

# TECHNOLOGICAL INNOVATIONS PERFORMANCE AND PUBLIC-PRIVATE- PARTNERSHIPS

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## Abstract

The research institutes' dilemma in successfully bringing their breakthrough technological innovations to the market has remained major concern in most developing economies. Zimbabwe is no exception. The theory of Public-Private-Partnerships (PPPs) and their increasing applicability in especially the provision of public facilities and services has commanded some research interest worldwide. However, not much attempts have been made to unlock the value in the PPP's capability in enhancing commercialization of technological innovations, worst still from a developing economy's perspective. This paper explores the role of PPPs in ensuring successful Research and Development, and Commercialization (R & D-C) of research outcomes. Guided by a systematic literature review on key success factors of PPPs, cases of two forms of PPPs (a Build-Own-Operate-Transfer (BOOT) PPP, and a concession contract) were studied and their operations were monitored and evaluated, in comparison to institutes not engaged in any partnership - to supplement data obtained through key informant interviews. The study established that research institutes engaged in PPPs had relatively fewer commercialization challenges for their output as compared to those who were not engaged. However, it emerged that there are limitations regarding observance of the critical success factors, thereby hindering progress of the prevailing PPPs. The findings of this study imply that there are limited understandings surrounding the value that could be unlocked in commercializing research institutes' innovations through PPPs. To the few existing PPPs, there is lack of integrative frameworks for the management of, and success of the PPPs. Anchored on promoting ideal collaborations in which all key values are honoured, the study proposes a framework that emphasizes a collaboration in which the public research institute concentrates on research and development, while the private firm partner uses her market analytics to focus on getting the product to the market.

**Keywords:** Commercialization, Developing Economies, Innovations, Research Institutes, PPPs

## 1. INTRODUCTION

PPPs have indeed become prominent of late, and their importance has become more significant over time. Jamali (2004; 2007) observed that the growing appreciation of the importance of the market mechanism, coupled with the success of privatization in various countries has sharply increased interest in the continuously emerging PPP phenomenon. PPPs have thus become a popular institutional arrangement, as they are perceived to remedy a lack of dynamism in traditional public service delivery. Over the recent years, the public sector has been faced with various conflicting pressures emanating from global competition, public debt problems and a more sophisticated and demanding consumer base (Ancarani & Capaldo, 2001; Wright, 1994) thus the sector is being challenged to improve its performance through the use of 'market-like approaches' to public sector activities, management decentralization, and focus on constantly improving service quality (Kelly, 2005), and PPPs have appeared on top of the recommendations list. However, while research on R&D networks is abundant, network relations in the

commercialization of innovations have amazingly attracted little attention and consideration (Aarikka-Stenroos & Sandberg, 2012) and there has been no systematic evaluation of the policy requirements for successful PPP implementation (Jamali, 2004) predominantly in developing economies that have only just begun to try out with some few practical applications of such partnerships in commercializing their hard-earned research output.

This paper explores the role of PPPs, and a framework drawn from literature is extracted to guide especially developing economies in formulating successful PPPs, while guidelines for assessing the effectiveness of such partnerships are also depicted.

## 2. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

### 2.1. PPPs and their various forms

Different countries exploit varied approaches to PPPs. As such the partnerships are becoming more common and as their literature is growing hence the discussion of partnership aspects may occasionally

cause confusion due to differences in vocabulary and underpinning concepts. Mouraviev and Kakabadse (2012) critically assessed some of these conflicting and overlapping views on contractual and institutional PPPs, their forms and models, and the authors further draw insights especially for developing and transitional economies. The term 'public-private partnership' (PPP) has been described mainly from contractual (Renda & Schrefler, 2006) and institutional (Hall, 2008a) perspectives, thus it is important to contextualize the PPP, given that the term has been understood differently.

