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**PUBLIC SECTOR PRODUCTIVITY
AND COMPETITIVENESS**



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PUBLIC SECTOR PRODUCTIVITY AND COMPETITIVENESS

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Foreword

The aim of Public Enterprise Half-Yearly Journal is to disseminate high-quality scholarly research and add to the pool of knowledge on the subject of public enterprise by publishing theoretical and empirical academic articles in the field of governance of public enterprises.

The issues of ‘productivity’ and ‘competitiveness’ of the public sector are very topical in every economy, being associated with a nation’s growth, living standards, and deficit reduction. And although their definition, measurement, and improvement are subject of constant debate, their very presence is both a market necessity and a political imperative, with an increasing pressure for public-sector organizations to demonstrate progress with effective measures in both the areas. It is thus relevant to seek greater understanding and continuous improvements in the productivity and competitiveness of the public-sector organizations, so as to increase the likelihood of successfully developing appropriate models of productivity and competitiveness.

This Special Issue on *Public Sector Productivity and Competitiveness* of Public Enterprise Half-Yearly Journal includes five research articles by authors from Austria, India, Peru, the United Kingdom, and the United States. It spans a spectrum of research areas, such as disinvestment (privatization), performance contracts, public sector restructuring, and public reform; city planning, urban economics, and urban competitiveness; sustainable land management and national competitiveness; productivity, market competitiveness, and strategic management; and public sector productivity measurement.

In the paper titled “*Bolder Disinvestment or Better Performance Contracts? Which Way Forward for India’s State-Owned Enterprises*”, Ajay Chhibber and Swati Gupta focus on policy variables and factors affecting the efficiency and productivity of India’s Public Sector Undertakings (PSUs) using various measures of value added. More specifically, the authors analyse the performance of India’s PSUs using measures of labour and overall efficiency and productivity indicators as opposed to financial returns. Among others, results indicate that disinvestment has a very strong positive effect on firm efficiency, improving labour productivity and efficiency, as well as overall efficiency, while performance contracts have no positive and sometimes negative effect on performance. The paper concludes with recommendations for practice, among which the suggestion for the adoption of a bolder privatization roadmap for gradually getting the Indian government out of the business of business.

In the paper titled “*The Public Sector and its Contribution to Urban Competitiveness*”, Peter K Kresl invites us to an in-depth discussion of and reflection on the evolution of the role of public authorities in recent decades in relation to city planning for competitiveness. The author advances that not only do the tools for competitiveness change over time, but the goals keep changing, as do city planners’ objectives. In other words, it is postulated that city planning for competitiveness enhancement has not actually evolved as it has

changed fundamentally in nature as the economy has developed over the past century or more. The paper also discusses the case of the company Amazon that opened a competition among over 230 cities in North America for its second headquarters complex.

In the paper titled “*Sustainable Land Management: The Forgotten Pillar of Competitiveness*”, Emigdio Alfaro proposes the Sustainable Land Management’s Integrated Framework for Interventions (SLMIFI). The proposed framework contains objectives and indicators for managing the fight against climate change, the conservation of biological diversity, and the fight against desertification, land degradation, and drought, with a holistic approach. SLMIFI could assist relevant policymakers in their efforts to develop and manage environmental projects with a focus on sustainable land management. Among others, the paper advances the necessity to include sustainable land management as an important pillar in the construction of competitiveness indexes. The extensive analysis performed is further complemented with managerial recommendations and avenues for future research on the topic.

In the paper titled “*Lay-Off to Hats-Off: The Strategic Turnaround of Public Enterprise*”, Febi Varghese and Vinachi Arachi Jabamala walk us through the successful case of Kerala Minerals and Metals Ltd. (KMML), the largest public sector undertaking, that managed to turn around from the verge of lay-off and the possibility of closure to a state of productivity and competitiveness in a short period of time. The insightful lessons point towards the support and cooperation of the employees within the organisation, which coupled with the strategies adopted by the management to increase the production, was key to making the company change status from operating on overdraft to earning profit.

Finally, in the paper titled “*Stakeholder Involvement for Public Sector Productivity Enhancement: Strategic Considerations*”, Vincent Charles, Tatiana Gherman, and Juan Carlos Paliza invite us to reflect on the various definitions of public sector productivity and its measurement, with the aim to highlight the need for more innovative solutions to the issue of public sector productivity enhancement. The authors propose the creation of “collaboratories”, or powerful action-learning environments or platforms that bring together the various understandings and stakeholders, and wherein each of the actors involved would serve a dual role of both facilitator and learner. The paper is a contribution to the existing debate on the topic of public sector productivity enhancement.

The many academics and researchers who contributed articles and the experts within the field who reviewed the articles have made this *Special Issue on Public Sector Productivity and Competitiveness* of the *Public Enterprise Half-Yearly Journal* possible. We wish you, our readers, informative reading!

Vincent Charles
Special Issue Editor

Bolder Disinvestment or Better Performance Contracts? Which Way Forward for India's State-Owned Enterprises

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Abstract

This paper analyses the performance of India's Public Sector Undertakings (PSUs) using measures of labour and overall efficiency and productivity indicators as opposed to financial returns. Using methods that correct for selection bias, the results show that performance contracts do not improve firm efficiency, but disinvestment has a very strong positive effect on firm efficiency. Disinvestment improves labour productivity and efficiency, which is not surprising, but it also improves overall efficiency. India should pursue much bolder privatization even of PSUs which claim to be making operational profits – such as Air India, because privatization improves overall firm efficiency and unlocks capital for use elsewhere, especially in public infrastructure, and reduces the possibility of political interference in their functioning in the future.

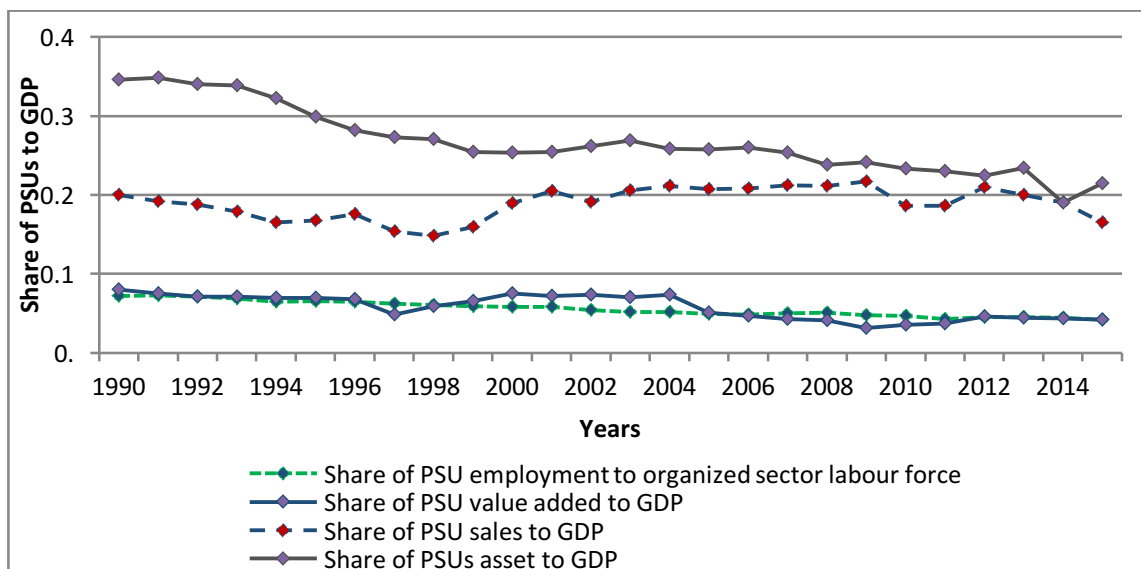
Keywords: Disinvestment (privatization), MOU (performance contract), public sector restructuring, public sector undertakings, state owned enterprises.

Reference to this paper should be made as follows: Chhibber, A. & Gupta, S. (2019). Bolder Disinvestment or Better Performance Contracts? Which Way Forward for India's State-Owned Enterprises. *Public Enterprise*, 24(1), 1-22.

Introduction

Since the 1980s, the number of public sector undertakings (PSUs) in India has varied between 213 and 241. Of these, 7 largest PSUs are called Maha Ratnas, 17 are called Nav Ratnas, and 73 are given the title of Mini Ratnas. The remainder has no classification as such. About half of them are in manufacturing and mining and the rest are in the service sector – transport, telecommunications, financial services, and so on (service sector PSUs are about 106, while those in the non-service sector are 129). These are the remnants of India’s socialistic legacy from the Nehru-Gandhi era.

The combined asset of all PSUs was around 35% of GDP in 1990 but by 2015 had declined to just over 20% of GDP (Figure 1). Over the same period, the sales to GDP ratio declined from 20% of GDP in 1990 to about 16% of GDP in 2015, a much smaller decline indicating that the sales to asset ratio increased from 0.5 in 1990 to around 0.8 in 2015. Value added, created by PSUs, as a share of GDP and the ratio of PSU employment to total organized employment in the economy declined from around 8% of GDP in 1990 to under 5% of GDP by 2015. Post the economic reforms of 1991, although the number of PSUs has remained more or less the same, their share in the economy measured by value added, employment and sales has declined, as the private sector has expanded faster. This is a pattern we see in several other countries with State capitalism such as in Brazil and China, where the share of State enterprises has also been declining.



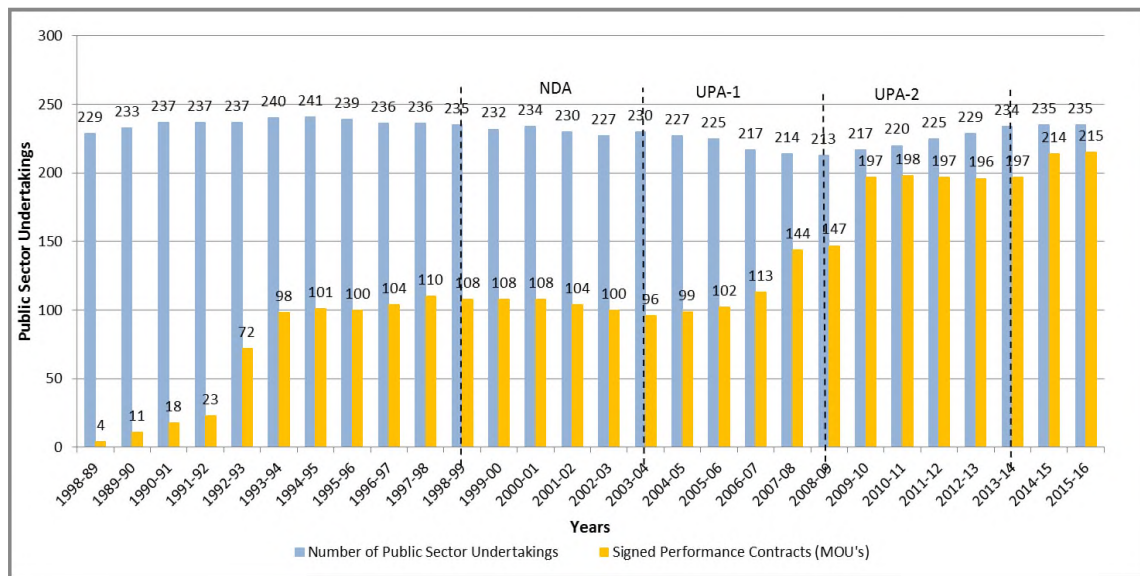
Note. Source: Public Enterprise Survey, 1988-89 to 2014-15.

Figure 1. Value added, sales, and employment in PSUs (1990-2015).

The economic reforms of 1991 dismantled the “license-raj” but left the PSUs more or less intact. Vigorous efforts were made to try and improve their performance through performance contracts called Memorandums of Understanding (MoUs) with some success as the number of loss makers declined. But yet, with still a third of the PSUs making substantial losses.

A partially successful attempt made under the NDA-1 government from 1999-2004 to initiate the dismantling of this legacy with strategic disinvestment (privatization) met with considerable opposition from vest-

ed interests and labour unions. Subsequent UPA governments have tried to further improve the performance of these companies through better performance contracts and bringing more PSUs into the Ratna classification. The number of MoUs increased rapidly in the early 1990s from 4 in 1988-89 to over 100 by 1994-95. A second big jump came in the late 2000s and the number of MoUs jumped to 197 by 2009-10 and to 215 by 2015-16, with only 20 PSUs now remaining without performance contracts (Figure 2).



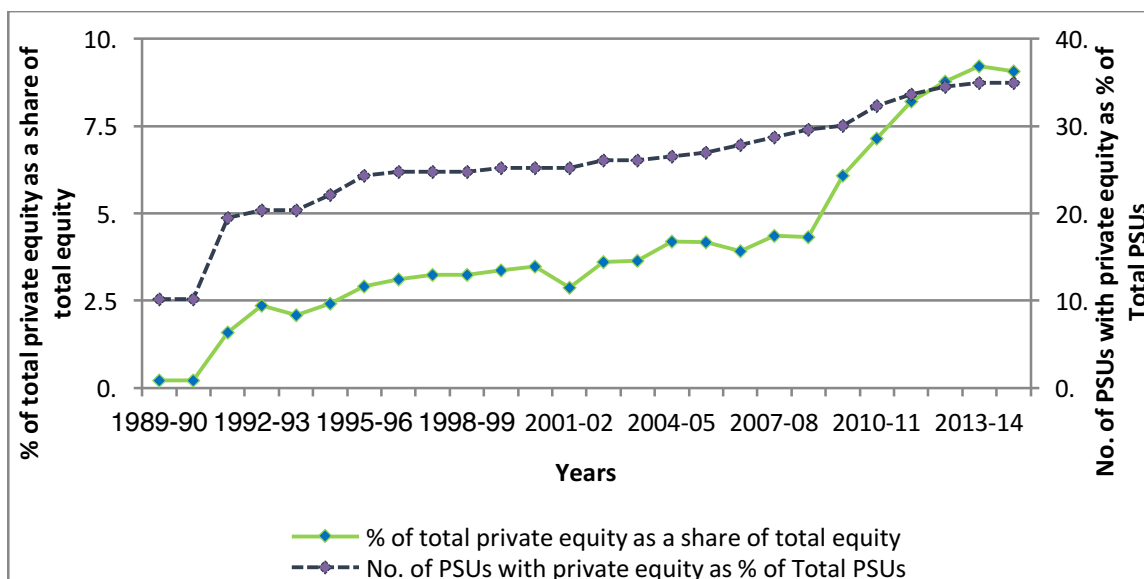
Note. Source: Public Enterprise Survey, 1988-89 to 2014-15.

Figure 2. Growth of PSUs and performance contracts (MoUs).

The Department of Disinvestment was created in 1999 and the objective of disinvestment under it was not only to raise revenue but also to improve efficiency. Over 30 companies were either fully privatized or 50% of their stock divested¹, including one of India's most successful privatization initiatives — the sale of Maruti to Suzuki was completed during this period. But, the initiatives were internally opposed within the NDA government and the bureaucracy as the control over PSUs would have meant jobs, patronage and corruption in PSU contracts. What is surprising is that while the NDA government was aggressively pursuing privatization, some new PSUs were also created.

The UPA-1 government which came to power in 2004, backed by the communists, did not aim to privatize PSUs, although a few were shut down. UPA-2 brought back disinvestment with the intent to raise revenue, and the share of private equity in total equity in all PSUs combined jumped from around 4% in 2008-09 to over 9% by 2013-14 (Figure 3). Over one-third of the PSUs had some private equity in them.

¹ Bombay Stock Exchange Disinvestments Database, March 2015.

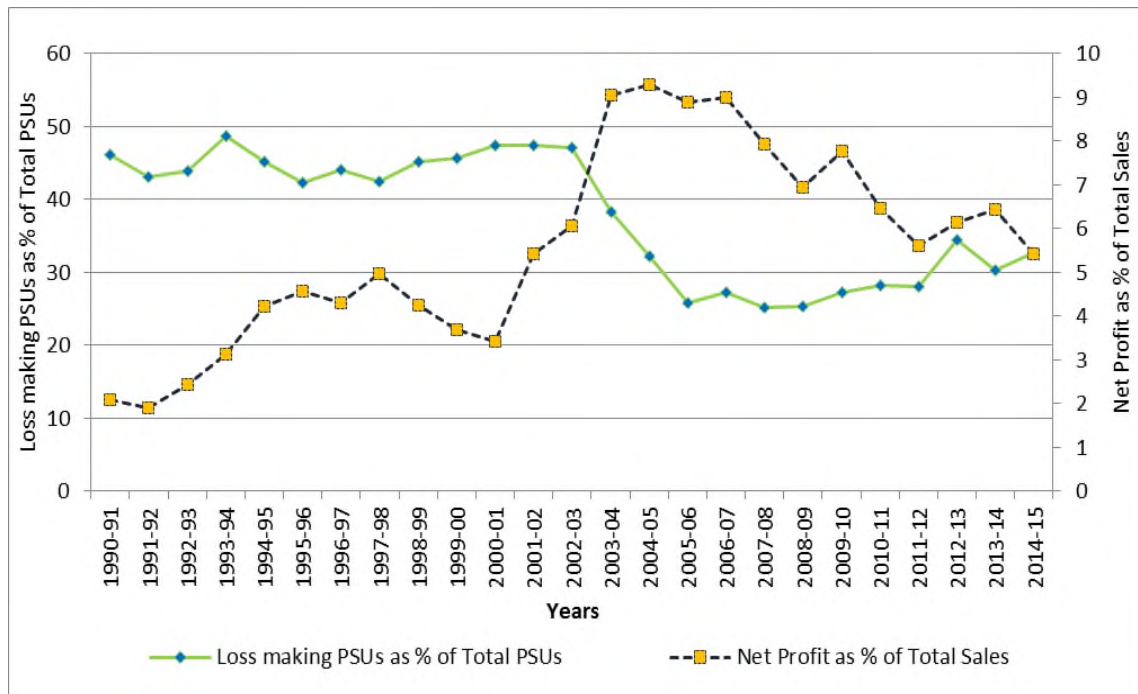


Note. Source: Public Enterprise Survey, 1989-90 to 2014-15.

Figure 3. Progress on disinvestment (partial privatization) 1990-2015.

