in Foreign Policy, IICSS2017Dubai)

In the real policy making process, many aspects became to be seen which domestic politics influences the foreign economic policy. The increasing influence of the domestic politics to the foreign economic policy is clear due to the following reasons. First, the political theory emerged by Katzenstein or Putnam who proposed relevancy between domestic policy and foreign economic policy. Katzenstein pointed out that domestic interest group and political party influence the foreign economic policy. Putnam presented 2 level game model. In the domestic level of the model, the game is played between government and interest group, and in the international level of the model, the game is played between states. Second, the Japanese bureaucracy dealing bilateral or multilateral relations became influenced not only by the international relations but also opinion of the domestic interest groups.

(Yoshihiro Nagata, Bureaucracy of Power-Dependence in Domestic Politics in Japan and Interdependence of International Relations in the UK, U.S. and EU, ECSS2017Brighton)

### **Policy Networks and Linkage**

The policy networks and the linkages have similarity, meanwhile the former is addressed in the domestic power dependence and the latter in the international interdependence. Policy networks are composed of bureaucracy, central government, party, parliament, politicians, interest groups and local government. Policy networks, especially central government and bureaucracy coordinate domestic and foreign issue

and policy. Policy-making has been determined by policy networks. Rhodes defines policy networks as set of formal institutional and informal linkages between government and other actors structured around shared if endlessly negotiated beliefs and interests in public policy making and implementation (Rhodes, 2006, pp. 423-424). Rhodes continues that the power-dependence approach treats policy networks as set of resource-dependent organizations. Their relationships are characterized by power-dependence (Rhodes, 2006, pp. 432-433). On the other hand, in the world of international relations, Kissinger, a pioneer of the 'linkage', describes start of the linkage in the Nixon Administration. Kissinger pointed out that Nixon's view of Soviet Union was not based on all-or-nothing proposition as his predecessors but rather based on comprehensive approach, that is, linkage on issues with varying degree of solubility. Nixon attempted to synthesize all the elements of the superpower relationship into an overall approach which is neither confrontation nor conciliation (Kissinger, 1994, p. 714). Keohane and Nye pointed out that military and economically strong states will dominate organizations and issues by linking their own policies to other states' policies, however, when military force is devalued, strong states may still attempt linkages on other issues, trade, shipping or oil (Keohane and Nye, 1977, pp. 30-31). Putnam studied entanglement of domestic and international politics. Putnam takes a case of Japan in which the Ministry of Trade and Industry (MITI), the Economic Planning Agency, and some politicians within the Liberal Democratic Party attempted to promote business interest agenda, using U.S. pressure against the resistance of the Ministry of Finance (MOF) (Putnam, 1988, pp. 427-460).

The power-dependence theory (Rhodes, 1986b) and interdependence theory (Keohane and Nye, 1977) involve the policy networks and the linkage, respectively.

I consider equilibrium of policies in the UK and Japan. Nash equilibrium of n-players game is defined as a condition in which every player takes equilibrium strategy to obtain overall performance criterion, that is, a function of n variables. In other words, if (n-1)-players take equilibrium strategies but for the remaining one player (the i-th player), the performance degrades (Nash, 1950). If the i-th player takes selfish strategy only for his interest, the performance criterion meaning 'cost' degrades. The equilibrium is intuitively understood as a solution of trade-off among players. Although the world of real politics is far from mathematical theory, I study condition of the equilibrium between central-local governmental relations by analyzing bargaining of the rate support grant policy by which central government attempted to reduce amount of the rate imposed by the local authorities. I also explore condition of the equilibrium of the administrative and financial reforms by which central government attempted privatization of the Japan Post and national universities in the Koizumi Administration. Through this analysis I withdraw result about comparison of policy networks in the UK and Japan.

(Yoshihiro Nagata, Policy Networks of Central-Local Government Relations in the UK and Japan and Linkage of International Relations in the EU, IICSSHawaii2017)

**Table 2 Comparison between Policy Networks and Linkage**

|                            | Policy Networks   | Linkage                                     |
|----------------------------|---|---|
| Representative Researchers | Katzenstein<br>R.A.W. Rhodes  | H.Kissinger<br>Joseph Nye<br>Robert Keohane |
| Research Area              | Administration<br>Politics  | International Relations                     |
| Objective                  | Intergovernmental Relations<br>between Centre and Local   | International Relations<br>among States     |
| Common Concept             | Linkages between governmental<br>and other actors   | Linkage between States                      |
| Actor                      | Bureaucracy,<br>Central Government,<br>Parliaments,<br>Politicians,<br>Interest Group<br>Local Government | States<br>International Organizations       |

This Table is made by the author based on Rhodes(1986a, 2006), Nye(2007), Keohane and Nye(1977) and Katzenstein(1978).

(Yoshihiro Nagata, Policy Networks of Central-Local Government Relations in the UK and Japan and Linkage of International Relations in the EU, IICSSHawaii2017)

### **Japan-U.S. relations**

Japan-US alliance was signed on September 8 1951. Secretary of State John Foster Dulles contributed to Security Treaty Between the United States and Japan.

President Dwight David Eisenhower signed Treaty of Mutual Cooperation and Security between the United States and Japan in 1960.

Tairo, chief senior councilor Naosuke Ii signed Japan-U.S. Treaty of Amity and Commerce in 1858.

President Theodore Roosevelt helped Japan by coordinating Treaty of Portsmouth on September 1905.

From the era of Douglas MacArthur, Edwin Reischauer and McGeorge Bundy, Japan has been protected by U.S.