For instance, Witters *et al.* (2012: 81) describe a PPP as a relationship in which public and private resources are blended to achieve a goal or set of goals deemed to be reciprocally beneficial both to the private entity and to the public. Sedjari (2004: 303) argues that a PPP is a new cultural phenomenon by itself and defines it as an "a culture of engagement...a capacity for the collective mobilization of participants which now forms the substance and strength of public programmes..." According to Nijkamp *et al.* (2002), a PPP is an institutionalized form of cooperation of public and private actors, who on the basis of their own indigenous objectives, work together towards a joint target. PPPs are a means of public sector procurement using private sector finance and best practice thus they can involve design, construction, financing, operation and maintenance of public infrastructure and facilities, or the operation of services, to meet public needs (Jefferies, 2006). Thus PPPs imply collaborations to achieve common goals, while leveraging joint resources and capitalizing on the respective competences and strengths of the public and private.

We can still gather a lot more views and perspectives of PPPs as the concept has attracted worldwide attention and has become of much interest especially in the context of developing economies. A closer look at the above views is however sufficient to conclude that academics have not given complete definition of PPPs. Instead, different scholars have concentrated on selected characteristics of PPPs. Taking into account that conceptual frameworks that may be useful for studying PPPs vary, Mouraviev & Kakabadse (2012:264) have come to the realization that though there are different perspectives of PPP analysis, the bulk of studies fall in three major domains: partnerships as a policy tool; a PPP as an organizational and financial arrangement; and PPP performance, risk allocation, and critical success factors.

## 2.2. Forms of PPPs

Börzel & Risse (2005) present their understanding in terms of about four distinct types of PPPs namely regular consultation and cooptation of private players, delegation of state functions to private actors, co-regulation of public and private actors as well as private self-regulation in the shadow of hierarchy. The authors have also adopted a fifth PPP form, state adoption of privately negotiated regimes (Kerwer, 2002; Lehmkuhl, 2000).

According to Li *et al.* (2004), the UK government identified eight types of PPPs including (1) Asset sales, (2) Wider market, (3) Sales of

business, (4) Partnership companies, (5) Private Finance Initiative, (6) Joint ventures, (7) Partnership investments, and (8) Policy partnerships. The authors however noted that the most used PPP model developed economies such as in the UK is the Privately Financed Projects (PFI). In support of these views, Jefferies (2006) noted that alternative PPP project delivery systems can include the Build-Own-Operate-Transfer (BOOT) system and the Privately Financed Projects (PFP).

Hellowell *et al.* (2008) used slightly different criteria. They believed that PPP contractual forms vary from those where there is a great deal of public sector involvement to those where there is very little involvement. Different forms also present different levels of risk transfer. Thus The Price Waterhouse Coopers Report (Ireland) reports that the spectrum of contractual options ranges from Design, Build and Operate (DBO) contracts to Design, Build, Operate and Finance (DBOF) contracts and Concession contracts. The BOOT and concession contracts appear to be common in many developing countries.

McQuaid & Scherrer (2010) however summed up all preceding studies on PPPs and concluded that all PPP forms can be categorized as follows: Provision of services (including infrastructure) to the public sector, Ownership i.e. the introduction of private sector ownership into state-owned businesses, generating commercial value from public assets through selling of public sector services to others, as well as Promotional PPPs.

As noted above, it can be concluded that there are various forms and / or types of PPPs and each form involves a unique set of rules, requirements in terms of investment and eventually this impacts on the degree of risk(s) involved. Developing economies could thus learn from success stories by different economies who have adopted different forms of PPPs. A starting point would rather be going for those PPP forms that involve less risks before embarking of high-return but highly risky projects. For this reason, PFPs have become very common as they have demonstrated their capability to be a good starting point for any PPPs in any economy.

## 2.3. The role of PPPs in R & D and commercialization of Technological Innovations (TIs)

### 2.3.1. Innovation risks sharing

Preceding researches (*e.g.* Mohr *et al.*, 2005) have reiterated that risks are inevitable in the development and commercialization of TIs. Under a *legal* construction of PPPs (Witters *et al.*, 2012), the partners share risk, reward, and responsibility for a shared investment (Akkawi, 2010). PPPs are therefore not merely paraphernalia for projects funding - they call for full dedication from all parties involved to ensure minimum risks prevail.