The UPA 1 government also encouraged the restructuring of State-owned firms by creating the Bureau for Restructuring of Public Firms. A National Investment Fund was also created to collect disinvestment receipts, with the idea that it would be strategically deployed rather than used as part of budget receipts. Following fiscal pressures after the 2009 crisis, the criterion was gradually relaxed until the fund, for all practical purposes, became part of the budget. With the NDA government coming to power in 2014, there was an expectation that the disinvestment, pursued quite aggressively by NDA-1, would be taken up again and while not much has happened in the first two years so far there are signals that more effort will be made in the remainder of its term – especially with the decision to sell Air India.

Almost half of the PSUs were making losses in the 1990s, but with the period of high growth from 2002-3 onwards, the number of loss-making PSUs declined to about a quarter (Figure 4). But since then and especially once growth slowed down after 2012, the share of loss makers has increased again to almost one-third of the total. Profitability of the PSUs, measured here by profits over total sales, has also increased from an abysmal level of 2% in 1990-91 to around 3% by 2000-01, then peaked at almost 9% between 2003-4 and 2006-7 and has since fallen to between 5-6%. How much of the improved performance is due to MoUs and how much is due to partial privatization will be explored further in the later sections of the paper. We will also explore whether there are differences in performance due to hard budget constraints as well as the degree of competitiveness in the industry in which the PSU is operating.



Note. Source: Public Enterprise Survey, 1989-90 to 2014-15.

Figure 4. Trends in profits and losses in the Indian PSUs (1990-91 to 2014-15).

Earlier studies on PSU performance in India and the proposed approach

There are a vast number of studies on privatization around the world with mixed results. Many of them show that privatization improves labour productivity and even profitability but not necessarily overall efficiency and productivity. A comprehensive survey (Megginson & Netter, 2001) of this literature concluded that divested (fully and partially privatized) firms almost always become more profitable and more efficient. An OECD survey soon thereafter also arrived at the same conclusion. Subsequent surveys (Muhlenkamp, 2013) have questioned these findings and shown that the previous survey suffered from flaws. It questions whether privatization leads to greater efficiency and argues that public and private sector firms perform the same when subject to competition and better regulation. Few authors have argued that many of the studies have methodological flaws because the gains from privatization may be due to selection bias – since better performing PSUs may be privatized first. The most recent survey by UNDP’s Global Centre for Public Service Excellence (GSCPE, 2017) shows that privatization is likely to lead to positive results in markets with greater competition and better regulation. These results are more likely in developed countries but not so in middle income and developing economies, where the results of privatization are more mixed.

There are a large number of studies that discuss the performance of PSUs in the Indian context. But very few of these use rigorous techniques and are therefore largely descriptive (Arun & Nixon, 2000; Mathur, 2010; Nagaraj, 2005; and Trivedi, 1990). Some of the most prominent rigorous studies (e.g., Gupta, 2006, 2011) showed that disinvestment (even the sale of minority shares) had a positive effect on PSU financial performance, ostensibly because new owners injected greater commercial drive, which helped improve

profitability. But this result has been challenged by recent studies as it did not factor in the effect of performance contracts - MoUs. More recent studies (Gunasekar & Sarkar, 2014) showed that when PSUs with and without MoUs are considered, much of the financial performance improvement – earlier attributed to privatization – is due to the performance effect of MoUs. The positive effect of privatization disappears once the MOU performance effect is taken into account. So, a policy of selling a minority stake (up to 49%) as a disinvestment measure is unlikely to have any positive effect on financial performance.

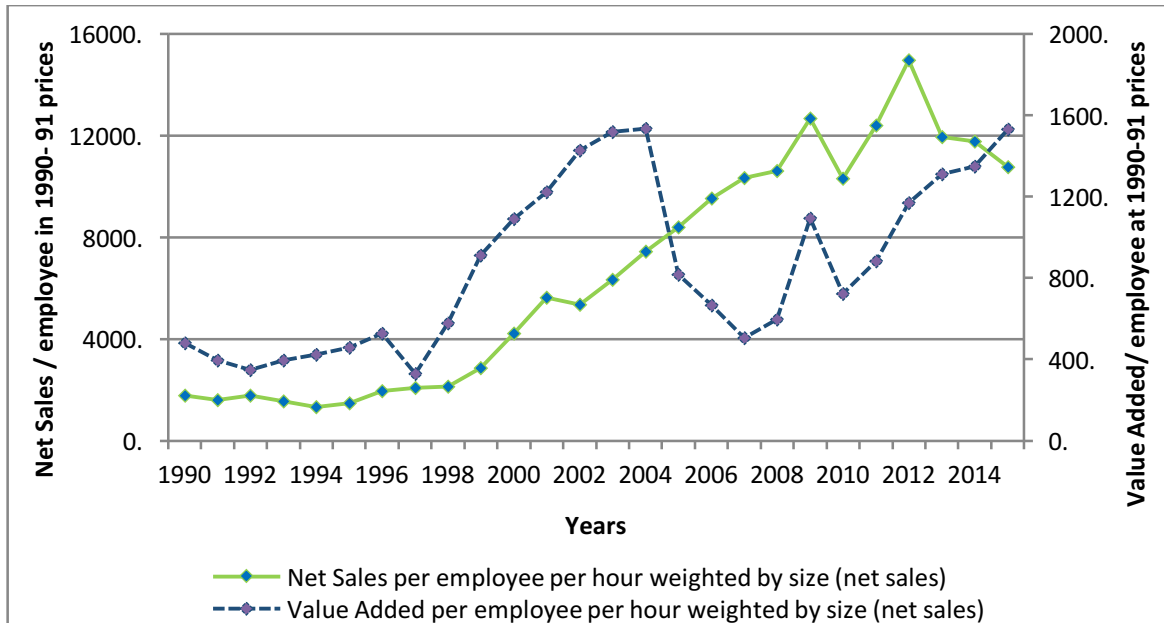
In another recent paper, Jain (2016) used technical efficiency as the performance variable, instead of financial rates of return. She applied a stochastic frontier analysis technique to generate technical efficiency by industry and by firm and then examined the impact of disinvestment and the ideology of the state government in which the enterprise is located as well as whether the state government belongs to a political party that is different from the central government. The results indicated that disinvestment, even partial disinvestment, has a strong positive effect on firm performance. The political ideology of the state government as well as whether the state government and the central government belong to different parties has a significant effect on performance. Her results are, however, dependent on the credibility of the method used to calculate technical efficiency.

In a previous paper, Chhibber and Gupta (2017) analyzed the performance of India's 235 PSUs using firm-level data over the period 1990-2015 from the Public Enterprise Survey (time series panel data set); the authors looked into the factors that explain financial performance – return on capital (ROC) and return on assets (ROA) of these PSUs. The results showed that MoUs had a positive impact on PSU performance by increasing their return on capital (ROC). This result holds mainly for the non-service sector (manufacturing, mining) but less so for service sector firms. In the case of service sector firms, partial privatization (share sales) had a positive impact on performance, making them ideal candidates for more aggressive disinvestment. The results also showed that larger PSUs – Maharatnas – appear to perform better on financial indicators than smaller PSUs and even better than private firms of similar size.

The present paper shifts from using financial rates of return which was used in the previous paper by Chhibber and Gupta (2017) to study measures of productivity in the PSUs. The paper uses value added per employee (VAE) as a measure of labour productivity. In addition, it also uses value added per assets (VAA) and value added per capital (VAC) as measures of efficient use of assets and capital and the turnover ratio measured by net sales to assets (NSA) as a measure of operational efficiency.

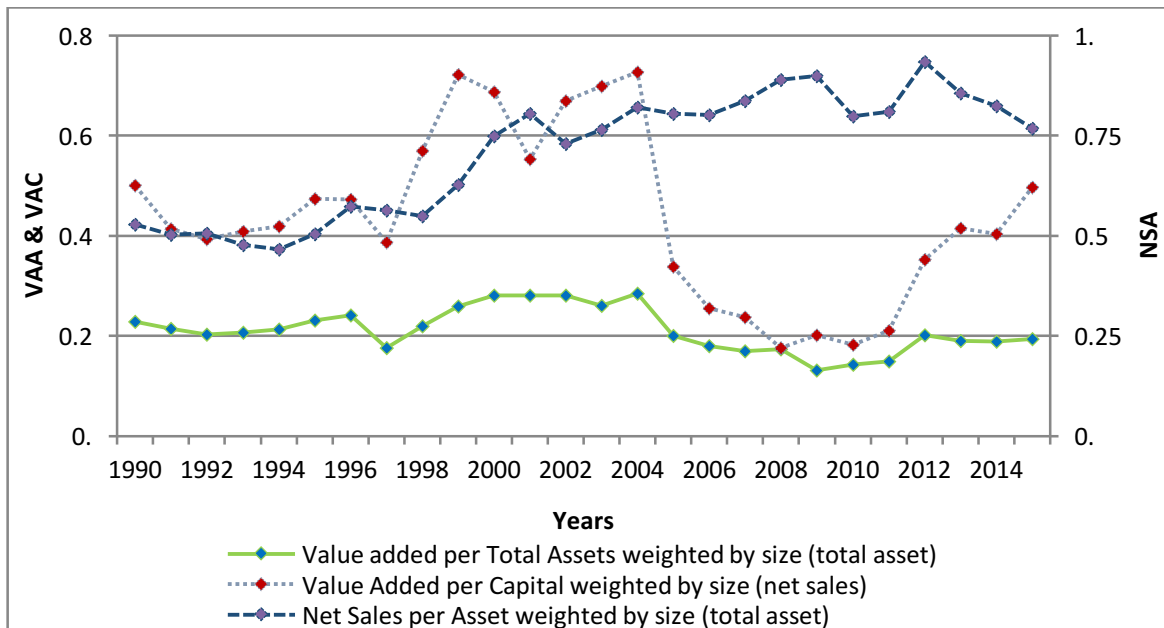
NSE and VAE have increased five-fold and four-fold, respectively, between 1990 and 2015 (Figure 5). On an annual average basis this translates to a 2.0% per annum for VAE against overall labour productivity growth of 5.2% for the labour force as a whole of the Indian economy. The increase in VAE was very rapid initially increasing from INR 400 per employee per hour in 1989-90 prices to INR 1600/- in 2003-04, fell sharply after that before recovering back to INR 1600/- per employee by 2014-15. Labour productivity in PSUs increased considerably slower than average labour productivity growth of around 5.2 % for the economy as a whole (including low productivity sector such as agriculture) over the same period.

Value Added per asset has remained around 0.2 over the entire period 1990 to 2015 (Figure 6). It went up to 0.3 in 2003-04 but since then fell back to settle at 0.2. Value added per unit of capital has remained around 0.5 in 1990 and again at the end of the period 2015 but in between fluctuated considerably rising to 0.7 in 2003-04, falling to 0.2 in 2008-09 and then rising again after that. Net sales per asset (NSA) has increased from around 0.5 to 0.8 over the entire period 1990-2015.



Note. Source: Public Enterprise Survey, 1989-90 to 2014-15.

Figure 5. Net sales and value added per employee in PSUs (1990-2015).



Note. Source: Public Enterprise Survey, 1989-90 to 2014-15

Figure 6. Value added per capital and per asset and net sales per asset (1990-2015).

The Model

The nature of the industry, the size of the PSU, how well the economy is doing and other factors such as a hard budget constraint and the performance contracts can affect the performance of the PSUs. Some PSUs have soft budget constraints per se, some are given soft loans under various dispensations which allow them to have a soft budget as these loans are frequently rolled over. PSUs that are more export-oriented may also have better performance as they face greater external competition as against those that sell in a more protected domestic market – although lately, India has become more open so even PSUs selling largely into the domestic market face higher competition from imports.

For a better understanding of the effect of various factors on PSU productivity performance, the paper estimates a model over the period 1990 – 2015 using panel data assembled through the Public Enterprise Surveys which each PSU is required to file every year.

The model estimated for this paper is as follows:

$$Y_{it} = \alpha_G + \eta_I + \beta' X_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it},$$

where:

Y_{it} = represents the productivity performance variable, VAE, VAA, VAC for firm 'i' at time 't';

α_G = represents the group effects for Type-1, Type-2, and Type-3 PSUs;

η_I = represents industry fixed effects;

X_{it} = represents the variables for showing before and after effect of a performance contract MOU and partial privatization (disinvestment);

P_{it} = represents the preparation effects – the actions taken to qualify for an MOU and disinvestments;

Z_{it} = represents the control variables;

ε_{it} = represents the error term.

Type-1 includes firms which neither have management autonomy nor are partially privatized, Type-2 includes firms which signed MoU with the government, and Type-3 includes firms which got partially privatized and signed MoU.

Control Variables:

SOFTLN = Ratio of loans borrowed by PSU from the central government to total loans borrowed, lagged by one year;

LASSET = Log of total assets, which is a size effect;

EXINT = Ratio of exports to total sales;

DEPINT = Ratio of depreciation expenditure to total sales;

GRGDP_{constant price} = Growth Rate of GDP at constant prices;

Industry effects = Industry dummies, one dummy for each of the 22 industry groups, taking the value of 1 for a particular industry and zero otherwise;

α_2 = Dummy variable that takes the value of 1 for Type-2 PSUs and zero otherwise;

α_3 = Dummy variable that takes the value of 1 for Type-3 PSUs and zero otherwise.

These are included to control for selection bias as the first of these dummies measure the average difference between firms with no MoU or disinvestment and the second captures the difference between firms with MoU but no disinvestment with those that had disinvestment.

Performance Contract Variables:

MoU = Dummy variable that takes the value of 1 in period ' $t+1$ ' if the firms had signed an MoU in year ' t '; and the value of zero, otherwise;

mouprep0 = Dummy variable that takes the value of 1 for the year PSU signed an MoU and zero otherwise;

mouprep1 = Dummy variable that takes the value of 1 for year ' $t-1$ ' if the firms signed an MoU in year ' t ' and zero otherwise;

mouprep2 = Dummy variable that takes the value of 1 for year ' $t-2$ ' if the firms signed an MoU in year ' t ' and zero otherwise;

mouprep3 = Dummy variable that takes the value of 1 for year ' $t-3$ ' if the firms signed an MoU in year ' t ' and zero otherwise.

Partial Privatization Variables:

ppvt_dummy = Dummy variable that takes the value of 1 for PSU in time ' t ' and thereafter if the firm gets partially privatized in year ' t ' and zero otherwise;

ppvt_shr = Share of private equity to the PSU total equity;

ppvt_prep1 = Dummy variable that takes the value of 1 for year ' $t-1$ ' if the PSU became partially privatized in year ' t ' and zero otherwise;

ppvt_prep2 = Dummy variable that takes the value of 1 for year ' $t-2$ ' if the PSU became partially privatized in year ' t ' and zero otherwise;

ppvt_prep3 = Dummy variable that takes the value of 1 for year ' $t-3$ ' if the PSU became partially privatized in year ' t ' and zero otherwise;

Table 1 shows the sample description of the sub-samples of PSUs to study the differential impact of ‘MoU signed with the government’.

Initially, we use S1, where we include all the observations of type-1 and type-2 and type-3 pre-privatization:

$$Y_{it} = \alpha_2 + \alpha_3 + \eta_{it} + \beta_1 \text{MoU}_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it}. \quad (1)$$

The second estimation is done using S2, which excludes type-1 PSU, focusing only on the firms which have an MoU and had share sales. It consists of type-2 and type-3 observations pre-privatization only:

$$Y_{it} = \alpha_3 + \eta_{it} + \beta_1 \text{MoU}_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it}. \quad (2)$$

Table 1
 Description of Sample Used in the Analysis by Type of PSUs

Sample Observations						
	Type-1	Type-2		Type-3		
Sample Type	No Reform	Pre-MOU	Post-MOU	Pre-MOU	Post MOU-Pre-PPVT	Post-PPVT
	Regime 1	Regime 1	Regime 2	Regime 1	Regime 2	Regime 3
S1	√	√	√	√	√	-
S2	-	√	√	√	√	-
S3	-	√	√	-	-	-
S4	√	√	√	√	√	√
S5	-	√	√	√	√	√
S6	-	-	-	√	√	√

The third estimation is done using S3 by taking type-2 firms only, *i.e.*, those with MoUs, but excludes those that had share sales:

$$Y_{it} = \eta_{it} + \beta_1 \text{MOU}_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it}. \quad (3)$$

The fourth estimation is done using S4 by taking all the three types, type-1, type-2, and type-3, to show the impact of partial privatization on the entire sample of firm-year observations. Given that all partially privatized PSUs were also under MoU, the coefficient of the partial privatization variable that is PPVT_DUMMY and PPVT_SHR captures its incremental effect over and above the MoU.

$$Y_{it} = \alpha_2 + \alpha_3 + \eta_{it} + \beta_1 \text{MoU}_{it} + \beta_2 \text{PPVT_DUMMY/PPVT_SHR}_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it} \quad (4)$$

The fifth estimation is done using S5, which excludes type-1 PSUs, focusing only on the firms which have an MoU and had share sales. It consists of type-2 and type-3 observations, including post-privatization of type-3.

$$Y_{it} = \alpha_3 + \eta_1 + \beta_1 \text{MOU}_{it} + \beta_2 \text{PPVT_DUMMY} / \text{PPVT_SHR}_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it} \quad (5)$$

The sixth estimation is done using S6 and is similar to S2, and is conducted before and after study of only type-3 PSUs, those who signed the MoU and partially privatized, to compare their performance before and after partial privatization.

$$Y_{it} = \eta_1 + \beta_1 \text{MOU}_{it} + \beta_2 \text{PPVT_DUMMY} / \text{PPVT_SHR}_{it} + \eta' P_{it} + \gamma' Z_{it} + \varepsilon_{it} \quad (6)$$

Empirical Findings and Implications

Using the latest PSU survey data, we have estimated the equations (1), (2), and (3) for the period 1990-2015 with value added per employee (VAE) as the dependent variable.

Value Added per Employee (VAE) is often used as a measure of labour productivity. Performance contract MoU has no significant effect on VAE (Table 2a). Firm size LASSET has a significant positive effect on VAE. Soft loans have a positive effect on labour productivity – presumably as these funds are used to buy new equipment and/or for labour training.