Power Elite by Mills, Pluralism by Dahl and Technocrat influenced Japan Politics. Traditionally, Japan tends to focus on economy than security.

I hope that Japan and U.S. have friendly ties, and strengthen Japan-US Alliance.

### **Bureaucracy and Government**

Government and Bureaucracy coordinate politics. Japan traditional bureaucrat-led politics is represented by Ministry of Finance and Ministry of International Trade and Industry.

Bureau of personnel at Cabinet Office(Naikaku-Jinjikyoku) in 2014 changes bureaucrat-led politics to politician-led politics.

In 1920s and 2010s, Government is stronger than Bureaucracy because of Taisho Democracy, Rikken-Seiyukai, Kenseikai and Bureau of personnel at Cabinet Office. From 1960s to 1990s, Bureaucracy led Government.

### **Japan-EU Relations**

From era of European Commission President Walter Hallstein to Jacques Delors, EEC(EC, EU)-Japan relation has not been strong and deep. Japan-EU Summit has been held from 1991.

Kyoto Protocol was signed in Kyoto,1997. Kyoto Protocol is treaty related with UNFCCC. Paris Agreement was signed in 2016. I think Kyoto Protocol and Paris Agreement are interdependence, linkage. My family and I live in Kyoto and once lived in Vienna(Wien), Austria.

President Herman Van Rompuy and Barroso agreed to start Japan-EU EPA(Economic Partnership Agreement) bargaining on May 2011.

Japan government and majority of Diet promoted but Ministry of Agriculture, Forestry and Fisheries and JA, interest group of agriculture opposed Japan-EU EPA because of protection of agriculture.

Japan government, Ministry of Foreign Affairs(MOFA), and Ministry of Economy, Trade and Industry(METI) have been main actors of Japan-EU EPA negotiations. Government, MOFA and METI had to coordinate various ministries and agencies and politicians.

President of European Council, Donald Tusk, and President of European Commission, Jean-Claude Juncker and Prime Minister Shinzo Abe signed Japan-EU EPA and Japan-EU Strategic Partnership Agreement(Japan-EU SPA) on July 6 2017.

### **Japan-U.K. Relations**

Lord Lansdowne achieved the Anglo-Japanese alliance that Minister Hirobumi Ito opposed but Minister Aritomo Yamagata, Taro Katsura approved on January 30 1902.

Anglo-Japanese Alliance is Alliance and Balance of Power.

Vienna System by Prince Metternich-Winneburg and Talleyrand-Périgord in 1815 included Quintuple Alliance and Balance of Power. Balance of Power of Vienna System was artistic.

Prime Minister David Cameron and Prime Minister Yoshihiko Noda agreed to joint defence deal to strengthen bilateral defense cooperation on April 10 2012. I think Japan-UK defence deal 2012 is cornerstone of Japan-UK Foreign and Defence Ministerial Meeting.

On January 21 2015, Japan-UK Foreign and Defence Ministerial Meeting(Japan-UK 2+2) was held.

Through British Referendum on June 23 2016, UK decided to withdraw from EU, BREXIT by Article 50 of Lisbon Treaty.

Japan-UK 2+2 on December 2017 affirmed Japan and UK are closest security partners, defence and security co-operation, commitment to maintain rules-based international system emphasizing international order based on rule of law and ACSA.

### **Japan-France relations**

Japan Civil Law, Criminal Law, Criminal procedure were by France. Japan Constitution was by British Westminster System, Austria and U.S.

In Washington Naval Conference, US-UK-France-Japan Treaty was signed on December 1921. I think US-UK-France-Japan Treaty 1921 is alliance, quasi-alliance.

In 1975, G6 Summit was held. I think G6 Summit includes alliance, quasi-alliance of collective security as reincarnation of US-UK-France-Japan Treaty 1921.

Japan-France Foreign and Defense Ministers' Meeting(Japan-France 2+2) was held on January 2014. Minister Jean-Marc Ayrault and Jean-Yves Le Drian joined Japan-France 2+2 on January 2017. Japan-France Foreign and Defense Minister's Meeting confirmed "exceptional partners" sharing fundamental values, common responsibility to peace and stability.

President Emmanuel Macron celebrated 160th anniversary from France-Japan relations on July 2018. Japan and France signed ACSA and agreed framework for dialogue on maritime security cooperation.

### Comparison of Bureaucracy in the History

|  | <b>The UK</b>                        | <b>The U.S.</b>   | <b>France</b>           | <b>Austria</b>          | <b>Japan</b>            |
|--|--------------------------------------|---|-------------------------|-------------------------|-------------------------|
| <b>Characteristics of Bureaucracy</b>                          | <b>Party Politics by politicians</b> | <b>Party Politics by politician and interest groups</b> | <b>High Bureaucracy</b> | <b>High Bureaucracy</b> | <b>High Bureaucracy</b> |
| <b>Degree of bureaucracy From 17th century to 19th century</b> | <b>Middle</b>                        | <b>Low</b>  | <b>High</b>             | <b>High</b>             | <b>High</b>             |
| <b>Degree of bureaucracy 20th century</b>                      | <b>Middle</b>                        | <b>Middle</b>   | <b>High</b>             | <b>High</b>             | <b>High</b>             |

**Table 3 Comparison of Bureaucracy in the History made by the author**

(Yoshihiro Nagata, Bureaucracy of Power-Dependence in Domestic Politics in Japan and Interdependence of International Relations in the UK, U.S. and EU, ECSS2017Brighton)

### NATO-Japan Relations

General George Marshall and Hastings Ismay founded NATO(OTAN)(North Atlantic Treaty Organization).