### 2.3.2. Facilitating commercialization of innovations

According to Witters *et al.*, (2012), the PPP legal construction can cover three types of arrangements, and these go a long way in facilitating commercialization of TIs. "...first, it can be used to introduce private-sector ownership into state-owned businesses through a public listing or the introduction of an equity partner. Second, it can

become a private finance initiative, where the government takes advantage of private-sector management skills by awarding long-term franchises to a private-sector partner, which assumes the responsibility for constructing and maintaining the infrastructure and for providing the public service. Third, it can cover the selling of government services to private-sector partners, which can better exploit the commercial potential of public assets. In these three arrangements, the private-sector consortium typically forms a special company, called a 'special purpose vehicle' (SPV) - to develop, build, maintain, and operate the assets for the contracted period. In cases where the government has invested in the project, it is usually - but not always - allotted an equity share in the SPV..." Witters *et al.* (2012: 81).

Thus by exposing the technological innovations invented in the public research institutes to competitive tendering, PPP's enable the quality and cost of such TI's to be benchmarked against the prevailing international market standards, thereby helping to secure efficiency improvements within the economy as a whole.

### 2.3.3. Economy sustainability through PPPs

Research shows that PPPs can improve urban living through collaborations that combine innovative efforts from the private sector, forward-thinking policies from governments, and support from non-profit organizations (Crozier, 2010). Hence PPPs can revive an economy and improve living standards through employment creation, education, economic development, public safety, healthcare, and other social services. Rather than cutting back on these critical services, the government may rope in the private players and transform the manner in which such products and services are developed, commercialized and distributed.

### 2.3.4. PPPs drive innovation

PPP's are critical instruments for innovation. They help governments become more inventive by creating a space outside the government structure that allows innovation to flourish. They also help to inject a broader set of skills and talents, as well as a more diligent and responsive work culture into the government machinery and to create a solid foundation for innovative thinking and creativity. PPP's also help private companies embrace innovation and bring together new financial resources and business capital to help open the door for the creation of new industry clusters, thus ultimately helping to facilitate innovation in increasingly competitive environments (Witters *et al.* (2012).

### 2.3.5. Use of private sector expertise

Besides provision of quicker and long term private financing options (NCPPP, 2003), PPP's ensure the use of the private sector expertise in terms of technology, marketing, management, and customer service for implementation of the public sector objectives (Brinkerhoff & Brinkerhoff, 2004; Sedjari, 2004). Thus it can be concluded that PPP's provide a platform upon which the state can provide capital resource outlays that will help in R & D, for example

the infrastructures and natural resources; while the private players will use their marketing skills to get the TI sail through to the market.

### 2.3.6. PPPs on innovation policies

Nurturing relationships in the National Innovation System (NIS) has become one of the R & D, and commercialization major policy focus areas, with PPP's being the main policy instrument. Research has proven that PPP's in the field of TI are essential for the competitiveness of regions and individual countries, and various regions are making moves to identify the best use of PPP's in this respect (Witters *et al.*, 2012; Akkawi, 2010). For instance, the European Commission is building up a specific legal framework to facilitate the creation of PPP's and ensure that risks and responsibilities are shared (European Commission, 2011; Europa, 2010); the intent being to assure access to finance through grants, public procurement, or investment.

Back home, a study by Akkawi (2010) reveals that in the Middle East and North Africa, PPP's are also taking centre stage in terms of regulatory requirements. It is apparent from these observations that any commercializing policy should revolve around linkages and PPP's make the policy complete. Zimbabwe can thus derive some lessons from the above case studies through defining legal frameworks and policies to develop and make the use of PPP's more transparent and better integrated in the national context for the betterment of the economy.

### 2.3.7. PPPs improve economic competitiveness & modernises national infrastructure

The concept of PPP's recognizes that there are some activities that the public sector does best and other activities where the private sector has more to offer. Through permitting each sector to focus upon what it does best can the Government provide the quality services that the public expect of them. PPP's can thus generate substantial benefits for both consumers and taxpayers. PPP's also enable the public sector to deliver its objectives better and to focus upon its core activities of procuring services, enforcing standards and protecting the public interest.