Table 2a

Regression for Value Added per Employee (VAE) MOU Effect (1990-2015)

Variables	Sub-Sample S1		Sub-Sample S2		Sub-Sample S3	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	-0.2258045***	-0.2223916***	-0.2585025***	-0.2460657***	-0.2363382***	-0.2247423***
mou_prep0		-0.0278763**		-0.0260053*		-0.022787
mou_prep1		-0.0133997		-0.0116697		-0.0101831
mou_prep2		-0.0262621		-0.0244716		-0.019113
mou_prep3		-0.0405593**		-0.0391663*		-0.0267375
MOU	-0.0103466	-0.0152996	-0.0101205	-0.0146697	-0.0128594	-0.0159353
SOFTLN	0.0164172	0.0168321	0.0211019*	0.0212305*	0.0257695**	0.0252534**
LASSET	0.1444896***	0.1398684***	0.1538821***	0.1490752***	0.1452213***	0.1407979***
EXINT	-0.000213	-0.0002221	-0.0051774	-0.0052701	-0.0012675	-0.0013905
DEPINT	0.0000615	0.0000753	-0.0080143	-0.0073881	-0.0067736	-0.0061886
GRGDP constant price	-0.0008827	-0.0004893	-0.0011652	-0.0007507	-0.0022307	-0.0018954
α2	-0.0131572	-0.0040889	NA	NA	NA	NA
α3	-0.13802***	-0.1220562**	-0.1279139***	-0.1211764***	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.342	0.346	0.3453	0.349	0.3748	0.3786
No. of Observations	2536	2536	2401	2401	2121	2121

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level **Significance at 5% level *** Significance at 1% level.

In contrast to performance contracts disinvestment – whether measured by privatization dummy (ppvt_dummy) or by the private share in equity – it has a strong and very significant positive effect on VAE (Tables 2b and 2c). In fact, when a privatization dummy is used, the benefits of a decision to divest starts three years prior to the actual divestment. Firm size also has a strong positive effect on value added per employee. In the case of S3 firms, export orientation has a negative effect on VAE.

The coefficients of the dummy variable α_2 for Type 2 firms which signed an MOU are negative but insignificant, which suggests Type 1 firms have on average the same VAE compared to Type 2 firms. The coefficient for the dummy variable α_3 , which controls for group effects of firms that had some privatization, is negative and highly significant. This shows that on average VAE is lower for Type 3 firms when compared to Type 2 firms. These variables were introduced to remove selection bias.

The results for value added per employee (VAE) as a measure of labour productivity suggest that the introduction of performance contracts (MoUs) has no significant effect on them. However, disinvestment has a very significant and positive impact on them. This result is not so surprising as many studies found that privatization increases labour productivity, as firms retrench labour and invest in capital after privatization. In the case of Indian PSUs, retrenchment is not so easy, so the result is largely due to more efficient use of labour through restructuring, also possibly due to new investment in equipment from the proceeds of the disinvestment: some of which are retained by the PSU and some passed back to the budget.

Table 2b
Regression for Value Added per Employee (VAE) Disinvestment Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	-0.2410661***	-0.2303463***	-0.286218***	-0.2718267***	-0.8713268***	-0.8644863***
ppvt_dummy	0.1594198***	0.2739901***	0.1567953***	0.269816***	0.0926618***	0.1735557***
ppvt_prep1		0.1890245***		0.1863496***		0.1275967***
ppvt_prep2		0.1857151***		0.1833557***		0.1234164***
ppvt_prep3		0.0734235***		0.0717535*		0.0123478
mou_prep0	-0.019572	-0.0229785	-0.0186553	-0.0219736	0.0108952	-0.0033748
mou_prep1	0.0023797	0.0003994	0.0039184	0.0020352	0.0710983	0.066326
mou_prep2	-0.015233	-0.0157661	-0.0128534	-0.013406	-0.0086199	-0.0120891
mou_prep3	-0.032179	-0.0274962	-0.030239	-0.0256122	-0.0845523	-0.0612194
MOU	-0.0140878	-0.0149253	-0.0137239	-0.0144676	-0.0016068	-0.0044511
SOFTLN	0.0138858	0.0137378	0.0182893	0.0181099	-0.0283872	-0.0309465
LASSET	0.161761***	0.1563224***	0.1725626***	0.1669571***	0.3551607***	0.3327858***
EXINT	-0.0003078	-0.0002872	-0.0108614*	-0.009557	-0.2291217***	-0.206119***
DEPINT	-0.0002997	-0.0002538	-0.0009594	-0.0008678	0.0002163	0.0002107
GRGDP constant price	-0.0020222	-0.002253	-0.0024062	-0.0026422*	-0.0054282	-0.0060932
α_2	-0.0224055	-0.0191119	NA	NA	NA	NA
α_3	-0.2238862***	-0.3130697***	-0.2024044***	-0.2930852***	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.3542	0.3507	0.355	0.3519	0.3898	0.386
No. of Observations	3044	3044	2909	2909	826	826

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 2c
 Regression for Value Added per Employee (VAE) Private Equity Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	-0.2291219***	-0.2270638***	-0.2809798***	-0.2787635***	-0.7803***	-0.7466797***
ppvt_shr	0.4819101***	0.5057038***	0.4814733***	0.5066897***	0.4047398***	0.4886218***
ppvt_prep1		0.0360848		0.0368605		0.0556799
ppvt_prep2		0.0372015		0.0380235		0.059116
ppvt_prep3		-0.0426033		-0.0419697		-0.0443217
mou_prep0	-0.0275489*	-0.0304743**	-0.0264404*	-0.0293759*	-0.0150768	-0.0368187
mou_prep1	-0.0074839	-0.0084549	-0.0057297	-0.0067089	0.0299319	0.0157313
mou_prep2	-0.0255762	-0.0270358	-0.0231265	-0.0245941	-0.0605596	-0.0824371
mou_prep3	-0.0360797	-0.0358677	-0.0341664	-0.0339175	-0.1120478	-0.1093088
MOU	-0.0187982	-0.0193988	-0.0182247	-0.0188196	-0.0140436	-0.0198361
SOFTLN	0.0133763	0.0123373	0.0168880	0.0157818	-0.0283479	-0.0322337
LASSET	0.1588993***	0.1581833***	0.1689318***	0.1682546***	0.3295223***	0.3148682***
EXINT	-0.0003197	-0.0003205	-0.0118556*	-0.0117549*	-0.2336744***	-0.2245043***
DEPINT	-0.0001433	-0.0001116	-0.0006297	-0.0005641	0.0002479	0.0002953
GRGDP constant price	-0.0020436	-0.0020895	-0.0023879	-0.0024376	0.0003644	-0.0057559
α_2	-0.0306418	-0.030413	NA	NA	NA	NA
α_3	-0.1445915***	-0.1475657***	-0.115329***	-0.1186918***	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.3692	0.3689	0.3686	0.3682	0.4049	0.4076
No. of Observations	3037	3037	2903	2903	826	826

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level

Having established that privatization improves labour productivity, we turn next to value added per capital VAC (a measure of the productive use of capital) and value added per assets VAA (a measure of the productive use of assets – which include land and other assets).

Table 3a shows that performance contracts MOU have no positive impact on value added per unit of capital (VAC). Disinvestment as measured by the privatization dummy in Tables 3b and 3c has a very significant and positive impact on VAC, especially once the privatization preparation dummies are also introduced. But when private equity share is used as the disinvestment variable, it has no significant effect on VAC.

Table 3a
 Regression for Value Added per Capital (VAC) MOU Effect (1990-2015)

Variables	Sub-Sample S1		Sub-Sample S2		Sub-Sample S3	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.1696551*	0.1681746*	0.2940761***	0.2929685***	0.3002602***	0.2962975***
mou_prep0		-0.0037613		-0.0026975		0.0033147
mou_prep1		0.0033147		0.0029524		0.0104903
mou_prep2		0.0154563		0.0147798		0.024276
mou_prep3		-0.0516154*		-0.0523843*		-0.0485762
MOU	-0.0127381	-0.0132915	-0.0128295	-0.0133533	-0.0128998	-0.0122389
SOFTLN	0.0074943	0.0082519	0.0060238	0.0068344	0.0028195	0.0034297
LASSET	0.0283787**	0.0284637**	0.0271776**	0.0272151**	0.024462*	0.0254699*
EXINT	-0.0002233	-0.0002255	-0.0001624	-0.0001643	-0.0001616	-0.00016
DEPINT	-0.0012406	-0.0012429	-0.0128936	-0.0129855	-0.0121612	-0.0124492
GRGDP constant price	-0.0059252***	-0.0057353***	-0.0056466**	-0.005431**	-0.0064354***	-0.0062863**
α_2	0.1235755*	0.1240748*	NA	NA	NA	NA
α_3	0.2710186***	0.2711567***	0.1544437***	0.1541158***	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.1156	0.1159	0.1054	0.1058	0.1265	0.1271
No. of Observations	2568	2568	2427	2427	2118	2118

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 3b
 Regression for Value Added per Capital (VAC) Disinvestment Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.2376224***	0.2423529***	0.4134831***	0.4200107***	0.8559085***	0.8603492***
ppvt_dummy	0.0308124	0.0755507**	0.0307148	0.074858**	0.0622297**	0.1099457***
ppvt_prep1		0.0841775*		0.0833077*		0.0896645**
ppvt_prep2		0.0897114**		0.0884838**		0.0856125**
ppvt_prep3		-0.0154792		-0.0163902		-0.0252378
mou_prep0	-0.006373	-0.008942	-0.0066344	-0.0091981	-0.0402375	-0.0536965
mou_prep1	-0.0003795	-0.0007656	-0.0008993	-0.0012755	-0.0543675	-0.0565279
mou_prep2	0.00352	0.0030238	0.0031117	0.0026169	-0.1241481	-0.1273287*
mou_prep3	-0.0577806*	-0.0556911*	-0.0580139*	-0.0559515	-0.1109501	-0.0935009
MOU	-0.0157053	-0.0158019	-0.0159319	-0.0160309	-0.0518427	-0.0539618
SOFTLN	-0.0107062	-0.0100621	-0.0143004	-0.0136296	-0.0239393	-0.021393
LASSET	-0.0158306	-0.0179637	-0.0188504	-0.0210102*	-0.1127556***	-0.1247056***
EXINT	-0.0002636	-0.0002649	-0.000266	-0.0002675	-0.2777707***	-0.2623968***
DEPINT	-0.0012329	-0.0012008	-0.0016217	-0.0015605	-0.0018209	-0.0018118
GRGDP constant price	-0.007601***	-0.0078021***	-0.0074548***	-0.00766***	-0.0096395**	-0.0103441***
α_2	0.1698472***	0.1715388***	NA	NA	NA	NA
α_3	0.2819899***	0.2472693***	0.1152893**	0.0793587	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.134	0.1359	0.1232	0.1249	0.2966	0.2989
No. of Observations	3104	3104	2963	2963	889	889

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level **Significance at 5% level *** Significance at 1% level.

MoUs have a negative effect on value added per assets (VAA) (Table 4a). Firm size LASSET and GDP growth also have a surprising negative effect on VAA. Larger firms have higher labour productivity – presumably since they use more capital but have lower value added per asset.

Disinvestment on the other hand has a very positive effect on VAA whether we measure disinvestment by a dummy variable for the year of disinvestment (ppvt_dummy) or whether we measure it by the share of private equity in total equity (ppvt_shr). The positive effect of disinvestment starts at least two years prior to the actual disinvestment as the variables ppvt_prior are positive and significant two years before the actual disinvestment. In this latter case, the effect of the performance contract MOU remains negative. Firm size and the capital intensity of the firm measured by the share of depreciation in total assets are also negative.

Bigger firms were seen to have higher returns on capital (ROC) and returns on assets (ROA) in an earlier research paper (Chhibber & Gupta, 2017). Bigger firms also have higher labour productivity measured by VAE and NSPE. But on value added per asset (VAA), size has a negative effect, so bigger firms have lower value added per asset, the efficiency variable, although they have higher financial profitability measured by ROC or ROA.

Table 3c
 Regression for Value Added per Capital (VAC) Private Equity Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.2498616***	0.2514431***	0.4388936***	0.4404136***	0.7696668***	0.7764581***
ppvt_shr	-0.1172725	-0.1099987	-0.1113951	-0.1041454	-0.0901177	-0.0807926
ppvt_prep1		0.0154597		0.0157762		0.0113205
ppvt_prep2		0.0225189		0.0224531		0.0132735
ppvt_prep3		-0.063712		-0.0639547		-0.0784216
mou_prep0	-0.017343	-0.019261	-0.0175515	-0.0194822	-0.0642439	-0.0695861
mou_prep1	-0.0093783	-0.0090615	-0.0097787	-0.0094651	-0.0773891	-0.0703042
mou_prep2	-0.0020394	-0.0030186	-0.0024968	-0.0034763	-0.1439003*	-0.1470565*
mou_prep3	-0.0604468*	-0.0604699*	-0.0606239*	-0.060649*	-0.1188389	-0.1174509
MOU	-0.0262288	-0.0259134	-0.0264213	-0.0261161	-0.0688614*	-0.0646987
SOFTLN	-0.0166632	-0.0171762	-0.0205068	-0.0210318	-0.0403302	-0.0438438
LASSET	-0.0143203	-0.0143711	-0.0176559	-0.0177116	-0.0679489**	-0.066495**
EXINT	-0.0006039	-0.0006049	-0.0006948	-0.000696	-0.2849175***	-0.2834066***
DEPINT	-0.0012204	-0.0012021	-0.0016079	-0.0015715	-0.0016327	-0.0016212
GRGDP constant price	-0.0078698***	-0.0079771***	-0.0077788***	-0.0078896***	-0.0102562***	-0.0106921***
α_2	0.1818865***	0.1817683***	NA	NA	NA	NA
α_3	0.2951396***	0.2944019***	0.1156574**	0.1150371**	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.134	0.135	0.1236	0.1246	0.3022	0.3048
No. of Observations	3062	3062	2923	2923	889	889

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 4a
 Regression for Value Added per Asset (VAA) MOU Effect (1990-2015)

Variables	Sub-Sample S1		Sub-Sample S2		Sub-Sample S3	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.0936028	0.0952819	0.2574034***	0.2659574***	0.2581818***	0.262715***
mou_prep0		-0.0175408		-0.0176365		-0.0121414
mou_prep1		-0.0146687		-0.0154325		-0.008323
mou_prep2		-0.0226129		-0.0238348		-0.0145553
mou_prep3		-0.0432859*		-0.0445908**		-0.0353317
MOU	-0.0211249	-0.0253886*	-0.020817	-0.0252154*	-0.0226571	-0.0252766
SOFTLN	0.0112711	0.0121075	0.0047442	0.0055124	0.0147281	0.0151082
LASSET	-0.0337779***	-0.0369017***	-0.0373183***	-0.0408755***	-0.0344595***	-0.0364265***
EXINT	-0.0001944	-0.0002032	-0.0001151	-0.0001242	-0.0001125	-0.0001186
DEPINT	-0.0006203	-0.0006199	-0.0143479	-0.0143934	-0.0138563	-0.0139164
GRGDP constant price	-0.0065352***	-0.0061493***	-0.0058853***	-0.0054484***	-0.0070295***	-0.0066907***
α_2	0.1598485***	0.1660002***	NA	NA	NA	NA
α_3	0.2957047***	0.3059543***	0.1492176***	0.1536461***	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.1726	0.1721	0.1598	0.159	0.1798	0.1794
No. of Observations	2677	2677	2540	2540	2240	2240

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 4b
 Regression for Value Added per Asset (VAA) Disinvestment Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.1302193**	0.1355729**	0.3229232***	0.3306753***	0.547848***	0.547375***
ppvt_dummy	0.0364425**	0.1026553***	0.0372656**	0.10265***	0.0582224***	0.1334707***
ppvt_prep1		0.1184834***		0.1172944***		0.1262605***
ppvt_prep2		0.1109643***		0.1090175***		0.1123936***
ppvt_prep3		0.056133		0.0554201		0.0534209
mou_prep0	-0.0140366	-0.016015	-0.0143358	-0.0162856	-0.0181689	-0.0302529
mou_prep1	-0.0115423	-0.0128845	-0.0123172	-0.0136472	-0.0222858	-0.0314619
mou_prep2	-0.024386	-0.0241876	-0.024951	-0.0247419	-0.0840862	-0.0826154
mou_prep3	-0.043374*	-0.0403814*	-0.0440091**	-0.0410532*	-0.099198	-0.0723331
MOU	-0.0225206	-0.0233803	-0.0224855	-0.0233556	-0.0246282	-0.0311409
SOFTLN	0.0011931	0.0026271	-0.0049472	-0.0035431	-0.0249063	-0.0165305
LASSET	-0.057936***	-0.0610423***	-0.0623323***	-0.0655174***	-0.1051901***	-0.1260956***
EXINT	-0.0002051	-0.0002067	-0.0001852	-0.0001871	-0.1551243***	-0.1323275***
DEPINT	-0.0032213***	-0.0031857***	-0.0062682***	-0.0062065***	-0.0062254***	-0.0062509***
GRGDP constant price	-0.0070121***	-0.0071642***	-0.006522***	-0.0066718***	-0.0072779***	-0.0077778***
α_2	0.1860889***	0.1883246***	NA	NA	NA	NA
α_3	0.2885252***	0.236355***	0.1152371***	0.0615614*	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.188	0.1909	0.1666	0.1692	0.2889	0.2966
No. of Observations	3216	3216	3079	3079	891	891

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 4c
 Regression for Value Added per Asset (VAA) Private Equity Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.1447084**	0.1456418**	0.345059***	0.3453838***	0.542859***	0.547195***
ppvt_shr	0.0641623	0.101087*	0.070399	0.1074417**	0.1158683	0.1805307**
ppvt_prep1		0.0528313*		0.0523872*		0.0559589**
ppvt_prep2		0.0450971		0.0438982		0.0473373*
ppvt_prep3		0.0058589		0.0055349		0.0001588
mou_prep0	-0.0206096	-0.0237299	-0.0209546	-0.0240064	-0.0357061	-0.0517509
mou_prep1	-0.0105858	-0.0129954	-0.0114421	-0.0138001	-0.0448145	-0.0591699
mou_prep2	-0.0212065	-0.022768	-0.021972	-0.0235043	-0.1079723**	-0.1211985**
mou_prep3	-0.0445613*	-0.044073*	-0.0452137	-0.0447388**	-0.1105816	-0.1069119
MOU	-0.0286192**	-0.0304762**	-0.0286174**	-0.0304408**	-0.0351891	-0.0431302
SOFTLN	-0.0005734	-0.0009167	-0.0070470	-0.0074458	-0.0305259	-0.0311
LASSET	-0.0608828***	-0.0609205***	-0.0656539***	-0.0657862***	-0.0952227***	-0.1002045***
EXINT	-0.000612*	-0.0006132*	-0.0006631*	-0.0006645*	-0.1613791***	-0.1551633***
DEPINT	-0.0031999***	-0.0031547***	-0.0062303***	-0.0061448***	-0.0061107***	-0.0060583***
GRGDP constant price	-0.0073797***	-0.0074278***	-0.0069162***	-0.0069596***	-0.0076605***	-0.0081229***
α_2	0.1926512***	0.1918575***	NA	NA	NA	NA
α_3	0.300978***	0.2934732***	0.1216123***	0.1151829***	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.2011	0.2039	0.1795	0.1823	0.2959	0.3037
No. of Observations	3170	3170	3035	3035	891	891

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

The coefficients of the dummy variable α_2 for Type 2 firms which signed an MoU are positive, which suggests Type 1 firms have on average lower VAA compared to Type 2 firms. The coefficient for the dummy variable α_3 , which controls for group effects of firms that had some privatization, is also positive and highly significant. This shows that on average VAA is higher for Type 3 firms compared to Type 2 firms. These variables were introduced to remove selection bias.