Secretary General Jens Stoltenberg called “NATO and Japan are natural partners”. North Atlantic Council accepted Japan’s request to designate Embassy to Belgium as Mission to NATO.

### Soft Law

Snyder defines “Soft Law, rules of conducts which, in principle, have no legally binding force but which, nevertheless, may have practical effects.”(Snyder, 1993)

Abbott and Duncan Snidal define “The realm of ‘soft law’ begins once legal arrangements are weakened along one or more of the dimensions of obligation, precision, and delegation.”(Abbott and Snidal, 2000)

The principle of subsidiarity and the Open Method of Coordination are linked with Norm and Legalization.

“Yoshihiro Nagata, (2013), Policy-Making Process of Education and Politics in the EU focusing on the Norm and Legalization, the Master’s Degree Paper of Osaka

Kyoiku University 2013, pp1-115”

## **Conclusion**

I think Diplomacy and Domestic Politics are related each other.

I consider similarity and common factors between power-dependence and interdependence.

U.S.-UK-France-EU-Japan relation becomes alliance, quasi-alliance.

I think Linkage Diplomacy is applied to modern politics. U.S. started paradigm shift from economic trade to security in 2010s. Iron Curtain by Winston Spencer-Churchill and Containment by George Kennan are revived in 2010s as New Cold War. Western Bloc(U.S.-UK-EU-France-Japan) should develop partnership.

Linkage is applied to both economic trade and security. The main objective of Linkage is economic trade in 1980s and security in 2010s.

U.S.-UK-EU-Japan relations establish Soft Law.

I hope U.S.-UK-EU-France-Austria-Japan Interdependence, Linkage stronger in diplomatic, political, legal and cultural fields.



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**Contact email:** ykm-ngt@fancy.ocn.ne.jp



***Build-up to the Waste House: The Development of Building Projects to Explore the Use of Recycled Materials and the Enhanced Engagement of Student Builders***

Glenn Longden-Thurgood, University of Brighton, United Kingdom

The European Conference on the Social Sciences 2018  
Official Conference Proceedings

**Abstract**

The Waste House was completed in 2014 - built almost entirely by the collaborative work of some 300 young people including school children and students studying construction trades, architecture and design. “The building was Europe's first permanent public building made almost entirely from material thrown away or not wanted. It is also an Energy Performance Certificate ‘A’ rated low energy building.” (Baker-Brown<sup>1</sup> 2017). Parallel to the production of this pioneering building, students from the architecture courses at the University of Brighton built a number of developmental pavilion structures. These pavilions, used to exhibit the work of students at the annual Graduate Show, helped build the knowledge and experience that supported and enabled a proposal to have the Waste House constructed largely by an “unskilled” workforce of students. Three key Graduate Show pavilions built between 2011 and 2013 were large enough in terms of scale and complexity to simulate the ambitions of the Waste House. These pavilions were developed following material searches that revealed an abundance of waste and locally sourced materials and as a result explored the use of unconventional construction processes such as rammed chalk, structural straw bales, tensioned birch and reciprocating structures. This paper describes the School of Architecture and Design's (SoAD) approach to these pavilions and how they helped inform an emerging attitude towards the (re)integration of technology and design in architectural education with a view to producing graduates who are in a position to direct more sustainable attitudes to construction in the future.

Keywords: Integrated teaching, integrated design and technology, waste house

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<sup>1</sup> Duncan Baker-Brown is an expert in contemporary methods of ecology-friendly building design, architect and Senior Lecturer at the University of Brighton, UK.

## Introduction

The first section of this paper is a brief summary of the opinions and observations of a number of academics since 1984 relating to the evolving relationship between design and technologies in architectural education. The second section describes the approach developed by the BA(Hons) Interior Architecture course team in SoAD at the University of Brighton for dealing with problems identified by External Examiners in the integration of technology in design portfolio submissions. This section includes a brief description of the pedagogy that was used and the projects that were developed as a vehicle for testing and implementing change. This work ultimately led to the construction of the Graduate Show pavilions, which are described and illustrated. Sections three and four are outcomes and conclusions respectively.

## Literature Review

There has been a cyclical debate about the relationship between design and technology in architectural education over at least a 30-year period with numerous academics and professionals lamenting the dissection of architectural curricula into easily digestible subject areas suitable for modularisation: design, humanities, technology and professional practice being the most commonly used subject areas. In addition, the trend has been for architectural philosophies to replace the historical survey of architecture (i.e. students no longer learn from precedent studies), and for new digital or virtual technologies to replace construction technology courses.

Barbara Allen<sup>2</sup> (1984) made the point that architecture schools have become preoccupied with theory and philosophy and its influence on design in favour of a conversation relating to construction, materials and environment.

David Lee Smith<sup>3</sup> (1984) discussed the issue of reintegrating technology into architectural education in response to gaps in the curriculum he had identified as a result of the ever-increasing range of topics with which academics were concerned.

Professor G. Goetz Schierle<sup>4</sup> (1984) illustrated the importance of technology to the architectural designer, warning that sound technological knowledge allows the architect to retain the position of leader in the construction process, with the alternative being relegation to the roll of 'aesthetic consultant'.

Several academics regard construction technology as an area that is learned through experience. William Carpenter<sup>5</sup> (1997) proposed that hands-on experience was vital to the education of an architect. Maurice Mitchell<sup>6</sup> (1998) explored the role of technology in architectural education in terms of experiential learning, social responsibility and the sustainable use of materials. He supports a 'culture of making' with a view to establishing technological principles, transferable knowledge and the attainment of skills through participating in the design and construction of buildings or large-scale models.