## 3. METHODOLOGY

Given the insufficiency of original research related PPP issues in developing economies, and the comparative nature of this study, a sequential process of combining the extant literature on assessing the effectiveness of PPP's, with real-world practices was adopted. More specifically, the method formulated a checklist on the criteria for assessing the effectiveness of PPP's as well as a set of interview questions, based on literature. This was then used to establish the situation on the ground. As posited by Yin (1994), this research approach is quite useful when developing well-grounded theory and is helpful in explaining how and why events have occurred in a certain manner. The extant literature reviewed brought to light some features of effective PPP's, and these were blended together with literature on university-industry collaboration (*e.g.*

Dooley & Kirk, 2007; Philbin, 2008; Saruchera *et al.*, 2014), as well as the role such partnerships can play particularly in ensuring successful commercialization of technological innovations in Zimbabwe. Thus the systematic analysis of literature resulted in the development of two instruments used in this study – a checklist used in assessing the effectiveness of the existing PPPs, and a string of structured interviews questions that were administered on select staff both institutes with and without PPPs. Eight (8) interviews were scheduled and held with five participants from public research institutes and the remaining three from private research institutes. Each interview lasted for 25-35 minutes. The structured interviews were administered on key informants from both private and public research institutes; and on appointed liaison officers in cases where PPPs exist.

An interview guide was used to facilitate the interviews, which acted as a basis to discuss the key PPP issues. A preliminary interview guide was used for the first round of three, which was then refined, based on the nature of responses emerging from these three sessions. This was meant to improve the quality and flow of the questions, thus certain questions were removed as they were deemed duplicate. Thus the revised guide contained eight main questions, whose questioning revolved around key PPP issues pertaining; (1) key elements and resources needed to establish PPPs, (2) PPP role distribution, funding and resource management issues, (3) principal factors that make PPPs successful, (4) role of PPPs in R & D and commercialization new products – actual and perceived, (5) Managing organizational diversity, (6) PPPs appraisal, and (8) Making PPPs in Zimbabwe more effective.

In obtaining the data, written consent was sought and obtained from both the research institutes and interviewees who took part in this study. Ethical Clearance, (Ref: *HSS/0457/013D*) was obtained from the University of Kwa-Zulu Natal, through the university's Humanities and Social Sciences Research Ethics Committee.

SPSS *Text Analytics* were used to sort the qualitative data emerging from the interview responses, into clusters and to locate the subsets of the data according to specified criteria. As a result a the responses were grouped in a related manner to cluster analysis as propounded by Aldenderfer & Blashfield (1984), in order to help structure the data to convey meaning. Most of the responses to the interview questions were common in nature. Section 4 provides some select responses from the interviews, most of which were indeed in line with literature. Table 1 gives a summary of the issues that emerged on the state of prevailing PPPs as guided by checklist constructs obtained from literature review, embedded with interview findings. Some of the data was used in the selection and proposal of a PPP framework, in section 5.

#### 4. MAIN FINDINGS

To start with, it emerged from the study that although all respondents from different institutes appreciate the idea of PPPs and their role, participants from two institutes only indicated that their institutes were engaged into “serious” collaborations – one identified as a BOOT and the

other, it emerged that it was a concessionary partnership. Statistically, these two translate to the fact that only 25% of the institutes that took part in the study have some PPP arrangements – a clear indication that PPPs formulation are still at grassroots level in developing economies such as Zimbabwe. Thus interview questions that revolved around the role of PPP's had ready answers from those respondents whose institutes were engaged in some PPPs. For instance, common roles that emerged from the study were in line with literature reviewed and these included: risk sharing, facilitation of technological commercialization, economy sustainability, innovation drive through sharing of ideas and expertise and modernization of the economy's infrastructure. One of the most common roles that emerged across all respondents was the fact that interviewees strongly felt that PPPs help in improving the economic competitiveness of the nation as a whole. This, the respondents said, can be enhanced through PPPs' ability to modernize national infrastructure. For instance, one respondent stressed that:

Indeed, PPPs help in resolving national problems. Take for instance, the E10 fuel PPP which saw the erection of the gigantic ethanol plant in Chisumbanje, how many jobs has it created? How many living standards have the structure improved? How many access roads have roads have been constructed? What about houses...?