Finally, we also analyze net sales per asset (NSA) as a measure of efficiency of the firm. The results in Tables 5a, 5b, and 5c show that MOU has no effect on performance. But disinvestment has a very positive effect on firm efficiency. Larger firms are less efficient as the coefficient of size is negative and significant. Greater export orientation has a negative effect on NSA and more capital intensity has a negative effect which we measure by the share of depreciation. We also see that GDP growth has a positive impact on NSA which is to be expected as demand for products rises in a faster growing economy.

Table 5a
Regression Net Sales per Asset (NSA) MOU Effect (1990-2015)

Variables	Sub-Sample S1		Sub-Sample S2		Sub-Sample S3	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.4700819**	0.4764372**	0.6324914***	0.6665434***	0.6491935***	0.6705172***
mou_prep0		-0.0431966		-0.0329884		-0.012731
mou_prep1		-0.0754307*		-0.077043**		-0.0608721
mou_prep2		-0.1468405***		-0.1505047***		-0.1270821**
mou_prep3		-0.1872663***		-0.1938496***		-0.1758239***
MOU	-0.0154951	-0.0336814	-0.0152651	-0.0328552	-0.0074218	-0.0205991
SOFTLN	-0.0151677	-0.0139235	-0.0175496	-0.016667	-0.0157277	-0.0155974
LASSET	-0.0699272***	-0.0859553***	-0.0860077***	-0.1024329***	-0.0781492***	-0.0901201***
EXINT	-0.0013926***	-0.0014349***	-0.0008478**	-0.0008926**	-0.0008474**	-0.0008813**
DEPINT	-0.0047206	-0.0047437	-0.096514***	-0.0961587***	-0.0952264***	-0.095411***
GRGDP constant price	0.0076986**	0.009818**	0.0104364***	0.0128012***	0.0081973*	0.0105413**
α_2	0.1393024	0.1684783	NA	NA	NA	NA
α_3	0.3316639**	0.3780871**	0.2089087**	0.2254308**	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sq	0.2708	0.2744	0.2937	0.2976	0.2805	0.2835
No. of Observations	2696	2696	2550	2550	2241	2241

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).
 *Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 5b
Regression Net Sales per Asset (NSA) Disinvestment Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.4620753**	0.4693645**	0.6208374***	0.631205***	0.5112547	0.5037802
ppvt_dummy	0.1290758***	0.2191388***	0.1338202***	0.2242002***	0.0869655**	0.1778847***
ppvt_prep1		0.113963		0.1152548		0.0997122
ppvt_prep2		0.1874123**		0.1869379**		0.1833993***
ppvt_prep3		0.0980761		0.100593		0.069289
mou_prep0	-0.0272051	-0.030045	-0.0274425	-0.0302456	-0.0355586	-0.0525644
mou_prep1	-0.0563963	-0.0590297	-0.059096	-0.0617543	-0.030556	-0.0456736
mou_prep2	-0.1425298***	-0.1435577***	-0.1450906***	-0.1460657***	-0.2656374**	-0.2788926***
mou_prep3	-0.1848095***	-0.1807506***	-0.1879647***	-0.1838707***	-0.3231676**	-0.2893631**
MOU	-0.0276678	-0.0272376	-0.0280505	-0.0276732	-0.0390891	-0.0389229
SOFTLN	-0.0151438	-0.0146884	-0.0173724	-0.0169217	-0.1769657***	-0.1622062***
LASSET	-0.0654842***	-0.0695947***	-0.077581***	-0.081738***	-0.0409528	-0.0626605
EXINT	-0.0014151***	-0.0014175***	-0.0013538***	-0.0013566***	0.0239358	0.0535768
DEPINT	-0.0057814***	-0.005733***	-0.010057***	-0.0099642***	-0.0062832**	-0.0063046**
GRGDP constant price	0.0086693**	0.008416**	0.0104853***	0.0102284***	0.0071721	0.0062224
α_2	0.1419706	0.1449833	NA	NA	NA	NA
α_3	0.3028812*	0.2314704	0.1760326*	0.1011627	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sq	0.3492	0.3505	0.3631	0.3644	0.7074	0.7093
No. of Observations	3228	3228	3082	3082	893	893

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015).
 *Significance at 10% level; **Significance at 5% level; *** Significance at 1% level.

Table 5c
Regression Net Sales per Asset (NSA) Private Equity Effect (1990-2015)

Variables	Sub-Sample S4		Sub-Sample S5		Sub-Sample S6	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Intercept	0.5442003***	0.54436***	0.7469765***	0.7462294***	0.557172	0.559231
ppvt_shr	0.4228285***	0.4543925***	0.4257005***	0.4544601***	0.2635199***	0.3306599**
ppvt_prep1		0.0003674		-0.0022132		0.0122526
ppvt_prep2		0.0742417		0.0699556		0.1034338*
ppvt_prep3		0.0070396		0.006677		0.0014073
mou_prep0	-0.0564793*	-0.0593951*	-0.0571779*	-0.0598536*	-0.0624600	-0.0854449
mou_prep1	-0.0664741*	-0.0689744**	-0.0698011**	-0.0721105**	-0.068017	-0.0902385
mou_prep2	-0.1478261***	-0.1506089***	-0.1509447***	-0.1535698***	-0.3078012***	-0.3412084***
mou_prep3	-0.1725013***	-0.1721324***	-0.1757379***	-0.1753921***	-0.3463651**	-0.3445991**
MOU	-0.0527834	-0.0525871	-0.0535846	-0.0532893	-0.0548119	-0.0572858
SOFTLN	-0.0135	-0.0133761	-0.0159885	-0.0158666	-0.1799605***	-0.1775295***
LASSET	-0.096988***	-0.0965476***	-0.109592***	-0.1091493***	-0.0478421	-0.051246
EXINT	-0.0011203	-0.0011213	-0.0007479	-0.0007492	0.0159920	0.0249515
DEPINT	-0.0056106***	-0.0055729***	-0.0097267***	-0.0096609***	-0.0062141**	-0.0061569**
GRGDP constant price	0.0071081**	0.0070029**	0.0089624***	0.008861***	0.0067613	0.0059015
α_2	0.1853393	0.1844862	NA	NA	NA	NA
α_3	0.3241705**	0.3174403**	0.1567298	0.1514245	NA	NA
industry effects	Included	Included	Included	Included	Included	Included
Adj. R- sqr	0.3952	0.3959	0.4089	0.4095	0.7111	0.7128
No. of Observations	3181	3181	3038	3038	893	893

Note. Source: Author's calculation using data from Public Enterprise Survey (1990-2015)

*Significance at 10% level; **Significance at 5% level; *** Significance at 1% level

Conclusions

In this paper, the focus is on policy variables and factors affecting the efficiency and productivity of India's PSUs using various measures of value added. In an earlier paper (Chhibber & Gupta, 2017), in which the focus was on financial rates of return, both performance contracts and disinvestment were seen to be important policy variables. In this paper, value added per employee is used as a measure of labour productivity and value added per capital and value added per asset to measure productive use of capital and assets. The model used ensures correction for self-selection. The results show that MoU – performance contracts – have no positive and sometimes negative effect on performance. On the other hand, disinvestment measured by a privatization dummy in the year of disinvestment and the share of private equity has a very positive effect on these productivity measures.

The results provide very clear support for disinvestment as opposed to use of performance contracts to improve the performance of PSUs. Even if the objective of disinvestment is to raise revenue for the budget rather than a tool for improving performance of the PSU, the paper shows that it does improve both labour productivity and capital/asset productivity. Using disinvestment proceeds to finance the recurrent budget is a questionable practice. Instead disinvestment proceeds should be allocated to the recently created National Infrastructure Strategic Fund (NISF), which can then be used to finance infrastructure projects.

Larger PSUs – the so called 7 Maharatnas and 17 Navratnas were considered better performers but their value added per asset and net sales per asset are significantly lower than even the smaller PSUs. They have

higher labour productivity but that simply comes from greater capital intensity in these large PSUs. For these firms, the government needs to prepare a strategic plan and decide if they can become world class companies. For those that cannot should also be privatized to extract better value for assets.

In any case, the present paper shows that a bolder roadmap for gradually getting the government out of the business of business, must be prepared with a hard look at the real economic benefits from some of the profit-making State-owned firms, as well. The question to be asked is, are these firms locking up scarce capital to provide employment for a few, or can they become strategic world-class companies? The recent decision to sell Air India is one such bold decision. The argument that Air India is profitable and is only in trouble because of past debt, is not relevant, as the issue is not profitability but efficient and productive use of assets.

Such a bold approach to transferring State-owned assets with generally low return towards public social infrastructure is a win-win idea, especially because the private sector will improve efficiency. The second gain is it will unlock funds for building badly-needed social infrastructure — roads, power transmission lines, sewage systems, irrigation systems, railways and urban infrastructure. This will also help draw in private investment, including FDI.

So far India has no clear strategy in dealing with PSUs – it has followed a case by case approach – although more recently, with the decision to privatize Air India, it appears that the government is getting more serious about privatization. If the Modi government wants to leave behind a lasting transformation of the economy, getting the government out of business and laying a foundation for rapid growth by accelerating India's infrastructure plans is the way forward. Develop a 10-year plan to divest at least 50% of PSU assets, shift the proceeds into the strategic investment fund and reap the rewards. The business of the government is public infrastructure, not public companies. Transforming public assets into public infrastructure would be a lasting reform.

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The Public Sector and its Contribution to Urban Competitiveness

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Abstract

The topic of this issue of the journal, “Public Sector Productivity and Competitiveness”, is one that has become exceedingly important and relevant at this stage in the development of urban economics and of urban competitiveness. This assertion has been powerfully verified by the recent announcement by the company Amazon that it will seek a site for a second headquarters complex. After inviting applications from cities in North America to host the complex, Amazon received applications from more than 200 cities, with populations from New York City down to some rather small cities, in all but seven US states. Several Canadian Provinces, one joint US-Mexico region also, submitted applications. We will return to this phenomenon later in this paper, but suffice it to note at this point that the criteria to be used in the decision-making are a set of seven elements set by Amazon, as well as a set of other unstated criteria that are implicit in the fact that the city will have to be an attractive place for the young, perhaps family-oriented, technologically skilled workers who will impose their own preferences as to where they are willing to spend their lives. Thus, city planners have more than one constituency to address. Too much attention to bricks and mortar and they lose the work force that is the key to success. This is the story of the past century for city planning for competitiveness. Not only do the tools for competitiveness change over time, but the goals keep changing, as do the humans who respond to their signals. The objective of city planners has therefore changed as the environment in which they function has evolved. As will be suggested in this paper, city planning for competitiveness enhancement has not actually evolved as it has changed fundamentally in nature as the economy has developed over the past century or more. We must start at the beginning.

Keywords: Public sector, urban competitiveness, city planning.

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Introduction: Competitiveness enhancement in 1900

At the end of the 19th century, there was a great expansion of the economy in the United States. Robert Gordon describes the steady economic expansion of this period, 1870-1940, based on advances in retail – Sears Roebuck and Montgomery Ward, in transportation – automobiles and trains, communication, health, insurance and finance, air transportation, and action at the national level of government (Gordon, 2016). Most of this was accomplished by individuals with ideas and access to a stream of finance. Thomas Edison had little education but he was curious. As age 22, he invented a stock ticker that brought in funding he needed for further inventions. One patent generated the funds for further exploration and additional inventions. Henry Ford grew up in Michigan and developed the mass production line for automobiles with his own ideas and with help from other individuals. William Boeing grew up in Detroit, was educated at Yale, and began working in Washington state in the timber industry. He made a lot of money and bought a boat building site in Seattle that with his knowledge of wood and structure set him up for aircraft manufacture. Chicago was a center of meat packing and railroad transportation that owed its success to individuals who developed these two industries at the crucial period 1880-1910. Chicago was transformed but it was not because of the actions of city leaders (Cronon, 1991). Facilitating this growth were institutions of the private sector, such as the stock exchanges of New York and other major cities, and the Chicago Board of Trade.

By the beginning of the twentieth century, Detroit, New York Chicago, and Seattle were all ‘competitive cities’, without a great deal of input from the individual cities. At the turn of the century, most major US cities were dominated by political bosses who were primarily focused on distributing the spoils of their corruption and had little interest in developing the city economy. The federal government was a major player through policies such as the Land Grant College (Morrill) Act, The Homestead Act, and the Transcontinental Railroad Act, patent protection, antitrust legislation, food and drug regulation, and many other measures. But city governments were not prominent at this time. The famously corrupt Boss Tweed in New York City is perhaps the symbol of this period for city government since many cities had his counterpart.

The industries developed by Ford, Carnegie, Edison, Boeing, and the others were based on what we refer to as hard elements of competitiveness – access to raw materials, access to a port or other transportation, an adequate supply of relatively low skilled labor – many of whom were recent immigrants, proximity to manufacturing sites of inputs, and, of course, upon the creativity and imagination and energy of inventors and innovators at the heart of the process. The same was true in Great Britain, the Continent, and all places where the 19th and early 20th century transformation of the economy was taking place. There was, quite literally, little a city government could do to really stimulate economic development or the attractiveness to business of that city – except, of course, to call out the police to control and restrict labor unions and labor activism.

One aspect that made cities attractive to business firms was the city’s architecture. In North America, New York City and Chicago were the two leaders in this respect. The steel frame skyscraper building was invented in Chicago, by local architects. This made it possible to attract head offices of major companies, and all of the firms that support them to concentrate their facilities in a narrow piece of land between Lake Michigan and the Chicago River. The same was true in Manhattan, bounded as it is by the Hudson and East rivers and constrained as it was by the location of solid rock near to the surface of the island. Once again, city officials had very little to do with this innovation that was so crucial to the development of large cities with concentrated central business cores.

This all changes as we progress through the 20th Century. Two world wars and the Great Depression had impacts on all economies in the industrial world. The pace of the increase in production of war goods was far beyond that possible by the private economy. This was less true during the First World War, with the possible exception of production of ships and rifles – this war was one of men in one trench trying to kill their counterparts in another trench. After the war governments tended to return to their smaller less invasive pre-war role in the economy. ‘Do nothing’ governments tended to ‘do nothing’ even when the Great Depression developed.

The Great Depression brought into office governments such as those of Franklin Roosevelt that enormously expanded the power and activities of the central government. This was principally in the area of social relief, specifically the alleviation of hunger. Cities did get involved in providing some relief to the unemployed, un-housed and hungry. But still there was little concern on the part of city governments in making their city more attractive to business firms that might be induced to relocate there. There was little concern for the concept of ‘urban competitiveness’.

World War Two was the event that brought change to the role of cities and to their efforts to adopt policies that would attempt to induce companies to relocate or to develop production and administrative functions to their urban space. War production demanded several magnitudes more of material being produced – ships and guns, of course, but now also aircraft, tanks, sophisticated artillery pieces, and a variety of new electronic communications and other equipment, such as radar, using new technologies, some of which were created by defense producers. Cities began to lobby their congressional representatives, the defense department, and the companies themselves for the siting of facilities in their urban space. Thus, a transformation in the role of the city’s government and its agencies in the development and shaping of the local economy was stimulated, even created, by the exigencies of wartime and, of course, by depression.

Competitiveness enhancement in the second half of the 20th Century

“One of the distinguishing characteristics of American Dynamism is that, at its heart, the United States is an intramural, competitive enterprise. Competition among cities, regions and states for people and investment has been essential to our success as a nation” (Kotkin & Streeter, 2019, p. 1).

Kotkin and Streeter (2019) capture in the above quote the essential characteristic of post-WWII economic development in the United States, and in other industrial societies, as well. The level of decision-making regarding economic location, has devolved from the national government and defense needs to cities and other local authorities, all interested in attracting headquarters, distribution, research, and production facilities of major companies. It soon became clear that if these initiatives were to be successful, decision-makers in the cities would have made themselves attractive, first to the companies, but then to the employees, as well. As technology and high skill labor came to dominate company activities, the needs of highly skilled and highly mobile workers became more and more important.

City leaders soon discovered that they could not do what needed to be done as individual entities; rather, they formed organizations of cities both at the local and state level, and at the national level. In 1927, ten state leagues formed an association that grew dramatically in the post-WWII period as the National League of Cities, to encompass 49 state leagues and 19,000 municipalities of all sizes. Five years later, the US Conference of Mayors was formed by 48 mayors of cities larger than 100,000 population – today the Conference is composed of the mayors of 1,407 cities of at least 30,000 population (according to Wikipedia). Both organizations are engaged in a variety of activities that further their needs, including

promoting programs at the state and national level that support economic development, social programs, and international initiatives. Essentially, things that no city or small group of cities could accomplish on their own.