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<sup>2</sup> Barbara Allen, University of Southwestern Louisiana, USA.

<sup>3</sup> David Lee Smith, Professor of Architecture at the University of Cincinnati, USA.

<sup>4</sup> G. Goetz Schierle, Professor of Architecture at the University of South California, USA.

<sup>5</sup> William Carpenter, PhD, Fellow of the American Institute of Architects.

<sup>6</sup> Maurice Mitchell, Professor of Architecture of Rapid Change and Scarce Resources, London Metropolitan University, UK.

In the introduction to his selected essays 'Rethinking Technology' (2007), William Braham<sup>7</sup> asserts that technology relevant to the field of architecture has evolved to such an extent that 'the tools of design and construction have become a matter of systems'. Structural systems, computational systems, nervous systems: 'technology has become autonomous, not part of a design discourse, but a discourse in its own right.' As a counter point, in his foreword to 'Introduction to Architectural Technology' (McLean and Silver 2008) structural engineer and experienced teacher Hanif Kara<sup>8</sup> points out that an architecture based on systems and computational tools is an extreme. The contemporary student of architecture requires a middle ground where basic structural principles are enhanced by the new possibilities offered by the computer. Input from experts in new technologies, combined with a sound knowledge of historical precedent, offers the student 'a better chance of designing with originality and novelty without becoming an engineer or computer scientist'.

## Pedagogy

From this brief sample of opinions spread across the last 30 years it is clear that there has been an ever-increasing level of concern about the evolution of construction technology in architectural curricula and its integration into the design process. The evolution of architectural curricula is inevitable and indeed desirable, however the problems that have arisen from the distillation of design from the rich influences of technology, building and construction still need to be addressed, or at the very least recalibrated. Solutions range from identifying specific project briefs that, out of necessity, require an element of design, theory and technology, to the introduction of specific approaches to teaching and learning that align the delivery of design and technology. So far it seems that none of the explorations or discussions have been conclusive in finding an approach or attitude that successfully brings together the issues of design and technology that recognises the interdependent nature of the two while retaining two distinct subject areas.

Antony Radford<sup>9</sup> and Susan Shannon<sup>10</sup> (2010) identify the difficulties students have applying knowledge of environment, building performance, structure, construction and building services from precedents to their own projects. They discuss the introduction of specific and intensive technology projects as part of an iterative process that deals with design through technology. Their strategy was to use iterations of the same project with different foci. The first was a technology-centric design project run over a relatively long period with regular technological discussions and quizzes before and after the sessions testing the students on what they had learned. The second much shorter iteration repeated the project in a slightly different context, substituting the technology-centric theme with 'design for delight' and the experience of space as drivers for the students' explorations. Both projects incorporated increasing levels of complexity and were taught through iterations and elements of peer learning<sup>11</sup>. They deployed three tactics in relation to their studio experiment: spiral curriculum<sup>12</sup>, scaffolding<sup>13</sup> and peer learning. Radford and Shannon's

<sup>7</sup> William Braham, Associate Professor of Architecture at the University of Pennsylvania, USA.

<sup>8</sup> Hanif Kara, Professor in Practice of Architectural Technology at Harvard Graduate School of Design, USA; design director and co-founder of London-based structural engineering practice AKT II.

<sup>9</sup> Antony Radford, School of Architecture, Landscape Architecture and Urban Design at the University of Adelaide (Australia).

<sup>10</sup> Susan Shannon, School of Architecture, Landscape Architecture and Urban Design at the University of Adelaide (Australia).

<sup>11</sup> Peer learning is a pedagogical tool where students work with and learn from each other to achieve their educational goals.

<sup>12</sup> A spiral curriculum deploys the tactic of revisiting a topic or theme over a project, academic year or course, with complexity increasing with each revisit.

conclusions, however, do not relate to the success or failure of the project in relation to students' ability to understand architectural technology. In fact, they argue that in the context of architectural education it is almost impossible to quantify the pedagogic effect of one particular module over three or five years of education.

### **The Integrated Approach**

The evolution of the technology curriculum for the architecture courses in SoAD at the University of Brighton began in 2010 when we too began to explore the benefits of an integrated approach. Specifically, combining design and technology into an integrated curriculum that recognises the interdependent nature of the two subject areas, acknowledging that there is no design without technology. In support of an integrated curriculum we developed studio-based design and technology projects for Interior Architecture students, a course in SoAD that had manageable student numbers and was complex enough in its technological ambitions to be comparable to architecture courses generally. Through the incorporation of a variety of pedagogic strategies, we introduced a series of briefs that described increasingly complex and ambitious attitudes towards technology supported by the incorporation of making projects (scale models, artefacts, installations and exhibitions) that required students to deal with both design and technology simultaneously.

The use of a spiral curriculum allowed us to revisit issues and build up complexity through a series of iterations (Bruner 1960). Students moved quickly through the initial stages of projects as they drew and physically modelled initial design ideas. Building on early simple ideas, complexity increased as the scale of the investigations zoomed in and moved from general principles to detailed proposals describing material, structure and how elements work together.

Scaffolding (Wood 1976) was used to support students through projects that were far too ambitious for them to deal with individually. Teaching staff supported students through the more ambitious aspects of a project, explaining how to proceed and providing raw material and data, offering a complex framework within which the students worked. Often producing work in groups, students had the opportunity to learn a wide variety of skills by participating in scaffolded making or building projects linked to their design ideas.

Peer learning, linked to scaffolding, problem solving, seminars and critiques, was used to encourage students to interact with and learn from each other within a directed educational framework (Boud et al 2001).