In support of this opinion, another respondent echoed:

Of course we have a lot to gain than to lose with these alliances. You see when we engage in these alliances, in most cases we erect structures for production, sales and marketing, administration etc. hence employment is created, living standards are improved; peoples' tastes improve as they move along with technology. This means our new technologies' market uptake improves as well.

On the contrary, participants whose firms were not engaged in any PPP had nothing much to offer. It was only after trying to elaborate further about PPPs, that some began to recognize the potential value in PPPs. The participants however indicated that there was need for, besides financial resources – commitment, clear role distribution (which should be supported by “effective implementation”), willingness to participate, need for creation of, and adherence to clear PPP principles, transparency in all dealings – if success is to be achieved through PPPs. The majority of the interviewees alluded to the fact that PPPs have a great potential in unlocking the technological commercialization equation if they could get the necessary support and motivation. Thus the study supports the views of Witters *et al.*, (2012) who established that the PPP legal construction can go a long way in facilitating commercialization of TIs, building on the work of Brinkerhoff and Brinkerhoff (2004) and Sedjari (2004).

Asked the level of general public awareness they thought exist of the existence of some PPPs in Zimbabwe, the majority of the participants strongly felt that the general public is not very much aware of the existence of PPPs in Zimbabwe, “serve for a few” “constituencies” of respective research institutes.

With regards to managing organizational diversity, it emerged that in any PPP set-up, diversity

was indeed most likely to be inevitable. Due to diversified nature of the backgrounds from which each of the PPP players come from, multi-disciplinary proposals are most likely to emerge thus the respondents unanimously suggested that there is need for “stronger management...to make sure we get things done...”. Philbin (2008) notes that when commercializing technology, there is need to analyze both the technical and commercial positions, thus managing the expectations on both sides (diversity) is indeed crucial.

It was however evident from the findings that PPPs appraisal issues are still being looked down upon as most of the participants professed ignorance on how such appraisal could be done on existing partnerships. Thus, in order to fill in this gap, the researchers made use of the embedded checklist to assess the commercialization performance of the institutes with partnerships, and their overall performance was eventually compared against that of institutes without partnerships. Such performance was rated in terms of public awareness, market knowledge of the institutes’ products and general market preferences.

#### 4.1. Evaluating the effectiveness of the existing PPPs

Literature reviewed established that there are a number of ways that can be used to determine the effectiveness of PPPs. To start with, Chandran *et al.* (2009a) talks of the number of collaborative activities, networks and partnerships as one of the key indicators of the extent to which value is placed on PPPs. This is however influenced by the degree of interest to collaborate with public organizations among industries, which is in turn, also influenced by the gap in the nature of R & D activities between industry and research institutes. In assessing PPPs, Lund-Thomsen (2009; 2007) dominates the literature framework as he posits an integrated framework for assessing PPPs, which consists of about six criteria for assessing the impact of PPPs. These include relevance, effectiveness, impact, efficiency, sustainability, participation and the accountability criterion. Using these criteria, supported with views from other authors, Table 1 below summarizes issues that emerged on the state of prevailing PPPs as guided by checklist constructs.