The development of important technical advance in the United States has been often closely linked to defense procurement and programs. Certainly, the most dramatic event in the recent history of government and the economy is the role that the Defense Advanced Research Products Agency played when it developed, among other things, the internet. This innovation gave birth to much of the technological revolution that has occurred in the post-WWII period. But this, again, occurred at the national level of government, in the Department of Defense, in the late 1970s, with contracts to universities such as MIT. This linking of computers over great space enabled the development of collaboration and of access to data that had never before been possible.

From the early 1980s on, as this transformation of communication and collaboration developed, the nature of the determinants of a competitive city evolved from hard elements, such as access to raw materials, access to transportation and a port, and sufficient blue collar labor, to soft elements – public security, K-12 education, recreation facilities, local transportation, cultural facilities, attractive neighborhoods, and suitable nightlife. This is because the workers in the high-tech sector were younger, better educated, highly skilled, and often with young families. Most importantly, they were also highly mobile – these workers could find employment anywhere in the country, indeed in the world.

A city could not be successful at attracting desirable, clean, and well-paying companies simply through its own efforts. In competitive cities, as we enter the last years of the 20th century, excellent research universities and research laboratories, a full complement of technical consultants, and access to an airport, not for shipment of goods as much as for connectivity of employees of the firms for collaboration with counterparts elsewhere, have all become necessary attributes.

As noted at the outset, Amazon has opened a competition among over 230 cities in North America for its second headquarters complex with at least 50,000 employees being involved. This began with the issuance of a set of more-or-less formal first level criteria for the selection of its HQ2 competition:

- ✓ A metropolitan area with a population of over 1 million;
- ✓ A stable and business-friendly environment;
- ✓ Within 30 miles (48 km) of a population center;
- ✓ Within 45 minutes of an international airport;
- ✓ Proximity to major highways and arterial roads 1-3 miles (2-5 km);
- ✓ Access to mass transit routes;
- ✓ Up to 8 million square feet (740,000 m²) of office space for future expansion.

Optional preferences include airports with direct flights to Seattle, New York, San Francisco, and Washington, D.C., urban locations, and proximity to major universities.

At first glance, this might not provide much opportunity in which an ambitious city government could operate. Certainly, the city government can work to create a “business-friendly environment”, and most active city administrations have been doing this for a considerable time. However, transportation, a major element in the list, would seem to be in the hands of the US Department of Transportation and its state counterparts. But the emphasis on “access to...” does open the door to the city government to provide or to lobby for this aspect of connectivity. Zoning and a variety of incentive programs can and have been used by

cities to enhance their office space offerings. I would say that the ‘sleeper’ on the list is the population requirement – at least one million inhabitants or proximity to such a center. In this case, however, one million does not always mean one million, as it is the qualities of the constituent members of that million or more that is crucial. A large population base that is primarily composed of unemployed or unemployable former coal and steel, and basic manufacturing employees is not attractive to the Amazons of the world. I have used elsewhere the concept of the ‘competitive core’ of a city; essentially asking how many of a city’s million inhabitants are actually involved in the sector or sectors that comprise the essential competitiveness of that city – 50,000? 100,000? (Kresl & Ietri, 2016, pp. 57-58). The rest are at best supportive to some degree. The successful, or competitive cities have worked actively to encourage to development of a highly and appropriately skilled and immediately employable population. This is usually done with close cooperation of the city administration, local universities and tech schools, and the business community. Here is a place for very active engagement by a city’s administration and planners.

The Amazon HQ2 initiative has been very tempting to many public officials, given its potential impact. In this regard, it is worthy of note that the Governor of Maryland had to reprimand his Secretary of Transportation for saying that Amazon had a ‘blank check’ for whatever transportation needs they might have, after stating that he did not know how the state would pay for the \$2 billion already promised for Amazon’s transportation wish list. Such is the enthusiasm of local authorities when confronted by the possibility of a huge success (Neibauer, 2018).

The crucial question for all urban leaders is that of how to become more productive, not just to throw more money at desirable corporations and other investors. Here, we encounter a paradox of sorts. Local authorities often believe they know what is needed by the new high tech economy. The required transportation assets, some facilities, good neighborhoods and night life, public safety and education, and so forth, as noted above. But clearly there is more that must be done. Paradoxically, one notion of a successful city is that: “A city is not at its fundamental level optimizable” – Nicholas de Monchaux, as quoted by Badger (2018). “A city’s dynamism derives from its inefficiencies, from people and ideas colliding unpredictably” (Badger, 2018, p. 2). Creativity always entails a certain degree of uncertainty and unpredictability. Not everything can be, nor should it be, planned. Paths forward always entail several forks in the road and the most productive one cannot usually be determined in advance. It is difficult for a planner to leave important things to chance, but the reality is that some serendipity and messiness are vital ingredients in a successful experience. I remember working on a project in a Nordic city in which there was an underutilized industrial facility that local planners wanted to develop for high level fashion, design and information technology. They refashioned and modernized the space and installed the most current equipment, among others. After several months, they saw that the project was simply not taking off as they had anticipated. They questioned the individuals who were involved at the site and got a significant shock. The middle aged, middle class bureaucrats doing the planning thought all people had dinner, watched a bit of television and the news, and then went to sleep. The young techies’ plan was to work until 11pm or mid-night, then go to a bar and drink and talk about, among other things, what they were doing at work – the famous tacit transfer of knowledge. The planners simply had no knowledge with regard to the work life and life styles of the people they needed for the project to be a success.

In instances like this, it has proved to be insufficient just to work to attract existing firms to a city; ultimately, the real action was in creating an environment that would be conducive to start-up or new firms in technical areas of the economy. Individual entrepreneurs and innovators have requirements that are quite different than those of large firms. One thing they need is access to others in their situation who can share experiences, ideas, and strategies for success.

Furthermore, the best efforts of planners may be offset by aspects of the local milieu that are both intransigent and powerfully negative in their impact. These include income inequality in the city, commutes of two hours or more, social isolation, racial segregation, pollution, public insecurity, and slums. These are features of a city that are exceedingly difficult to ameliorate. While a certain pre-gentrification status is attractive to younger workers who are seeking a ‘cool’ neighbourhood, they can reshape, with retail, restaurants, coffee houses, culture venues, and living quarters, outright racial tension, crime, and *sluminess*, which are powerful deterrents to settlement by the desirable young techies and their families.

While most attention is devoted to the actions of officials in very large cities, very interesting success stories can also be found in many smaller cities, cities of between 20,000 and 250,000 inhabitants. First of all, smaller cities can often avoid the negative aspects of the previous paragraph. Second, smaller cities can often “borrow size” through their proximity to a large city with an international airport, a large pool of specialist professionals, international marketing, and other assets. Third, smaller cities that can develop both a quality university or college in conjunction with a significant medical services complex have been shown to be very competitive. (Kresl & Ietri, 2016). While planners in smaller cities do not have the resources that are available in large cities, it is often easier for them to be effective, in a more intimate environment in which social cohesiveness, familiarity among all of the significant actors, agility, and the ease in fashioning common objectives are all features.

Another thing that benefits all cities, but especially smaller cities, is the changes in communications technology, transportation, and production that make it possible to locate corporate activities almost anywhere in the physical space of a country. Individual tech workers can be in communication with co-workers hundreds or thousands of miles distant, as though they were on two different floors of the same high-rise building. Production no longer requires huge fixed facilities but can now be done on mobile platforms that give many more cities the possibility of participating in global production networks. Finally, airlines linking one hub airport to many others put technical workers in close proximity to counterparts hundreds or thousands of miles distant. For city planners this opens the range of possibilities exponentially.

Conclusion: The evolution of the role of public authorities in recent decades

During the past century, we have seen the role of public officials in the creation of a local environment that was inviting the high tech companies to evolve from rather passive observers of events to crucial participants in the siting of economic facilities, including the encouragement of start-ups. This evolution has taken place in an environment in which companies increasingly found options, alternatives, and bargaining power developing to their favor. Mayors and other city officials now compete for their favor. Before this, cities such as New York, Baltimore, Philadelphia, and Chicago were able to ride the propitious connection with ocean or lake transportation with one or, in the case of Chicago several, major railroads into the interior of the continent. More recently, city officials have become obligated to be more pro-active and imaginative in ‘selling’ their city to major, and somewhat footloose, companies from other parts of the country and increasingly from other parts of the world economy. As a consequence, mayors’ staffs are less likely to be dominated by political appointees and operatives and more by economic development and planning specialists, many of whom have graduate university degrees in the area in which they are working. The latter are the primary key to making city development and planning operations in our cities more productive.

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Biographical Note

Peter Karl Kresl has been researching and publishing aspects of urban competitiveness for over 19 years. He is co-founder and president of the Global Urban Competitiveness Project, a group of 18 scholars working in this area. His recent books have been on subjects such as: the place of smaller cities in the global economy, the impact of an aging population on urban economies, and planning cities for the future, and is currently writing a book on how cities use architecture. His Ph.D. is from the University of Texas and he is professor of economics emeritus at Bucknell University, USA.

Sustainable Land Management: The Forgotten Pillar of Competitiveness

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Abstract

Generally, frameworks for environmental interventions are focused only on the fight against climate change, the conservation of biological diversity, and the fight against desertification, land degradation, and drought, but not as a whole with indicators which could guide the attainment of better results for projects in diverse countries and organizations. A review of existing literature shows that there are no integrated frameworks for interventions regarding sustainable land management projects. The purpose of the present study is to propose an integrated framework for interventions of sustainable land management in countries with a national, regional, and local approach to contributing to their competitiveness and organizations. The proposed integrated framework for interventions contains objectives and indicators for managing the fight against climate change, the conservation of biological diversity, and the fight against desertification, land degradation, and drought, with a holistic approach. As a result, the Sustainable Land Management's Integrated Framework for Interventions (SLMIFI) is presented. SLMIFI could guide relevant governmental and non-governmental organizations in their efforts to develop and manage environmental projects with a focus on sustainable land management. Finally, the inclusion of the sustainable land management of countries as a pillar in the construction of competitiveness indexes is recommended, together with various managerial suggestions and guidelines for future research.

Keywords: Sustainable land management, competitiveness, SLMIFI, climate change, biological diversity, desertification and drought.

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Introduction

Although sustainable land management is one of the most important topics for the world economy, as of now, this theme has not been included as part of the components of the global indexes related to competitiveness. In this sense, Schwab (2017) explained the emerging consensus about the fact that “economic growth once again needs to focus more on human well-being” (p. vii) and pointed out that “such human-centric economic progress is multidimensional by nature—it is broad based by benefitting the vast majority of people, environmentally sustainable, and equitable in terms of creating opportunities for all and not disadvantaging future generations” (p. vii). Schwab (2017) also indicated that: “In this new context, competitiveness remains an important contribution to the broader goal of human-centric economic progress by creating the resources needed for increased well-being, including better education, health, and security, and higher per capita income” (p. vii). Then, the sustainable land management (SLM), which is considered as “a promising solution to land restoration, mitigation of climate change, and resilience of rural population to external shock” (Maisharou, Chirwa, Larwanou, Babalola, & Ofoegbu, 2015, p. 1) and includes issues and solutions related to climate change, biological diversity, desertification, land degradation, and drought has become one of the most important issues for improving the competitiveness of the countries and their organizations; however, this pillar seems to have generally been forgotten in the construction of global indexes related to competitiveness.

The officials of the United Nations have created formal organizational structures for managing the fight against climate change, the conservation of biological diversity, and the fight against desertification and drought, through the United Nations Framework Convention on Climate Change – UNFCCC (United Nations, 1992a), United Nations Convention on Biological Diversity – UNCBD (United Nations, 1992b), and the United Nations Convention to Combat Desertification – UNCCD (United Nations, 1994), respectively. Although these global efforts have been vital to improve the environmental management of the countries, the separate creation of these formal organizational structures has resulted in the actors and stakeholders associated with these issues to act through separate efforts without being able to achieve the respective management synergies at the levels of the national, regional, and local governments, as well as at the level of civil society, with the corresponding reduction of the competitiveness of the countries and their organizations.

This situation is even more critical when considering that, in practice, the actors and stakeholders involved in the development of the actions of the three conventions mentioned above are one and the same. In different countries worldwide, in the national government and in the regional and local governments, there are generally separate formal organizational structures to address these issues. In addition, it is common to find three separate national strategies for the purposes of the three conventions corresponding to the United Nations. In view of the above, it becomes necessary to integrate efforts and achieve management synergies to make the most of available resources and to achieve the proposed global goals, improving the competitiveness of the countries and their organizations.

Background of the Problem

The lack of synergies in the actions related to the three conventions mentioned in previous section for a real sustainable land management is a global issue. Regarding the separate budget for actions related to the climate change and the biodiversity in the European Union (EU), Kettunen (2018) explained that “even though the financial allocations from the EU development budget signal an ongoing and even slightly increasing commitment to biodiversity, they remain limited in comparison to the efforts related to climate

change” (p. 159). About the objectives and actions of the EU’s Biodiversity Strategy for 2020 and the lack of synergies in the actions related to the three conventions in the EU, Kettunen (2018, p. 149) explained:

These objectives and actions require coordination with other EU policy sectors including trade and development cooperation. Furthermore, synergies between the EU action on biodiversity and other environmental measures such as climate mitigation and adaptation are a key element of the Biodiversity Strategy. This includes the EU’s promise to promote enhanced cooperation between the CBD and the UN climate change and desertification conventions to yield mutual benefits (European Commission 2011).

About the multilateral conventions, Biedenkopf, Torney, and Adelle (2018) explained that: “The EU has been a driving force and demander of multilateral conventions on a broad range of issues, including chemicals, climate change, biodiversity, desertification, ozone-depleting substances, aviation and waste” (p. 338). Biedenkopf *et al.* (2018) also explained that: “Yet, it is important to note that this is a relative assessment compared to other jurisdictions’ levels of ambition” (p. 338) and that: “It does not necessarily mean that the EU’s level of ambition is sufficient to achieve the goals that were set by the various international agreements” (p. 338).

Diverse authors explained about the effects of the climate change in the USA (Abatzoglou & Williams, 2016), EU (Dupont, Oberthür, & Biedenkopf, 2018), Ghana (Adelle, Delputte, De Roeck, & Nicholson, 2018), Latin America and the Caribbean (Rodríguez De Luque, González, Gourdjji, Mason-D’Croz, Obando-Bonilla, Mesa-Diez, & Prager, 2016), and Kenya (Bryan, Ringler, Okoba, Koo, Herrero, & Silvestri, 2013). About the effect of climate change on the forest fire area in the USA, Abatzoglou and Williams (2016) estimated that “human-caused climate change contributed to an additional 4.2 million ha of forest fire area during 1984–2015, nearly doubling the forest fire area expected in its absence” (p. 11770). Dupont, Oberthür, and Biedenkopf (2018) indicated that: “Economic crisis and increasing domestic opposition to climate policy, rooted in fossil fuel interests and populism, have heightened internal divisions leading to less ambitious domestic policy” (p. 120) and that: “This, in turn, affects the perception of the EU as a leading actor on climate change internationally and its ability to shape effectively climate governance beyond its borders” (p. 120). Dupont *et al.* (2018) also explained that: “Furthermore, external contexts, including the rise of the emerging powers and developments in US politics and US-Chinese relations, have limited the EU’s international climate role” (p. 120) and pointed out that: “Under these challenging circumstances, the EU has demonstrated significant adaptive capacity so as to remain an influential player in international climate politics” (p. 120). Additionally, Adelle, Delputte, De Roeck, and Nicholson (2018, p. 92) explained the effects of climate change in Ghana, as follows:

Ghana offers interesting insights in this regard, since the country is particularly vulnerable to the effects of climate change. Ghana is already starting to experience more extreme weather conditions, desertification, changing rainfall patterns and more rapid coastal erosion. Moreover, Ghana also suffers from a high degree of socio-economic vulnerability, due to the fact that its economy is still mainly based on sectors that can be considered climate sensitive (*e.g.* agriculture and forestry) (DARA 2012).

Rodríguez De Luque *et al.* (2016) modeled the socio-economic impacts of climate change in Latin America and the Caribbean for the period 2020-2045. The results of their study revealed that “the growth of corn and beans production would fall significantly in Nicaragua, El Salvador, Guatemala, Honduras, Colombia, Venezuela and Brazil, and rice and wheat would decline significantly in Brazil, Argentina and

Uruguay” (p. 12) and that “climate change has the capacity to partially curb the progress in food security in the region, due to its negative effects on food availability” (p. 12). Additionally, Bryan, Ringler, Okoba, Koo, Herrero, and Silvestri (2013) indicated that: “Increasing poverty, dependence on low-input agricultural production, and rapid population growth are critical challenges facing Kenya” (p. 162) and explained that “Climate change will further exacerbate these problems unless investments in agriculture and rural development increase, particularly those targeted towards strategies that provide multiple benefits to the most vulnerable smallholder producers” (p. 162).

About the land degradation, Critchley and Radstake (2017) explained that the results of the FAO’s Global Land Degradation Information System study of land degradation revealed that “25% of the world’s terrestrial surface was highly degraded or degrading, and a further 8% was moderately degraded or degrading” (p. 6). “However, on the positive side, 10% was found to be improving (FAO 2010b): these improvements have surely stemmed, at least partially, from investment and education programs based on the principles of sustainable land management” (p. 6). About the impacts of pesticides on biodiversity, Dudey, Attwood, Goulson, Jarvis, Bharucha, and Pretty (2017) explained that: “Despite new evidence, conservation organizations have tended not to fully recognize the impacts of pesticides on biodiversity, and current conservation strategies pay little heed to addressing this threat” (p. 449) and that: “A comprehensive suite of strategies are required to reduce and rationalize pesticide use and mitigate risks to species conservation” (p. 449).