Iterations (Radford and Shannon 2010) were used to deliver associated modules at the same time. We encouraged students to make the connection between different modules and subject areas. For example, technology lectures, week-long 'sign-up' workshops and a series of 1:1 tutorials with technologists were related to a design project. This allowed staff to deploy a range of teaching tactics to help students develop a design project and encourage them to address the issues raised by the design question from a number of points of view.

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<sup>13</sup> Scaffolding refers to a process where teachers demonstrate how to solve a problem and then let the students take over, offering support when required.



The increasing complexity and ambition of the making elements of these projects led, in time, to the inclusion of a construction project in the curriculum for second year Interior Architecture students. As a vehicle for these projects the course team proposed to build pavilions for the SoAD Architecture and Interiors Graduate Show. In 2011 second year Interior Architecture students were asked to build the first of a series of Graduate Show pavilions and keep a record of their experiences.

How do we build a shelter large enough to house our Graduate Show, relying mainly on the abilities of our students, on an extremely limited budget?

In parallel to the discussion about the (re)integration of technology into design projects, Duncan Baker-Brown from SoAD was in negotiations with the University of Brighton to build the Waste House on their Grand Parade site. Recycled materials were an obvious resource to investigate for both projects. By 2010 research in this area was not new, in fact, enthused by the ethos of recycling, reusing, and remaking, championed by pioneers such as Samuel Mockbee, staff and students from SoAD had already made a series of experiments with waste materials in their exhibition entitled 'The Given, the Twisted and the Broken' in 2004.

Mockbee's view was that architectural education should "expand its curriculum from paper architecture to the creation of real buildings" (Dean and Hursley 2002). This led to his formation of Rural Studio, in collaboration with Auburn University in the early 1990s. Rural Studio was a design and build programme for second and fifth year architecture students who took up residency in Hale County and worked on domestic and public buildings in this underprivileged community in the American South. Students experienced the whole development process from inception to completion. Their activities included consultation with the local community, applying for and gaining planning consent, design and ultimately the construction of the buildings they had conceived. As budgets were extremely limited, students were also expected to be creative in the collection and use of materials. These financial restrictions led to remarkable innovations. The creative reuse of materials such as car windscreens and licence plates as cladding, and carpet tubes and bailed cardboard as structure, became the signature aesthetic of many of the early projects.

'The Given, the Twisted and the Broken' (figure 1) was an installation project carried out by second year architecture students in SoAD, looking at the reuse of materials in building. Working with plastic sheet from furniture stores, food cans, drink bottles and, of course, cardboard, students and staff applied what they knew about architectural construction to the materials they had gathered. Plastic sheet, plastic bottles and thin insulation were abundant – one student looked at using drink bottles to secure a plastic waterproof membrane to a structural surface by slitting the bottom of the bottle to make fixings and using the top to secure the plastic and insulation. Another used the bailed plastic as structural material held within a timber frame, a detail we would use later with hay bales. Yet another flattened hundreds of drink cans to create a tile hanging – nothing much new here, but we explored the principle again and again in later projects where we tried DVD boxes, CDs and office paper trays, until eventually the Waste House was clad in repurposed carpet tiles.

Although these early attempts at building with recycled materials were thought provoking, and often innovative, the images (figure 1) reveal that the experiments

were largely intellectual ideas that really only explored the aesthetics of the installation and not the practical application of recycled material in the construction of shelters with specific performance criteria such as protection from the elements.



Figure 1. The Given, the Twisted and the Broken.<sup>14</sup>  
Image courtesy of Duncan Baker-Brown.

Ultimately both the Waste House and the Graduate Show pavilions were made primarily from waste material. The Waste House used recycled plywood and OSB as its main structure, it was insulated with material that include denim off-cuts, video or audio tapes, and even tooth brushes. The building uses plastic publicity hoardings as a vapour barrier.

The Pavilions: How do we enhance students learning through participation in live built projects?

To contextualise the Graduate Show pavilion projects, there were between 140 and 180 graduating students in SoAD who needed a wall space on which to mount drawings and a horizontal surface for models and artefacts. Each exhibiting student needed roughly 4sqm or 720sqm in total for the largest of the pavilions. The second year Interior Architecture students who were charged with carrying out the construction were presented with a comprehensive description of the pavilion. This included general arrangement drawings, a plan of works, construction details, risk assessments and health and safety plans. Students were expected to work for five days on the building site but were encouraged to come back over the period of the build and complete their individual document evaluating the construction process.

The construction site was set up formally in compliance with UK Construction, Design and Management (CDM) regulations, was cordoned off with security fencing and students were provided with protective gear: boots, high-viz jackets, gloves and hard hats. A foreman ran the site in collaboration with several members of staff. When construction started students were expected to read the drawings and to participate in all aspects of the building process. Throughout the process students were given instruction in the use of various tools and processes. Alongside our

<sup>14</sup> Figure 1 clockwise from top left: 1. Plastic bale wall; 2. Drink bottles used to hold an insulated rainscreen off a sub structure; 3. Food tin tile hanging.

activities industrial demonstrations where provided where possible. These projects provided the students with hands-on experience on a real construction site.

### Pavilion 1 - Chalk Wall

In 2011 the intention was to build three key structural elements to support a large flat roof: a rammed chalk wall, a straw bale wall, and recycled plywood wall, demonstrating different structural principles. We accepted almost everything we could get our hands on in an attempt to revive our experiments from 2004. Our first external pavilion used 22 tonnes of chalk, 100 sheets of plywood, 54 water damaged timber I-beams, 64 hay bales, an abundance of wooden pallets that were available locally and a lot of cheap plastic sheeting.