**Table 1.** Literature and empirical responses on state of PPPs in Zimbabwe

<i>Criteria</i>	<i>Literature reference(s)</i>	<i>Findings / current state</i>
Relevance	This criterion is helpful in relation to evaluating whether clear objectives have been established for a given PPP, and whether these objectives are in line with those of partner organizations and intended beneficiaries. (Lund-Thomsen, 2007)	Most PPP arrangements are often initiated with a clearly stated objective but it is the consideration of whether the intended objective is in line with the interests of an intervention’s intended beneficiaries that usually lacks.
Effectiveness	The criterion draws attention to whether PPPs are capable of meeting the stated objectives (Lund-Thomsen, 2007)	Respondents indicated that though their PPPs had the capacity to meet objectives, efforts are shuttered through “claims that are made in the name of PPPs that never will be fulfilled
Impact	This criterion relates to the theoretical critique of PPPs, including whether partners are co-opted, regulatory efforts undermined, an internal culture of censorship developed (Lund-Thomsen, 2007).	Since our PPPs are mostly inclusive of the state, as the regulators, correct procedures are followed though at times, “shortcuts” are taken.
Efficiency	This useful in considering whether the PPP has used its resources efficiently in order to achieve its intended objectives (Lund-Thomsen, 2007)	Shared resources make all work fairly smoothly though at times there are issues over ownership.
Sustainability	The <i>sustainability</i> criterion helps assess whether the benefits generated through PPPs can be sustained over time, whether the PPP can financially sustain itself	Shared efforts make this possible (1+1=3).
Participation	The process through which stakeholders influence and share control over priority setting, policy-making, resource allocations and access to public goods and services	With cleared laid rules, participation is almost guaranteed. What lacks is the ability to identify, and concentrate efforts on what one partner is good at.
Accountability	How to keep power under control....how to prevent its abuse, how to subject it to certain procedures and rules of conduct” (Schedler <i>et al.</i> , 1999:13). Newell and Garvey (2005)	It is made clear that all involved are aware that they are accountable for their actions.
Social capital	As expressed through the social capital theory (Adler and Kwon, 2002)	Participants emphasized the need to gradually build up trust and commitment between the partners
Special Project Vehicle (SPV) / Collaboration agent	Woods <i>et al.</i> (2004) calls for the need for leaders and project co-coordinators	There are more benefits derived from having a person (special vehicle) who “drives forward” the partnership ensuring that the vigor is maintained.
Economic benefits	A PPP is said to have been effective if it reaps more socio-economic benefits than private benefits and industrial R & D and commercialization success.	This is especially true if the PPP was created with the society at heart.
Technology transfer	PPP success is achieved in terms of transfer of technology (Rasiah & Chandran, 2009).	Speedy, efficient and cost effective delivery of projects
Stakeholder consultation	Necessary in the development of PPPs programme, progress review etc. (Hellowell <i>et al.</i> , 2008)	Almost inevitable. The platforms help in shaping the way forward for improvement.

## 5. DEVELOPING A FRAMEWORK FOR CREATION OF PPPs

Both developed and developing economies are working towards formulating and sustaining PPPs in their various forms. However, most developing countries have lacked a framework for developing such partnerships. And to those economies who

have managed to set up some PPPs, not much has been done in terms of assessing how effective such partnerships have been. Various authors have identified factors they consider critical to the success of PPPs. Table 2 below attempts to summarize these CSFs that could be adopted in developing economies such as Zimbabwe.

**Table 2.** Critical success factors of PPPs

<i>Critical success factor (s)</i>	<i>Main contributors (Source)</i>
Consistent and justified changes in network relations	Aarikka-Stenroos & Sandberg (2012)
Argue that ICT is necessary to facilitate the formation and operation of virtually every PPP	Witters <i>et al.</i> (2012)
Informal networks often facilitate more formal relationships that facilitate spinoff and licensing arrangements with established firms	Martinelli <i>et al.</i> (2008); Landry <i>et al.</i> (2002)
Composition of the founding team, their collective industry experience, management capability, and knowledge are critical.	Pollock <i>et al.</i> , (2007); Rothaermel <i>et al.</i> (2007); O'Shea <i>et al.</i> (2005); Shane and Stuart (2002)
Need for a workable and efficient procurement protocol	Zhang (2005)
Available financial market	Jefferies <i>et al.</i> (2002); Qiao <i>et al.</i> (2001); Akintoye <i>et al.</i> (2001a)
Government involvement by providing guarantees	Qiao <i>et al.</i> (2001); Kanter (1999); Zhang <i>et al.</i> (1998); Stonehouse <i>et al.</i> (1996)
Good governance	Qiao <i>et al.</i> (2001); Badshah (1998); Frilet (1997)
Political support	Qiao <i>et al.</i> (2001); Zhang <i>et al.</i> (1998)
Stable macro-economic environment	Qiao <i>et al.</i> (2001); Dailami and Klein (1997)
Technology transfer	Qiao <i>et al.</i> (2001)
Appropriate risk allocation and risk sharing	Qiao <i>et al.</i> (2001); Grant (1996)
Sound economic policy	EIB (2000)
Shared authority between public and private sectors	Kanter (1999); Stonehouse <i>et al.</i> (1996)
Commitment/responsibility of public/private sectors	Kanter (1999); Stonehouse <i>et al.</i> (1996)
Favourable legal framework	Bennett (1998); Jones <i>et al.</i> (1996); Stein (1995)
Social support	Frilet (1997)
Well-organized public agency	Finnerty (1996); Jones <i>et al.</i> (1996); Stein (1995)