With respect to the water availability in People’s Republic of China (PRC), Critchley and Radstake (2017) indicated that: “Water will be an increasingly severe limitation to production in Asia. For example, the PRC, with 20% of the world’s population, has only around 7% of global freshwater supplies—yet currently has to produce for this number on just 10% of the global land area (The Economist 2013b)” (p. 14). Critchley and Radstake (2017) also explained that “Countries in Asia are taking the lead in implementing green growth by reforming economic incentives, promoting a more inclusive and adaptive governance, and pursuing and investing in green strategies and policy reforms that help align economic growth strategies with the objective of sustainable development (ADB 2012)” (p. 4). With respect to the desertification in Latin America and the Caribbean, the officials of the United Nations (2018) explained that “UNDP/EU (2015) estimates that, in Latin America and the Caribbean, approximately 60% land is arid and more than 300 million hectares of agricultural land are desert, approximately 20% of the arable land” (p. 25) and that “IFAD (2010) estimates that 50% of agricultural land in the region will be subject to desertification by 2050” (p. 25).

As can be appreciated from the above, there are not sufficient synergies in the actions related to the three conventions for the interventions on sustainable land management and the impact of this lack of synergies is increasing the effects of desertification, land degradation, drought, climate change, and the lack of conservation of biodiversity on the competitiveness of the countries and their organizations. This situation originates from the highest levels of management structures of the conventions and is replicated in the governments and the civil society internationally. It is, thus, necessary to approach the problem in a holistic manner.

Problem Statement

After the literature review, there were not found previous studies that proposed an integrated framework for interventions on sustainable land management at the national, regional, and local government levels, a situation which reduces the competitiveness of the countries and their organizations.

Purpose of the Study

The purpose of the present study was to advance an integrated framework for interventions on sustainable land management of the countries with a national, regional, and local approach for contributing to the competitiveness of the countries and their organizations.

Theoretical Framework

Competitiveness: Definition, Pillars, and Components

Schwab (2017) explained that the specialists of the World Economic Forum defined competitiveness as “the set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the economy can achieve” (p. 11). Schwab (2017) also explained the pillars of competitiveness according to the methodology proposed in the Global Competitiveness Index 2017-2018 Report; these pillars are presented in Table 1. Additionally, Schwab (2017) indicated that although the results of the 12 pillars of competitiveness are reported separately, “it is important to keep in mind that they are not independent: they tend to reinforce each other, and a weakness in one area often has a negative impact in others” (p. 319). Schwab (2017, p. 43) also detailed the components of the 12 pillars as follows:

Table 1
The 12 Pillars of the Global Competitiveness Index 2017-2018 Report (Schwab, 2017)

N	Pillar	Concept
1	Institutions	“The institutional environment of a country depends on the efficiency and the behavior of both public and private stakeholders” (p. 317).
2	Infrastructure	“Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy” (p. 317).
3	Macroeconomic Environment	“The stability of the macroeconomic environment is important for business and, therefore, is significant for the overall competitiveness of a country” (p. 318).
4	Health and Primary Education	“A healthy workforce is vital to a country’s competitiveness and productivity” (p. 318).
5	Higher Education and Training	“Quality higher education and training is crucial for economies that want to move up the value chain beyond simple production processes and products” (p. 318).
6	Goods Market Efficiency	“Countries with efficient goods markets are well positioned to produce the right mix of products and services given their particular supply-and-demand conditions, as well as to ensure that these goods can be most effectively traded in the economy” (p. 318).

7	Labor Market Efficiency	“The efficiency and flexibility of the labor market are critical for ensuring that workers are allocated to their most effective use in the economy and provided with incentives to give their best effort in their jobs” (p. 318).
8	Financial Market Development	“An efficient financial sector allocates the resources saved by a nation’s population, as well as those entering the economy from abroad, to the entrepreneurial or investment projects with the highest expected rates of return rather than to the politically connected” (p. 318).
9	Technological Readiness	“The technological readiness pillar measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies (ICTs) in daily activities and production processes for increased efficiency and enabling innovation for competitiveness” (p. 318).
10	Market Size	“The size of the market affects productivity since large markets allow firms to exploit economies of scale. Traditionally, the markets available to firms have been constrained by national borders” (p. 319).
11	Business Sophistication	“Business sophistication concerns two elements that are intricately linked: the quality of a country’s overall business networks and the quality of individual firms’ operations and strategies” (p. 319).
12	Innovation	“Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of generating more value by merely integrating and adapting exogenous technologies tends to disappear. In these economies, firms must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities” (p. 319).

1. **First pillar: Institutions.** Components: property rights, intellectual property protection, diversion of public funds, public trust in politicians, irregular payments and bribes, judicial independence, favoritism in decisions of government officials, wastefulness of government spending, burden of government regulation, efficiency of legal framework in settling disputes, efficiency of legal framework in challenging regulations, transparency of government policymaking, business costs of terrorism, business costs of crime and violence, organized crime, reliability of police services, ethical behavior of firms, strength of auditing and reporting standards, efficacy of corporate boards, protection of minority shareholders’ interests, and strength of investor protection. (p. 322)

2. **Second pillar: Infrastructure.** Components: quality of overall infrastructure, quality of roads, quality of railroad infrastructure, quality of port infrastructure, quality of air transport infrastructure, available airline seat kilometers, quality of electricity supply, mobile telephone subscriptions, and fixed-telephone lines. (p. 322)

3. **Third pillar: Macroeconomic environment.** Components: government budget balance, gross national savings, inflation, government debt, and country credit rating. (p. 322)
4. **Fourth pillar: Health and primary education.** Components: business impact of malaria, malaria incidence, business impact of tuberculosis, tuberculosis incidence, business impact of HIV/AIDS, HIV prevalence, infant mortality, life expectancy, quality of primary education, and primary education enrollment rate. (p. 322)
5. **Fifth pillar: Higher education and training.** Components: secondary education enrollment rate, tertiary education enrollment rate, quality of the educational system, quality of math and science education, quality of management schools, Internet access in schools, local availability of specialized research and training services, and extent of staff training. (p. 322)
6. **Sixth pillar: Goods market efficiency.** Components: intensity of local competition, extent of market dominance, effectiveness of anti-monopoly policy, effect of taxation on incentives to invest, total tax rate, number of procedures required to start a business, time required to start a business, agricultural policy costs, prevalence of trade barriers, trade tariffs, prevalence of foreign ownership, business impact of rules on FDI, burden of customs procedures, imports as a percentage of GDP, degree of customer orientation, and buyer sophistication. (p. 322)
7. **Seventh pillar: Labor market efficiency.** Components: cooperation in labor-employer relations, flexibility of wage determination, hiring and firing practices, redundancy costs, effect of taxation on incentives to work, pay and productivity, reliance on professional management, country capacity to retain talent, country capacity to attract talent, and female participation in labor force. (p. 322)
8. **Eighth pillar: Financial market development.** Components: financial services meeting business needs, affordability of financial services, financing through local equity market, ease of access to loans, venture capital availability, soundness of banks, regulation of securities exchanges, and legal rights index. (p. 323)
9. **Ninth pillar: Technological readiness.** Components: availability of latest technologies, firm-level technology absorption, FDI and technology transfer, Internet users, broadband Internet subscriptions, Internet bandwidth, mobile-broadband subscriptions, mobile telephone subscriptions, and fixed telephone lines. (p. 323)
10. **Tenth pillar: Market size.** Components: domestic market size index and foreign market size index. (p. 323)
11. **Eleventh pillar: Business sophistication.** Components: local supplier quantity, local supplier quality, state of cluster development, nature of competitive advantage, value chain breadth, control of international distribution, production process sophistication, extent of marketing, willingness to delegate authority, and reliance on professional management. (p. 323)
12. **Twelfth pillar: Innovation.** Components: capacity for innovation, quality of scientific research institutions, company spending on R&D, university-industry collaboration in R&D, government procurement of advanced technology products, availability of scientists and engineers, PCT patent applications, and intellectual property protection. (p. 323)

Despotovic, Cvetanovic, Nedic, and Despotovic (2016) explained that: “Although value creation and productivity improvement remain the base of economic growth and competitiveness for certain countries, it is of essential importance to review the nature of the bonds between the economic, social, and environmental dimensions of sustainable competitiveness” (p. 1675) and that: “These three dimensions of the sustainable competitiveness phenomenon are clearly related to each other” (p. 1675). Despotovic *et. al* (2016) also indicated that: “Sustainable economic growth, which enables continual standard of living, depends on finding a balance between economic progress and the demands of social and environmental sustainability” (p. 1675). Then, the sustainable land management is critical for the sustainable competitiveness of the countries.

Although “over the last decade, promotion of competitiveness represents one of the central goals of economic policy of most of the countries” (Despotovic, Cvetanovic, Nedic, & Despotovic, 2016, p. 1656), as can be appreciated, SLM is a critical pillar that has been forgotten in the Global Competitiveness Index. Another related index is the Doing Business Index, which measures “aspects of business regulation affecting domestic small and medium-size firms defined based on standardized case scenarios and located in the largest business city of each economy” (World Bank, 2018, p. 11). According to the World Bank (2018), the indicators measured in the Doing Business Index are as follows:

- ✓ Starting a business: “Procedures, time, cost and paid-in minimum capital to start a limited liability company” (p. 12).
- ✓ Dealing with construction permits: “Procedures, time and cost to complete all formalities to build a warehouse and the quality control and safety mechanisms in the construction permitting system” (p. 12).
- ✓ Getting electricity: “Procedures, time and cost to get connected to the electrical grid, the reliability of the electricity supply and the transparency of tariffs” (p. 12).
- ✓ Registering property: “Procedures, time and cost to transfer a property and the quality of the land administration system” (p. 12).
- ✓ Getting credit: “Movable collateral laws and credit information systems” (p. 12).
- ✓ Protecting minority investors: “Minority shareholders’ rights in related-party transactions and in corporate governance” (p. 12).
- ✓ Paying taxes: “Payments, time and total tax and contribution rate for a firm to comply with all tax regulations as well as post-filing processes” (p. 12).
- ✓ Trading across borders: “Time and cost to export the product of comparative advantage and import auto parts” (p. 12).
- ✓ Enforcing contracts: “Time and cost to resolve a commercial dispute and the quality of judicial processes” (p. 12).
- ✓ Resolving insolvency: “Time, cost, outcome and recovery rate for a commercial insolvency and the strength of the legal framework for insolvency” (p. 12).
- ✓ Labor market regulation: “Flexibility in employment regulation and aspects of job quality” (p. 12).

As can be appreciated, the environmental conservation or protection is not part of the indicators measured in the Doing Business Index. Additionally, apart from the Global Competitiveness Index and the Doing Business Index, there are some indexes which considered environmental issues, such as the Social Progress Index (Porter, Stern, & Green, 2017) and the Environmental Performance Index (Yale University, 2018); however, these indexes are not considered to be associated with competitiveness directly. In the next section, the impact of the SLM on competitiveness is explained.

SLM: Definition and Its Impact on Competitiveness

Critchley and Radstake (2017) explained that SLM has emerged over the last 20 years as “the most commonly acceptable current international term and concept, rather than soil conservation, soil and water conservation, land degradation control, or integrated ecosystem management—though each of these is still used in specific situations” (p. 8). Maisharou *et al.* (2015) commented that “SLM is also considered as a tool for harmonisation of interventions between the major sub-sectors with respect to land use” (p. 1). Critchley and Radstake (2017) further indicated that: “From an economic perspective, land degradation can adversely affect food security, which in turn affects population well-being, labor productivity, and, henceforth, economic growth and development as well as political stability” (p. 6).

The officials of GEF, UNEP, and FAO (2013) explained that: “The main objective of SLM is to promote long-lasting human coexistence with nature, in order that the provisioning, regulating, cultural and supporting services of ecosystems are assured for future generations” (p. vi) and that “SLM is an essential prerequisite for sustainable development” (p. vii). GEF is the Global Environment Facility. About the Global Environment Facility (GEF), Delreux (2018) indicated that it serves as: “the financial mechanism of the main climate, biodiversity, desertification, chemicals and ozone agreements” (p. 21). UNEP is the United Nations Environment Programme. FAO is the Food and Agriculture Organization of the United Nations.

The specialists of the WOCAT (2010) defined SLM as: “the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions” (p. i). WOCAT is the World Overview of Conservation Approaches and Technologies. The specialists of the World Bank (2008) also explained that SLM is a “knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities) to meet rising food and fiber demands while sustaining ecosystem services and livelihoods” (p. 5). Critchley and Radstake (2017) also pointed out that “one of the most important elements of the “new approach” to conservation, underpinning the evolution of sustainable land management is the acknowledgement of indigenous knowledge and tradition” (p. 11) and that “farming has been practiced for over 10,000 years, yet for all but the last 200 years or so, the breeding of plants and animals, production systems, pest control, fertility maintenance, soil and water conservation, and irrigation have all been developed by land users themselves” (p. 11).

Despotovic *et al.* (2016) tested the hypothesis about “the positive impact of its social and environmental dimension on the economic dimension of sustainable competitiveness that is represented by the value of the Global Competitiveness Index” (p. 1656) with a sample of 34 European countries. The results of the study of Despotovic *et al.* (2016) confirmed the following:

the indisputable positive impact of the social dimension of sustainability, but also variable direction of the impact of the environmental dimension of sustainability (depending on the level of GDP per capita) on the economic dimension of sustainable competitiveness of European countries in 2013 (p. 1656).

In respect to the impact of biodiversity on climate change, Hisano, Searle, and Chen (2018) explained that “biodiversity may mitigate climate change impacts on (I) biodiversity itself, as more-diverse systems could be more resilient to climate change impacts, and (II) ecosystem functioning through the positive

relationship between diversity and ecosystem functioning” (p. 439). Hisano *et al.* (2018) further explained that “forest ecosystems are critical to mitigating greenhouse gas emissions through carbon sequestration” (p. 439) and that “climate change has affected forest ecosystem functioning in both negative and positive ways, and has led to shifts in species/functional diversity and losses in plant species diversity which may impair the positive effects of diversity on ecosystem functioning” (p. 439).

D’Odorico, Bhattachan, Davis, Ravi, and Runyan (2013) defined desertification as the “change in soil properties, vegetation or climate, which results in a persistent loss of ecosystem services that are fundamental to sustaining life” (p. 326). About the impact of desertification, D’Odorico *et al.* (2013) explained that “desertification affects large dryland areas around the world and is a major cause of stress in human societies” (p. 326) and that “a multidisciplinary approach to understanding the drivers and feedbacks of global desertification is motivated by our increasing need to improve global food production and to sustainably manage ecosystems in the context of climate change” (p. 326). D’Odorico *et al.* (2013) also explained that “desertification feedbacks may involve land degradation processes (*e.g.*, nutrient loss or salinization), changes in rainfall regime resulting from land-atmosphere interactions (*e.g.*, precipitation recycling, dust emissions), or changes in plant community composition (*e.g.*, shrub encroachment, decrease in vegetation cover)” (p. 326). The authors further pointed out that “desertification typically results from the compound effect of climate change and land use” (p. 332) and that “the long-range effects of desertification modify climate, global biogeochemical cycles and human geography” (p. 335).

About global climate change, Masih (2010) explained that it indicates “a change in either the mean state of the climate or in its variability, persisting for several decades or longer” (p. 102). In respect to the consequences of climate change, Masih (2010, p. 107) indicated the following effects of climate change: (a) the sea level is rising, (b) the arctic sea ice is melting, (c) glaciers and permafrost are melting, (d) sea-surface temperatures are warming, (e) heavier rainfall causes flooding in many regions, (f) extreme drought is increasing, (g) hurricanes have changed in frequency and strength, (h) more frequent heat waves, (i) the warmer temperatures affect human health, and (j) seawater is becoming more acidic. Finally, these consequences have been affecting diverse economic sectors, such as: agriculture, health, infrastructure, financial markets, tourism, and so on, with the consequent reduction of the competitiveness of those sectors in various countries.

Some Partial Frameworks about SLM

This section details previous studies and management instruments at the international and national levels for SLM. These studies and management instruments have been taken as a reference to propose an integrated management framework for interventions of SLM at the national, regional, and local levels, and that permits to take full advantage of the synergies between the related actors, stakeholders, and resources.

Environmental monitoring for the SLM in productive landscapes from New Zealand

MacLeod and Moller (2013, p. vi) proposed a framework for an environmental monitoring program in New Zealand, in which four outcomes were specified, along with their objectives and indicators, as follows:

1. **Outcome E1: Natural Capital Maintained.** Objectives:

- A. Maintaining ecosystem processes. Indicators: (a) soil status, (b) water quality and yield, (c) land cover, (d) ecosystem disruption, and (e) pollination.
- B. Reducing agricultural pest threats. Indicators: (a) new agricultural disease, weed, and pest species and (b) agricultural disease, weed, and pest dominance.
- C. Limiting environmental pollutants. Indicators: (a) environmental risk of toxins and (b) ecosystem levels of persistent toxins.

2. **Outcome E2: Resilience Secured for Future Use.** Objectives:

- A. Minimizing material and energy subsidies. Indicators: (a) non-renewable materials and (b) energy use.
- B. Buffering against socio-economic pressures and shocks. Indicators: (a) agro-environmental financial resources and (b) agro-environmental governance.
- C. Maintaining agro-biodiversity. Indicators: (a) genetic stock, (b) beneficial species status, and (c) landscape functional heterogeneity.

3. **Outcome E3: Contributed to National 'Natural Heritage' Goals.** Objectives:

- A. Improving ecosystem representation and composition. Indicators: (a) ecosystem representation and protection, (b) ecosystem composition, and (c) occupancy of environmental range.
- B. Preventing extinctions and declines. Indicator: status of threatened species.
- C. Reducing conservation pest threats. Indicator: (a) new conservation weed and pest species, and (b) conservation weed and pest dominance.

4. **Outcome E4: Global Environmental Change Obligations Met.** Objectives:

- A. Reducing emissions. Indicator: greenhouse gas emissions.
- B. Increasing carbon sequestration. Indicator: carbon storage and fluxes.