Figure 2. Chalk Wall Pavilion.<sup>15</sup>  
Images courtesy of Glenn Longden-Thurgood.

Chalk and straw bales came from a University building site and a local farm respectively. We had external help to run two workshops - Rowland Keable, expert in rammed earth construction oversaw the rammed chalk wall, and instructors from Amazonails, specialists in straw bale housing, helped us manage the straw bale build. We had to buy the plywood as we were let down by the contractor who had promised 200 recycled sheets, but altered the details to minimise the amount of material and

<sup>15</sup> Figure 2. clockwise from top left: 1. Rammed chalk wall; 2, 3 and 4. Chalk wall foundations; 5. Straw bale wall footing; 6. Pallet floor substructure; 7. Floor construction of recycled timber; 8. Straw bale wall; 9. Plywood wall.

ensure that we could reuse it later. With the three main wall structures up, the site foreman for the nearby building site started to deliver a continuous stream of rejected timber and pallets for the floor.

We fitted the roof structure of rain damaged timber I-beams to span between the main structural elements. Larger than usual timbers were used as counter battens from which to hang plastic sheet in a catenary to allow for drainage.

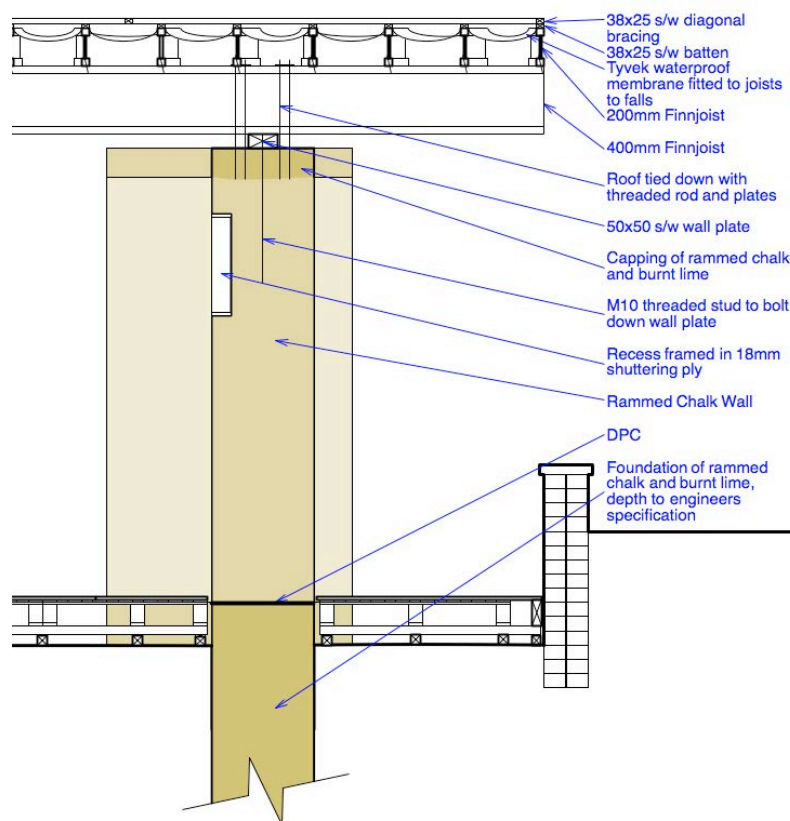


Figure 3. Section through chalk wall.

The two key lessons learned from pavilion 1:

1. Manage the number of students/volunteers. Too many and you spend your time inventing things for them to do, too few and progress is slow and the students are overworked.
2. Use techniques that students can pick up and achieve quickly. Contrary to expectations, the students built almost all of the chalk and straw bale and plywood walls following the instructions of the experts. The floor, however, was built almost entirely by staff. The relatively imprecise and unusual processes of building the main walls were popular and held students' attention - the complexity of building a level floor structure with multiple odd components was less successful in terms of engaging students or providing them with any meaningful learning experience.



## Pavilion 2 - Birch Pole Pavilion

In 2012, based on our experiences the previous year, we started early and took students to local woods to carry out a series of experiments with David Saunders from Woodland Enterprises Ltd in East Sussex.

We explored how we might use tree species that were in abundance locally, but in unconventional ways through the use of contemporary materials and techniques. We felled 100 seven metre tall birch trees that were crowding slower growing oak. We learned to fell, debark, bend and join green timbers. Once we had concluded our experiments we were confident we knew enough about the material to build a curved timber structure. As the birch was felled late in the season, pre-bending was unnecessary. We found we could hold it in tension to create a desired curve as it was dry enough to spring back but was rigid enough to resist bending forces, allowing us to control the curve. See figure 3.



Figure 3. Birch pole test rig.  
Image courtesy of Kate Cheyne.

For pavilion 2 we used the timber I-beams to create the floor – this quickly gave us a safe flat work surface. We use recycled plywood saved from the previous year to build a spine wall that would act as a pivot over which we bent the birch poles. The opposite wall was lightweight and was used to tie the birch poles down to the deck. The weights used to create the curve were one tonne troughs of rainwater, the thick end of the pole was stabilised in laser cut plywood bearers.



Figure 4. Birch Pole Pavilion.<sup>16</sup>

Main image courtesy of Jim Stevenson, details Glenn Longden-Thurgood.

Thinner birch poles were used as roofing battens that were tied to the main poles with cable ties. The roof was once again clad in plastic – this time much heavier scaffold sheeting (Monarflex) tied down in tension with elastic tarpaulin ties. The intention here was that the ties would break if we had winds over 35 mph, and the sheeting would lift off safely.