Haque (2004) underlines mutuality and organizational identity as the two key features for such partnerships. In support of O'Shea *et al.* (2005) and Shane and Stuart (2002), Rothaermel *et al.* (2007) emphasize that composition of the founding team, their collective industry experience, management capability, and knowledge, are all critical. Unfortunately, most of the few PPP's in developing economies teams lack these characteristics. Lack of most CSFs in developing economies has been attributed to the continued failure of PPPs.

As can be noted from the summary table, quite a considerable number of studies have focused on PPPs success factors. While these studies have developed different lists of critical success factors (CSF) for PPP/PFI projects, similarities and differences can be established. To this end, Li *et al.* (2005) have thus attempted to rank these CSFs according to their perceived relative importance - the top five CSFs being (1) Strong private consortium, (2) Appropriate risk allocation and risk sharing (3) Available financial market (4) Commitment/responsibility of public/private sectors and (5) Thorough and realistic cost/benefit assessment<sup>1</sup>.

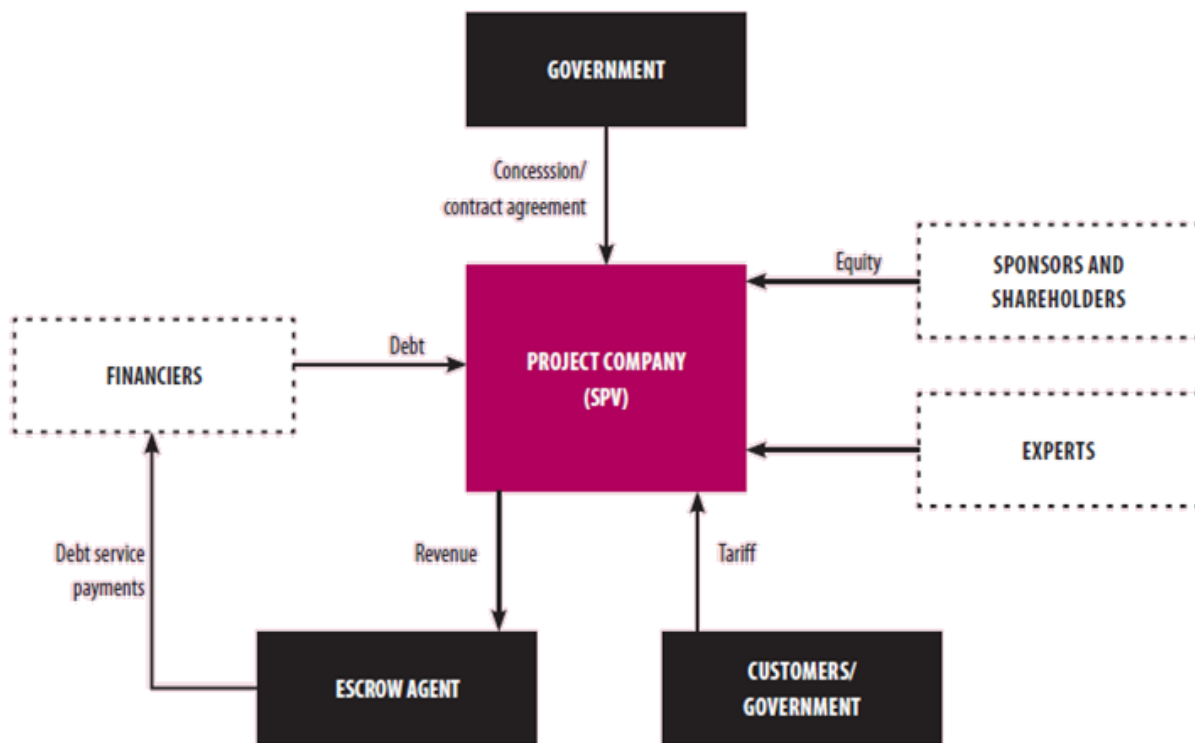
However, despite these CSFs, which have been mostly proven in PPPs / PFIs in developed economies, some problems have been reported with the partnerships, especially in the area of procurement. Pertinent issues include cost restraints on innovation, high costs in tendering, complex negotiation as well as differing or conflicting