Causes and consequences of land use change in Santiago, Chile

Matta (2008) proposed a framework with the direct and indirect causes, as well as the consequences of the land use change (p. 5). The indirect causes were as follows: demographic factors, economic factors, technological factors, governmental policies, and cultural factors; also, the indirect causes influence infrastructure development, agriculture expansion, and wood extraction. Matta (2008, p. 5) also indicated the following direct causes: (a) social trigger events (which influence land ownership); (b) infrastructure development, agriculture expansion, and wood extraction (which influence land management); and (c) climate change (which influences land characteristics). With respect to the land use change and the land system (comprising land ownership, land management, and land characteristics), Matta (2008) specified the following direct consequences:

- 1. **Related to land ownership:** (a) land tenancy conflicts, (b) expropriation conflicts, (c) resettlement of native communities, and (d) loss of cultural / religious areas.
- 2. **Related to land management:** (a) nonproductive land uses, (b) urban sprawl, (c) overgrazing, and (d) rural population decline.

3. **Related to land characteristics:** (a) soil and rangeland pollution and degradation, (b) deforestation and native forest loss, (c) soil quality decrease, and (d) soil erosion.

Matta (2008) also specified the indirect consequences associated with the land use change: (a) social discontent, (b) abandonment of marginal lands, (c) institutional problems, (d) water availability and water quality diminishment, (e) ecosystems fragmentation, (f) changes in microclimates, (g) rise of social organizations, (h) loss of agricultural land, (i) urban population increase, (j) NIMBY (“Not In My Back Yard”) effect, (k) political dichotomy, (l) politic and institutional credibility and confidence fall, (m) loss of biodiversity, (n) diminishment of food production, (o) floods and droughts, (p) project overlapping and waste of time, among others.

Guidelines for the National Assessment of Land Degradation and SLM of the LADA Project

The specialists of GEF, UNEP, and FAO (2013) proposed guidelines for the national assessment of land degradation and SLM through the LADA Project (Land Degradation Assessment in Drylands). The specialists of GEF, UNEP, and FAO (2013) also indicated that the purposes of the evaluation are the following: (a) to obtain a reliable image of the state of natural resources and their use in the country; (b) to prepare the way to establish a monitoring system for land use, land degradation, and land management; (c) to prepare the way and identify areas of greatest interest for more local and detailed evaluations; (d) to provide information (results) to inform decision makers about the wisest uses of natural resources, particularly land and water; and (e) to provide a reliable basis for reporting to different conventions in particular to the UNCCD, UNFCCC, and UNCBD. Additionally, the specialists of GEF, UNEP, and FAO (2013) detailed the phases of the evaluation, as follows:

1. Preparatory phase

A national workshop should be organized to explain the objectives of carrying out the inventory and the baseline involving multiple disciplines (agriculture, livestock, forests, statistics, natural resources, and environment). The workshop should give an overview of the state-of-the-art of the current inventory available within ministries and institutions of data on land resources (soil, climate, land cover, and topography), land use (what is the crop, levels of inputs, levels of management? or What is the extent and intensity of irrigation?), and specific information on the particular good practices applied to agriculture, pasture, and forest management. The availability of information should also be discussed on economic or social factors, particularly in the population and poverty sub-nationally. It is important to note that this first workshop must set the bases to involve the national scientific and technical community in the evaluation exercise, to obtain a widely accepted product and create the conditions to establish better collaboration between the involved institutions. The result of this first national workshop should be an agreement on:

- a. The leading institution that will coordinate the work.
- b. Institutions and ministries that will cooperate by collecting or elaborating available data and personnel to carry out the baseline study.
- c. Financial arrangements.

2. Phase 1: Preparation of a concerted national map about land use

- a. The preparation of the base materials. The base materials include: (i) national maps of soils, climate, vegetation cover, and land uses (irrigated and protected); (ii) national and sub-national statistics of socio-

economic factors about the density of the population, poverty levels, use of inputs (tractors and fertilizers), average yields of specific crops, land tenure arrangements, density classes of livestock and dominant livestock species; and (iii) regional and global data with sufficient graphic resolution for being used in national studies.

- b. The preparation of the base map. The base map is the map of the National System of Land Use. This map should be prepared and documented by the lead institution in collaboration with your team in other national ministries and institutions.
- c. The map of the national system of land use: delineating units. The starting point for the preparation of the map of the national system of land use is the information land cover, freely available for 2005 for everyone with a graphic resolution in a scale of 300 m. The use of the Globcover database is highly recommended to avoid significant errors.
- d. The map of the national system of land use: attributes of the delineated units. Cross georeferenced information of the national system of land use with socio-economic information.
- e. Validation of the national map of land use. This validation must be carried out through a workshop, involving the same institutions and ministries that participated in the first workshop, with the additional presence of representatives of farmers' organizations or forest rangers and extension agents of each large administrative unit in the country. In this meeting, the map must be submitted to the validation of experts with experience in the land and the changes must be made where required. It is very important that the principles on which the map is built are accepted by all the participants.

The final result of this phase has three parts:

- a. A central digital information system that contains maps, data, and information on the natural resources in the country, accessible by all actors.
- b. A unique national map of the land use system that can be used as a basis for the assessment and mapping of land degradation and sustainable management.
- c. The evaluation team has agreed and supported the map.

3. Phase 2: Assessment of land degradation and SLM

The questionnaire and software for land degradation and SLM are available on the LADA website. The activities of this phase are the following:

- a. Organization of the evaluation. The participation of teams of actors at the national and sub-national levels, including land users, extension agents, and district officials should be organized.
- b. Preparation of the evaluation team. Before starting the evaluation, the questionnaire should be shared with a number of experts to facilitate the process in the areas that will be investigated. Then, a short workshop should be organized by the lead institution to introduce experts from different areas in the use of the WOCAT / LADA questionnaire.
- c. The participatory evaluation. Administrative units should collaborate with measurable data for the lead institution and the lead institution must ensure that all maps and background information gathered to prepare the national map of land use are available. Google Earth maps, images and maps printed on a larger scale can often be very helpful. Depending on the dominant land uses, specialists in crops, livestock, and forestry should be associated with the evaluation, as well as the evaluation of sociologists and economists.
- d. Quality control. The questionnaire has verification entries that must be reviewed by administrative units. There are more sophisticated controls that were developed by the Free University of Amsterdam in

collaboration with LADA Senegal and that are available under the shape of a working paper on the LADA website.

4. Phase 3: Consolidation into a simple national product with related results, maps, and analysis

- a. Mapping of individual degradation and management characteristics.
- b. Combined mapping of the types of land degradation.
- c. National mapping of SLM.
- d. Analysis and interpretation of the mapping and questionnaires.

5. Phase 4: Feedback to users

A final workshop should be organized with the stakeholders involved in the first workshop, to discuss the results and evaluate the implications for land use and environmental planning. The authorities and the actors in the administrative units must also be involved in this final workshop. Agreements must be reached to order the results for the report. The exercise should be repeated within 5 to 10 years to monitor the results.

It is important to observe that the specialists of PBL Netherlands Environmental Assessment Agency (2014) described GlobCover database as follows: “Global composites and land cover maps using as input observations from the 300m MERIS sensor on board the ENVISAT satellite mission.”

Mapping global archetypes of land systems

Václavík, Lautenbach, Kuemmerle, and Seppelt (2013, p. 3) proposed the following global archetypes of land systems:

1. **Land-use intensity factors:** (a) area of farmland, (b) trend in the area of farmland, (c) pasture area, (d) tendency in the pasture area, (e) number of fertilizers, (f) irrigation, (g) soil erosion, (h) yields of crops (wheat, corn, and rice), (i) gaps of yields of crops (wheat, corn, and rice), (i) total production index, and (k) Human Appropriation of Net Primary Production (HANPP).
2. **Environmental factors:** (a) temperature, (b) daytime temperature range, (c) precipitation, (d) temporality of precipitation, (e) solar radiation, (f) climatic anomalies, (g) average NDVI (Normalized Difference Vegetation Index), (h) temporality of NDVI, (i) organic carbon of soil, and (j) wealth of species.
3. **Socio-economic factors:** (a) gross domestic product, (b) gross domestic product in agriculture, (c) social capital in agriculture, (d) population density, (e) trend in population density, (f) political stability, and (g) accessibility.

Sustainable Forestry Initiative

Sustainable Forestry Initiative (2010) proposed the SFI 2010-2014 Standard, whose principles, objectives, and performance measures were the following:

1. **Principles:** (a) sustainable forestry, (b) forest health and productivity, (c) protection of water resources, (d) protection of biological diversity, (e) aesthetics and recreation, (f) protection of special sites, (g) responsible practices for fiber supply in North America, (h) legal compliance, (i) investigation, (j) training and education, (k) public involvement, (l) transparency, and (m) continual improvement (p. 3).

2. **Objectives and performance measures:**

A. *Objective 1: Forest Management Planning.* Performance measure 1.1: “Program Participants shall ensure that forest management plans include long-term harvest levels that are sustainable and consistent with appropriate growth-and-yield models” (p. 5).

B. *Objective 2: Forest Productivity.* Performance measures:

- a. Performance measure 2.1: “Program Participants shall promptly reforest after final harvest” (p. 5).
- b. Performance measure 2.2: “Program Participants shall minimize chemical use required to achieve management objectives while protecting employees, neighbors, the public and the environment, including wildlife and aquatic habitats” (p. 6).
- c. Performance measure 2.3: “Program Participants shall implement forest management practices to protect and maintain forest and soil productivity” (p. 6).
- d. Performance measure 2.4: “Program Participants shall manage to protect forests from damaging agents, such as environmentally or economically undesirable wildfire, pests, diseases and invasive exotic plants and animals, to maintain and improve long-term forest health, productivity, and economic viability” (p. 6).
- e. Performance measure 2.5: “Program Participants that deploy improved planting stock, including varietal seedlings, shall use sound scientific methods” (p. 7).

C. *Objective 3: Protection and Maintenance of Water Resources.* Performance measures:

- a. Performance measure 3.1: “Program Participants shall meet or exceed all applicable federal, provincial, state and local water quality laws, and meet or exceed best management practices developed under Canadian or U.S. Environmental Protection Agency–approved water quality programs” (p. 7).
- b. Performance measure 3.2: “Program Participants shall have or develop, implement and document riparian protection measures based on soil type, terrain, vegetation, ecological function, harvesting system and other applicable factors” (p. 7).

D. *Objective 4: Conservation of Biological Diversity including Forests with Exceptional Conservation Value.* Performance measures:

- a. Performance measure 4.1: “Program Participants shall have programs to promote biological diversity at stand- and landscape-levels” (p. 7).
- b. Performance measure 4.2: “Program Participants shall apply knowledge gained through research, science, technology and field experience to manage wildlife habitat and contribute to the conservation of biological diversity” (p. 8).

E. *Objective 5: Management of Visual Quality and Recreational Benefits.* Performance measures:

- a. Performance measure 5.1: “Program Participants shall manage the impact of harvesting on visual quality” (p. 7).

- b. Performance measure 5.2: “Program Participants shall manage the size, shape and placement of clear-cut harvests” (p. 8).
- c. Performance measure 5.3: “Program Participants shall adopt a green-up requirement or alternative methods that provide for visual quality” (p. 8).
- d. Performance measure 5.4: “Program Participants shall support and promote recreational opportunities for the public” (p. 8).

F. *Objective 6: Protection of Special Sites.* Performance measure 6.1: “Program Participants shall identify special sites and manage them in a manner appropriate for their unique features” (p. 8).

G. *Objective 7: Efficient Use of Forest Resources.* Performance measure 7.1: “Program Participants shall employ appropriate forest harvesting technology and in-woods manufacturing processes and practices to minimize waste and ensure efficient utilization of harvested trees, where consistent with other SFI Standard objectives” (p. 9).

H. *Objective 8: Landowner Outreach.* Performance measure 8.1: “Program Participants shall provide information to landowners for reforestation following harvest, for the use of best management practices, and for identification and protection of important habitat elements for wildlife and biodiversity, including Forests with Exceptional Conservation Value” (p. 9).

I. *Objective 9: Use of Qualified Resource and Qualified Logging Professionals.* Performance measure 9.1: “Program Participants shall encourage landowners to utilize the services of certified logging professionals (where available), qualified resource professionals and qualified logging professionals in applying principles of sustainable forest management on their lands” (p. 9).

J. *Objective 10: Adherence to Best Management Practices.* Performance measurements:

- a. Performance measure 10.1: “Program Participants shall clearly define and implement policies to ensure that facility inventories and fiber sourcing activities do not compromise adherence to the principles of sustainable forestry” (p. 9).
- b. Performance measure 10.2: “Program Participants shall monitor the use of best management practices” (p. 10).

K. *Objective 11: Promote Conservation of Biological Diversity, Biodiversity Hotspots, and High-Biodiversity Wilderness Areas.* Performance measure 11.1: “Program Participants shall ensure that their fiber sourcing programs support the principles of sustainable forestry, including efforts to promote conservation of biological diversity” (p. 10).

L. *Objective 12: Avoidance of Controversial Sources including Illegal Logging.* Performance measure 12.1: “Program Participants shall ensure that their fiber sourcing programs support the principles of sustainable forestry, including efforts to thwart illegal logging” (p. 10).

M. *Objective 13: Avoidance of Controversial Sources including Fiber Sourced from Areas without Effective Social Laws.* Performance measure 13.1: “Program Participants shall avoid controversial sources and encourage socially sound practices” (p. 10).

N. *Objective 14: Legal and Regulatory Compliance.* Performance measures:

- a. Performance measure 14.1: “Program Participants shall take appropriate steps to comply with applicable federal, provincial, state, and local forestry and related social and environmental laws and regulations” (p. 11).
- b. Performance measure 14.2: “Program Participants shall take appropriate steps to comply with all applicable social laws at the federal, provincial, state and local levels in the country in which the Program Participant operates” (p. 11).

O. *Objective 15: Forestry Research, Science, and Technology.* Performance measures:

- a. Performance measure 15.1: “Program Participants shall individually and/or through cooperative efforts involving SFI Implementation Committees, associations or other partners provide in-kind support or funding for forest research to improve forest health, productivity, and sustainable management of forest resources, and the environmental benefits and performance of forest products” (p. 11).
- b. Performance measure 15.2: “Program Participants shall individually and/or through cooperative efforts involving SFI Implementation Committees, associations or other partners develop or use state, provincial or regional analyses in support of their sustainable forestry programs” (p. 11).

P. *Objective 16: Training and Education.* Performance measures:

- a. Performance measure 16.1: “Program Participants shall require appropriate training of personnel and contractors so that they are competent to fulfill their responsibilities under the SFI 2010-2014 Standard” (p. 12).
- b. Performance measure 16.2: “Program Participants shall work individually and/or with SFI Implementation Committees, logging or forestry associations, or appropriate agencies or others in the forestry community to foster improvement in the professionalism of wood producers” (p. 12).

Q. *Objective 17: Community Involvement in the Practice of Sustainable Forestry.* Performance measures:

- a. Performance measure 17.1: Program Participants shall support and promote efforts by consulting foresters, state, provincial, and federal agencies, state or local groups, professional societies, conservation organizations, indigenous peoples and governments, community groups, sporting organizations, labor, universities, extension agencies, the American Tree Farm System® and/or other landowner cooperative programs to apply principles of sustainable forest management (p. 13).
- b. Performance measure 17.2: “Program Participants shall support and promote, at the state, provincial, or other appropriate levels, mechanisms for public outreach, education and involvement related to sustainable forest management” (p. 13).
- c. Performance measure 17.3: “Program Participants shall establish, at the state, provincial, or other appropriate levels, procedures to address concerns raised by loggers, consulting foresters, employees, unions, the public, or other Program Participants regarding practices that appear inconsistent with the SFI Standard principles and objectives” (p. 13).

R. *Objective 18: Public Land Management Responsibilities.* Performance measures:

- a. Performance measure 18.1: “Program Participants with forest management responsibilities on public lands shall participate in the development of public land planning and management processes” (p. 14).

b. Performance measure 18.2: “Program Participants with forest management responsibilities on public lands shall confer with affected indigenous peoples” (p. 14).

S. *Objective 19: Communications and Public Reporting.* Performance measures:

a. Performance measure 19.1: “A Certified Program Participant shall provide a summary audit report, prepared by the certification body, to SFI Inc. after the successful completion of a certification, recertification, or surveillance audit to the SFI 2010-2014 Standard” (p. 14).

b. Performance measure 19.2: “Program Participants shall report annually to SFI Inc. on their conformance with the SFI 2010-2014 Standard” (p. 14).

T. *Objective 20: Management Review and Continual Improvement.* Performance measure 20.1: “Program Participants shall establish a management review system to examine findings and progress in implementing the SFI Standard, to make appropriate improvements in programs, and to inform their employees of changes” (p. 14).

SALUS Model (System Approach for Land Use Sustainability)

Basso and Ritchie (2015, p. 261) explained the components of the model SALUS (System Approach for Land Use Sustainability), which were the following: (a) biotic interactions, (b) crops (wheat, barley, maize, soy, potato, etc.), (c) roots, (d) weather, (e) soil, and (f) management (crop sequencing, planting, residue, tillage, fertilizers, manure, pesticides, irrigation, and drainage). Basso and Ritchie (2015) also indicated that these components affect the yield, the atmospheric flux, drainage leaching, and soil erosion, and that the previous issues affect socio-economic and environmental factors (p. 261).

SLM Project in The Gambia

Chileshe, Oladapo, Shalaby, Telahigue, and Sarr (2010, p. 4) explained the components of the SLM project in the Gambia, as well as the main used management indicators, which are the following:

1. Components of the project:

A. *Institutional strengthening of SLM.* It includes: (a) establishment and operation of the national platform for sustainable land management in The Gambia, (b) establishment and operation of six regional platforms for sustainable land management, (c) formulation of the framework for investments in sustainable land management, (d) development of a knowledge base and an information system for sustainable land management, (e) assistance in the development of appropriate policies in agricultural mechanization, and (f) construction of key planning capacity and advice to support service providers.

B. *Landscape and basin management based on community participation:* (a) watershed management planning based on community participation, (b) assurance of food safety, routing poverty, and land degradation towards a community based in sustainable land management investment with community participation, (c) monitoring and evaluation of the impact in a participatory manner, (d) construction of the institutional capacity for the planning of watershed management based on the participation of the community, and (e) validation and demonstration of agricultural conservation tools and techniques for mountain agriculture.