<sup>16</sup> Figure 3, clockwise from top left: 1. Completed pavilion looking at the lighter of the two walls, the heavy water troughs can be seen in the right of the image; 2. Wall head beam and laser cut bearers used to locate the thick end of the timbers; 3. Cable ties used to fix the birch roof battens to the bent birch roof structure; 4. Wooden pegs and elastic tarpaulin ties used to hold down the roof covering.

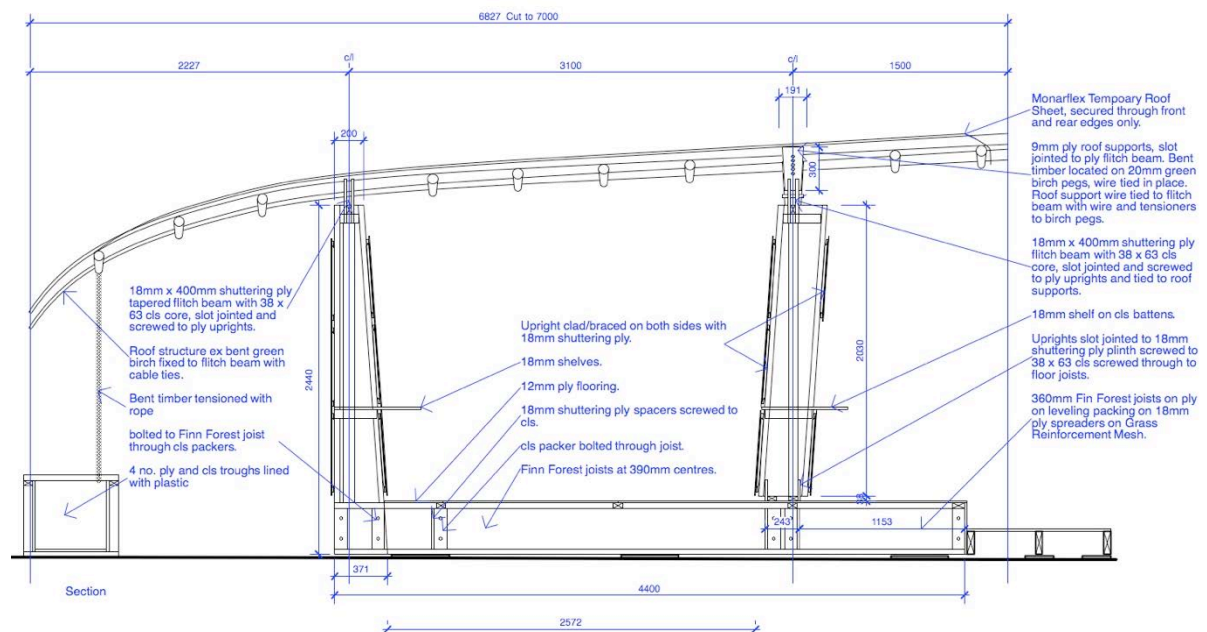


Figure 5. Cross section through the Birch Pole Pavilion

### Pavilion 3 - Reciprocating Lamella Roof

While working on the Birch Pole Pavilion in 2012 I saw a simple reciprocating structure that David Saunders had built to bridge a stream in his woods at Framfield, East Sussex. This was of particular interest to me as I had developed a curved version of this structure in my postgraduate thesis project. As part of the strategy for this project I developed a proposal for a lamella roof - a technology that would allow relatively short pieces of material to be combined into structures that could bridge relatively wide spans. This was a response to a project located in a poor area of Mumbai in an environment that had limited timber resources. I didn't completely understand how this worked at the time. I look back on the drawings I made to describe this structure, and they are relatively convincing, but it wasn't until we built pavilion 3 in 2013 that I really understood the potential of this structural system. (figure 6; 4.)

In 2013 we spent the Easter break building models at increasing scales that explored reciprocating lamella structures. These are vaulted structures made of crisscrossing elements, in this case, using small reciprocating sections in a square grid pattern. Following the modelling process we made a 1:1 version to be tested by a consultant structural engineer. An underlying challenge was that we intended to use recycled plywood for the roof structure to demonstrate that it could be built cheaply from recycled materials, be built using hand tools by our students and be strong enough to support a roof covering. Once the engineer had watched us put several hundred kilograms of weight on it without deflection, he agreed to the principle and we went into production.





Figure 6. Reciprocating Lamella Roof.<sup>17</sup>  
Images Courtesy of Glenn Longden-Thurgood.

The major difficulties for this build were to source 100 sheets of 18mm plywood and how to set up equipment, jigs and working processes that would help the students to cut each roof components precisely. We used all our reserve stock of plywood from previous shows, begged and borrowed what we could from local recycling companies, then fortunately came across a haul of plywood that had been water damaged in transit. We took possession of two pallets of this which was more than enough to complete the roof.

The roof consisted of 200 curved components and 200 parallel components, each with a tongue at each end, a square hole in the centre to receive two tongues and corresponding circular holes through which to peg the components together. We made several sets of templates so students could mark out, jigsaw and drill each component, getting as many out of one sheet as possible.