objectives among the project stakeholders (Akintoye *et al.*, 2001). Some of these challenges can, however, be resolved by ensuring that an appropriate structure is set up for the PPP.

As can be noted from Figure 1, there is need to share risk amongst various participants in the partnership, including the government, financiers, agents and support from shareholders and various experts is also vital. Through this interaction, the private-sector consortium typically forms a special company—called a 'special purpose vehicle' (SPV)—to develop, build, maintain, and operate the assets for the contracted period (Witters *et al.*, 2012). Within the PPP, it is the SPV that then signs the contract with the government and with subcontractors (where necessary) to build the facility and then maintain it.

Different participants play varying roles for the achievement of the common goal in the PPP. For instance, the shareholders provide equity into the SVP, while the experts are the providers of some specialized knowledge. The government provides a conducive legal framework (Qiao *et al.*, 2001), sound economic policy (EIB, 2000) as well as the appropriate resource base; while financiers should financially support the partnership. All partners involved share risk, reward, and responsibility for a shared investment (Akkawi, 2010). And as noted earlier on, Witters *et al.*, (2012) reiterate that PPPs are not simply tools for funding projects, but they require full commitment from all partners (as shown in the structure) for the entire undertaking.

Figure 1. Typical structure of a PPP project



Source: UN ESCAP, 2011 in Witters et al., 2012

The precise roles and responsibilities of the public and private sectors in any PPP will depend upon the contractual terms agreed and will vary from project to project. However, in most PPP's private sector contractors become long-term service providers rather than simple upfront asset builders. As a result, central and local government agencies become more involved as regulators and focus their resources upon service planning, performance monitoring and contract management rather than upon the direct management and delivery of services (Hellowell et al., 2008).

## 6. CONCLUSIONS AND RECOMMENDATIONS

Research shows that collaborative R & D and commercialization activities among industries in most developing economies are still low though there is a great potential for improvement. Most literature dwells on PPPs in national service delivery and very little work has been done focusing on TIs' commercialization PPPs. This paper has proven that PPPs can be safely used in R & D and commercialization of TIs in the same manner they are utilized elsewhere.

The findings of this study imply that there are limited understandings surrounding the value that could be unlocked in commercializing research institutes' innovations through PPPs. Thus there is need to educate various research institutes of the "miracles" a carefully-run PPP can work in getting new TIs to the market. In a modern competitive world where standardization is slowly taking precedence due to globalization forces, the only way is to cooperate with other firms. Some have even opted to collaborate with their competitors, a move described as "co-petition", all meant to prove that

the combined efforts of two or more, far surpass individual efforts (1+1=3).

To the few existing PPPs in Zimbabwe, the findings show that there is lack of integrative frameworks for the management of, and success of the PPPs. Anchored on promoting ideal collaborations in which all key values are honoured, the study thus proposes a framework that emphasizes a collaboration in which the public research partner concentrates on research and development, while the private partner uses her market analytics to focus on getting the product to the market.

## 7. DIRECTIONS FOR FURTHER STUDY

While most authors sing the PPPs tune as a partnership between the private institute and the government (public institute), Greer and Lei (2012) emphasize that research institutes should engage into Collaborative Innovation with Customers (CIC), a concept which the authors argue has not been fully explored and put into practice. From the review of some recent literature on the subject (e.g. Lichtenthaler, 2011, 2009; Ojanen and Hallikas, 2009), it would seem that a blending of the CIC concept with PPPs could bring some unique but complete results. Though this paper study did not necessarily blend these concepts, efforts were made to ensure that the model developed encompassed concepts from both PPP and CIC schools of thought.

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