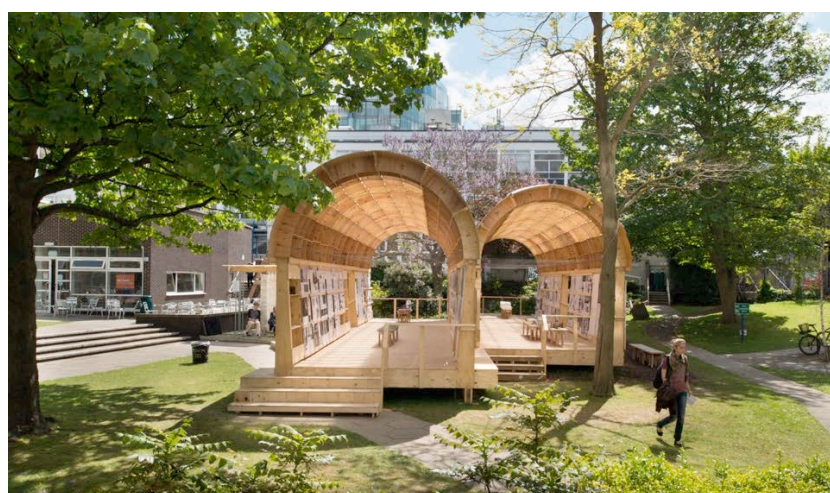


Figure 7. Reciprocating Lamella Roof pavilion.  
Image courtesy of Jim Stevenson.

<sup>17</sup> Figure 6. clockwise from top left: 1. Full scale model; 2. 1:50 laser cut model; 3. 1:20 laser cut model; 4. Digital model from the author's postgraduate thesis project.



Once all the components were ready we started the long job of building the roof. This required two passers, sending the right component up at the right time, a director, telling us which way each component had to face relative to the previous one, two fitters, two lifters and two peg fitters. We fitted thin plywood panels to the external sides and to the open arches at the front and back, stabilised the whole structure and gave us a clear bearing surface for the plastic roof covering.

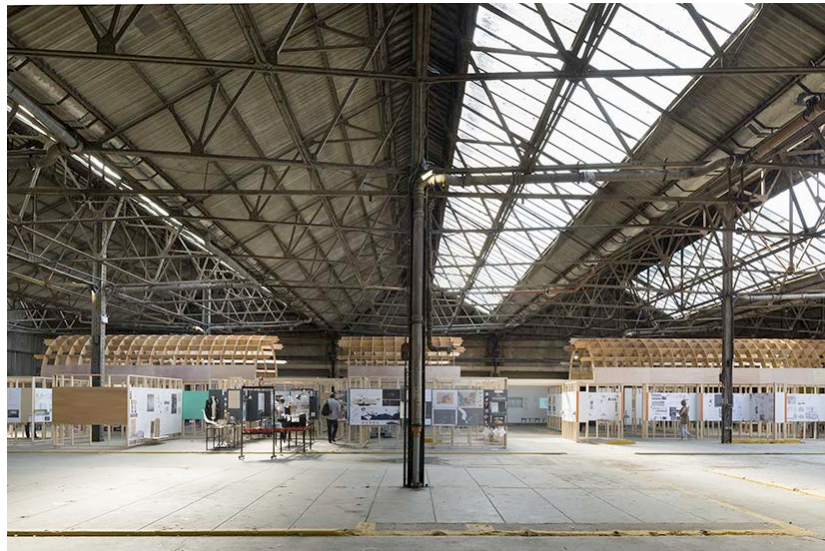


Figure 8. Reciprocating Lamella Roof pavilion rebuilt in 2014.  
Image courtesy of Jim Stevenson.

The reciprocating lamella roof pavilion was the most successfully reusable of the three structures. It was rebuilt by SoAD in 2014 in a new venue for their Graduate Show, and was subsequently sold to become the entrance to a garden centre.

## Outcomes

1. Measuring the success of the projects and approaches described is difficult over the time period they were carried out, this reflects the comments of Radford and Shannon (2010). We carried out numerous surveys, held focus group discussions and made analysis of the students' marks relating to technology. This analysis indicated some improvement, however, perhaps the best way to illustrate our successes is to quote Elizabeth Adams, who at the end of her five year period as external examiner for Interior Architecture wrote:

*“With the technology component of the course now embedded in the design studio there was more evidence of the architectural section being used to properly and intelligently explore the relationship between technical precision and invention and spatial/material proposals.”*

This indicates some movement in the right direction in terms of the integration of design and technology teaching.

2. Following a recent Curriculum Design Review where we looked in detail at all our courses, technology and design are now integrated in all three UG courses in SoAD. Each course now embeds technology teaching into the design studio. Interior Architecture no longer separates technology teaching and delivers it under the broad subtitle 'systems' as part of the design modules. In 2017 the course started the academic year with the assertion that 'technology is everywhere!' and built on this throughout the year.

## **Conclusion**

For most architectural students the integration of design and technology currently happens in practice after graduation. In industry, young designers have the opportunity to watch buildings grow and to discuss projects with experts from different disciplines. Perhaps more importantly, the constant requirement from building contractors for detailed and precise drawing packages drives home the interdependent relationship between design and construction technology.

In the 'Re-Use Atlas', Duncan Baker-Brown, (2017) relates that in the UK approximately 20% of all material arriving on building sites ends up incinerated or going to landfill; 30% of this is new material that was never used. Finding ways to reduce or eliminate waste from the construction process could help reduce environmental destruction from mining, as well as add value to material resources currently defined as waste.

While we have architectural courses that struggle to maintain the interdependency of design and technology, and where the larger proportion of technical expertise is learned in industry, we have a stalemate as the need for innovation and forward thinking is often stifled by the constraints of a construction industry that is slow or even unwilling to change. Our graduates need to be equipped with the tools that will enable them to go into industry and revolutionise the way we think about building.

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**Contact email:** gl@brighton.ac.uk







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