C. *Project management*: (a) to develop and execute annual supply plans, (b) to implement an internal system for the management of monitoring / evaluation, (c) to prepare and submit quarterly reports, to review the medium term and to report the progress of the project, and (d) to monitor agreements with implementing partners.

2. **Indicators of environmental management.** In the project of sustainable land management, among others, the following environmental indicators were specified: (a) use of land (arable land as a percentage of the total land area), (b) annual rate of deforestation, (c) annual reforestation rate, and (d) CO₂ emissions per capita (metric tons).

The 10-year strategic plan and framework to enhance the implementation of the UNCCD (2008–2018)

The participants of the COP 8 of the UNCCD celebrated in Madrid at September 2007 proposed the four strategic objectives and the five operational objectives (United Nations, 2007, p. 16). The four strategic objectives are the following:

1. **Strategic objective 1:** To improve the living conditions of affected populations.

Expected impact 1.1: People living in areas affected by desertification/land degradation and drought to have an improved and more diversified livelihood base and to benefit from income generated from sustainable land management.

Expected impact 1.2: The affected populations' socio-economic and environmental vulnerability to climate change, climate variability, and drought is reduced.

Indicator S-1: Decrease in numbers of people negatively impacted by the processes of desertification/land degradation and drought.

Indicator S-2: Increase in the proportion of households living above the poverty line in affected areas.

Indicator S-3: Reduction in the proportion of the population below the minimum level of dietary energy consumption in affected areas.

2. **Strategic objective 2:** To improve the conditions of affected ecosystems.

Expected impact 2.1. Land productivity and other ecosystem goods and services in affected areas are enhanced in a sustainable manner contributing to improved livelihoods.

Expected impact 2.2. The vulnerability of affected ecosystems to climate change, climate variability, and drought is reduced.

Indicator S-4: Reduction in the total area affected by desertification/land degradation and drought.

Indicator S-5: Increase in the net primary productivity in affected areas.

3. **Strategic objective 3:** To generate global benefits through the effective application of the UNCCD.

Expected impact 3.1. Sustainable land management and combating desertification/land degradation contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.

Indicator S-6: Increase in carbon stocks (soil and plant biomass) in affected areas.

Indicator S-7: Areas of forest, agricultural, and aquaculture ecosystems under sustainable management.

4. **Strategic objective 4:** To mobilize resources to support implementation of the Convention through building effective partnerships between national and international actors.

Expected impact 4.1. Increased financial, technical, and technological resources are made available to affected developing country Parties, and where appropriate Central and Eastern European countries, to implement the Convention.

Expected impact 4.2. Enabling policy environments are improved for UNCCD implementation at all levels.

Indicator S-8: Increase in the level and diversity of available funding for combating desertification/land degradation and mitigating the effects of drought.

Indicator S-9: Development policies and measures address desertification/land degradation and mitigation of the effects of drought.

The five operational objectives of the Decennial Strategic Plan 2008-2018 (United Nations, 2007, p. 18) are as follows:

1. **Operational objective 1:** Advocacy, awareness raising, and education.

To actively influence relevant international, national, and local processes and actors in adequately addressing desertification/land degradation and drought-related issues.

Outcome 1.1: Desertification/land degradation and drought issues and the synergies with climate change adaptation/mitigation and biodiversity conservation are effectively communicated among key constituencies at the international, national, and local levels.

Outcome 1.2: Desertification/land degradation and drought issues are addressed in relevant international forums, including those pertaining to agricultural trade, climate change adaptation, biodiversity conservation and sustainable use, rural development, sustainable development, and poverty reduction.

Outcome 1.3: Civil society organizations (CSOs) and the scientific community in the North and the South are increasingly engaged as stakeholders in the Convention processes and desertification/land degradation and drought are addressed in their advocacy, awareness-raising, and education initiatives.

2. **Operational objective 2:** Policy framework.

To support the creation of enabling environments for promoting solutions to combat desertification/land degradation and mitigate the effects of drought.

Outcome 2.1: Policy, institutional, financial, and socio-economic drivers of desertification/land degradation and barriers to sustainable land management are assessed, and appropriate measures to remove these barriers are recommended.

Outcome 2.2: Affected country parties revise their national action programmes (NAPs) into strategic documents supported by biophysical and socio-economic baseline information and include them in integrated investment frameworks.

Outcome 2.3: Affected country parties integrate their NAPs and sustainable land management and land degradation issues into development planning and relevant sectorial and investment plans and policies.

Outcome 2.4: Developed country parties mainstream UNCCD objectives and sustainable land management interventions into their development cooperation programmes/projects in line with their support to national sectorial and investment plans.

Outcome 2.5: Mutually reinforcing measures among desertification/land degradation action programmes and biodiversity and climate change mitigation and adaptation are introduced or strengthened so as to enhance the impact of interventions.

3. **Operational objective 3:** Science, technology, and knowledge.

To become a global authority on scientific and technical knowledge pertaining to desertification/land degradation and mitigation of the effects of drought.

Outcome 3.1: National monitoring and vulnerability assessment on biophysical and socioeconomic trends in affected countries are supported.

Outcome 3.2: A baseline based on the most robust data available on biophysical and socioeconomic trends is developed and relevant scientific approaches are gradually harmonized.

Outcome 3.3: Knowledge on biophysical and socio-economic factors and on their interactions in affected areas is improved to enable better decision-making.

Outcome 3.4: Knowledge of the interactions between climate change adaptation, drought mitigation and restoration of degraded land in affected areas is improved to develop tools to assist decision-making.

Outcome 3.5: Effective knowledge-sharing systems, including traditional knowledge, are in place at the global, regional, subregional, and national levels to support policymakers and end users, including through the identification and sharing of best practices and success stories.

Outcome 3.6: Science and technology networks and institutions relevant to desertification/land degradation and drought are engaged to support UNCCD implementation.

4. **Operational objective 4:** Capacity-building.

To identify and address capacity-building needs to prevent and reverse desertification/land degradation and mitigate the effects of drought.

Outcome 4.1: Countries which have carried out the national capacity self-assessment (NCSA) implement the resulting action plans to develop the necessary capacity at the individual, institutional, and systemic levels to tackle desertification/land degradation and drought issues at the national and local levels.

Outcome 4.2: Those countries which have not previously undertaken capacity needs assessments engage in relevant assessments processes to identify capacity needs for tackling desertification/land degradation and drought at the national and local levels.

5. **Operational objective 5:** Financing and technology transfer.

To mobilize and improve the targeting and coordination of national, bilateral and multilateral financial and technological resources in order to increase their impact and effectiveness.

Outcome 5.1: Affected country parties develop integrated investment frameworks for leveraging national, bilateral, and multilateral resources with a view to increasing the effectiveness and impact of interventions.

Outcome 5.2: Developed country parties provide substantial, adequate, timely, and predictable financial resources to support domestic initiatives to reverse and prevent desertification/land degradation and mitigate the effects of drought.

Outcome 5.3: Parties increase their efforts to mobilize financial resources from international financial institutions, facilities and funds, including the GEF, by promoting the UNCCD/Sustainable land management (SLM) agenda within the governing bodies of these institutions.

Outcome 5.4: Innovative sources of finance and financing mechanisms are identified to combat desertification/land degradation and mitigate the effects of drought, including from the private sector, market-based mechanisms, trade, foundations and CSOs, and other financing mechanisms for climate change adaptation and mitigation, biodiversity conservation, and sustainable use and for hunger and poverty reduction.

Outcome 5.5: Access to technology by affected country parties is facilitated through adequate financing, effective economic and policy incentives and technical support, notably within the framework of South-South and North-South cooperation.

Agreements and indicators on Land Degradation Neutrality

The officials of the United Nations (2016) endorsed the science-based definition of the Intergovernmental Working Group (IWG) for the Land Degradation Neutrality (LDN) as follows: “Land degradation neutrality is a state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems” (p. 9). The officials of the United Nations (2017) mentioned the objectives of the LDN as follows (p. 1):

- ✓ maintain or improve the sustainable delivery of ecosystem services;
- ✓ maintain or improve productivity, in order to enhance food security;
- ✓ increase resilience of the land and populations dependent on the land;

- ✓ seek synergies with other social, economic, and environmental objectives; and
- ✓ reinforce responsible and inclusive governance of land.

According to the officials of the United Nations (2016, p. 9), at the Twelfth Conference of the Parties (COP 12) of the UNCCD held on 21st October 2015, in relation to the integration of the Sustainable Development Goals (SDG) and its goals in the implementation of the UNCCD in the National Action Programs (NAP) and the report of the IWG on the Land Degradation Neutrality (LDN) for fighting the Desertification, Land Degradation and Drought (DLDD), it was agreed that parties are invited to:

- (a) Formulate voluntary targets to achieve LDN in accordance with their specific national circumstances and development priorities, taking into account the list of options for operationalizing LDN at the national level as outlined by the IWG.
- (b) Use the monitoring and evaluation approach adopted in decision 22/COP.11, including the progress indicators as listed in the annex to this decision, where reliable data is available pursuant to paragraph 7 of that decision and taking into consideration national circumstances and, as needed, add additional indicators to monitor, evaluate, and communicate progress towards achieving the LDN target.
- (c) Explore options on how to integrate the voluntary LDN targets in their NAPs as part of their overall discussion on the implementation of the SDGs.
- (d) Promote the use of LDN targets and projects and other SLM initiatives as an effective vehicle for mobilizing additional sustainable financing and responsible and sustainable investments that address DLDD issues.

The officials of the United Nations (2016, p. 11) proposed progress indicators for the strategic objectives of LDN, as follows:

- ✓ Trends in population living below the relative poverty line and/or income inequality in affected areas;
- ✓ Trends in access to safe drinking water in affected areas;
- ✓ Trends in land cover;
- ✓ Trends in land productivity or functioning of the land;
- ✓ Trends in carbon stocks above and below ground;
- ✓ Trends in abundance and distribution of selected species.

Purposes, Goals, and Indicators of National Strategies for Natural Resources in Peru

Objectives and indicators of the National Strategy to Combat Desertification and Drought 2016-2030

The specialists of the Ministry of Environment of Peru - MINAM (2016) proposed a general objective and six specific objectives in the National Strategy to Combat Desertification and Drought 2016-2030 (ENLCDS 2016-2030), with its corresponding management indicators:

1. **General Objective:** To prevent and reduce desertification, land degradation and the impact of drought in the national territory. The management indicators of the general objective are the following:

- ✓ IOG-1 Percentage of areas which were recovered from desertification, land degradation, and the impact of drought.
- ✓ IOG-2 Percentage of areas in which actions have been implemented to prevent desertification, land degradation, and the impact of drought.
- ✓ IOG-3 Increase in carbon stocks (soil and plant biomass) in the affected areas.
- ✓ IOG-4 Increase in net primary productivity of soils in affected areas.
- ✓ IOG-5 Reduction in the number of people affected by desertification, land degradation, and drought, as a result of interventions.
- ✓ IOG-6 Increase in the proportion of households living above the poverty line in the affected areas, as a result of the interventions carried out.
- ✓ IOG-7 Reduction in the proportion of the population that is below the minimum level of food energy consumption in the affected areas, as a result of the interventions carried out.

2. *Specific Objectives:*

A. Specific Objective N° 1: To elaborate and update the baselines of the state of soils, including the causes and consequences of desertification, land degradation and drought, with solid scientific-technological guidelines adapted to the national reality. The management indicator for the Specific Objective N° 1 is:

- ✓ IOE1: Percentage of regions that have developed and/or updated the baselines of the areas which were affected by desertification, land degradation, and drought.

B. Specific Objective N° 2: Strengthen regulatory frameworks related to the fight against desertification, land degradation, and drought (synergistic, multi-sectorial, intra-sectorial, regional, and local), the affected areas, and the areas that could potentially be affected by the desertification, land degradation, and drought. The management indicator for the Specific Objective N° 2 is:

- ✓ IOE2: Percentage of entities related to the reduction of desertification, land degradation, and the impact of drought, which have sufficient regulatory frameworks for their effective participation.

C. Specific Objective N° 3: To develop plans, programs, and projects that are synergistic, multi-sectorial, intra-sectorial, regional and local, to reduce the desertification, the land degradation, and the impact of drought in the affected areas and the areas that would potentially be affected. The management indicators of the Specific Objective N° 3 are as follows:

- ✓ IOE3-1: Percentage of related entities that have plans, programs, and projects that are synergistic, multi-sectorial, intra-sectorial, regional, and local to reduce desertification, land degradation, and the impact of drought.
- ✓ IOE3-2: Percentage of progress in the execution of plans, programs, and projects that are synergistic, multi-sectorial, intra-sectorial, regional, and local to reduce desertification, land degradation, and the impact of drought.
- ✓ IOE3-3: Percentage of budget execution of plans, programs, and projects to combat desertification, land degradation, and the impact of drought.

D. Specific Objective N° 4: To disseminate the problems and actions to mitigate desertification, land degradation, and the impact of drought through mass communication media. The management indicators of the Specific Objective N° 4 are as follows:

- ✓ IOE4-1: Percentage of mass media that disseminate the problems and actions to reduce desertification, land degradation, and the impact of drought, periodically.
- ✓ IOE4-2: Percentage of the population that knows the problems and actions to reduce desertification, land degradation, and the impact of drought.

E. Specific Objective N° 5: Strengthen management capacities of the theme of desertification, land degradation and drought, in the diverse stakeholders, on a scientific-technological basis adapted to the national reality. The management indicators of the Specific Objective N° 5 are as follows:

- ✓ IOE5-1: Percentage of government entities related to the reduction of desertification, land degradation, and the impact of drought, which have received training for their effective participation.
- ✓ IOE5-2: Percentage of non-governmental entities related to the reduction of desertification, land degradation, and the impact of drought, which have received training for their effective participation.
- ✓ IOE5-3: Percentage of people associated with the theme of desertification, land degradation and drought, who have received training on this subject.

F. Specific Objective N° 6: To develop scientific research or technological innovations that help sustainable land management, taking advantage of traditional national knowledge. The management indicators of the Specific Objective N° 6 are the following:

- ✓ IOE6-1: Percentage of progress in the development of scientific research and technological innovations associated with sustainable land management.
- ✓ IOE6-2: Percentage of progress in achieving the goal of publications in indexed journals associated with sustainable land management.

Objectives and indicators of the National Strategy on Climate Change 2015

In its National Strategy on Climate Change 2015 (wherein CC is Climate Change and GHG is GreenHouse Gases), the specialists of the MINAM (2015) proposed the following objectives and management indicators:

1. ***Objective 1:*** The population, economic agents, and the State increase awareness and adaptive capacity for action in the face of the adverse effects and opportunities of the CC. The management indicators are the following:

- a. Increase of the proportion of people who know what actions to take for risk management in a CC context and for adaptation to CC;
- b. Increase of private investment and increase of the quality of public spending for adaptation to CC;
- c. Reduction of losses of human and economic lives due to the occurrence of disasters of climatic origin;

- d. Increase in the production of scientific research and technological development as a basis and guide for risk management in a context of climate change and adaptation to climate change.
2. **Objective 2:** The population, economic agents, and the State conserve carbon reserves and contribute to the reduction of GHG emissions. The management indicators are the following:
- a. Growth rate of GHG emissions below the GDP growth rate;
 - b. Carbon intensity of the economy;
 - c. Reduction of GHG emissions in all sectors, especially in those that emit the most GHG emissions;
 - d. Increase of carbon capture and net reduction of emissions in the forestry sector.

Objectives and indicators of the National Biodiversity Strategy to 2021

In its National Biological Diversity Strategy to 2021, the specialists of MINAM (2014) proposed the following strategic objectives and management indicators:

1. **Strategic Objective SO1:** To improve the state of biodiversity and maintain the integrity of the ecosystem services that it provides. The management indicators are the following:

- ✓ Indicator 1.1: Percentage of the land area that is under some form of effective management of biodiversity;
- ✓ Indicator 1.2: Percentage of the marine area that is under some form of effective management of biodiversity;
- ✓ Indicator 2: Number of prepared conservation plans for species with initiated implementation;
- ✓ Indicator 3: Number of evaluated programs for conservation and sustainable use of genetic diversity for species or groups of species for which we are the center of origin and/or diversification, as well as for their wild relatives.

2. **Strategic Objective SO2:** To increase the contribution of biodiversity to national development by improving the country's competitiveness and the equitable distribution of benefits. The management indicators are the following:

- ✓ Indicator 4.1: Number of Remuneration Mechanisms for Ecosystem Services implemented;
- ✓ Indicator 4.2: Number of competitive bio-businesses, preferably oriented to the bio-commerce model, that commercialize products of biodiversity at a national and international level with added value;
- ✓ Indicator 5: Number of regulatory instruments implemented that are related to the Nagoya ABS Protocol.

3. **Strategic Objective SO3:** To reduce direct and indirect pressures for biological diversity and its ecosystem processes. The management indicators are the following:

- ✓ Indicator 6: Percentage of the population that declares to have knowledge about the country's biodiversity;
- ✓ Indicator 7: National deforestation rate;
- ✓ Indicator 8.1: Number of records of environmental events with an impact on biodiversity;

- ✓ Indicator 8.2: Number of regulatory mechanisms of threatened species, and updated mechanisms;
- ✓ Indicator 8.3: Number of regulatory mechanisms of invasive alien species.

4. **Strategic Objective SO4:** Strengthen the capacities of the three levels of government for the sustainable management of biodiversity. The management indicators are the following:

- ✓ Indicator 9.1: Number of regional governments that have strategies and action plans for the management of biodiversity in implementation;
- ✓ Indicator 9.2: Percentage of provincial and district municipalities that carry out activities within the framework of the respective strategy and regional biodiversity action plan.

5. **Strategic Objective SO5:** To improve knowledge and technologies for the sustainable use of biodiversity, as well as the revaluation of traditional knowledge linked to the biodiversity of indigenous peoples. The management indicators are the following:

- ✓ Indicator 10.1: Number of biodiversity research projects;
- ✓ Indicator 10.2: Percentage of annual increase in the number of traditional knowledge records;
- ✓ Indicator 11: Number of native species for which knowledge of genetic wealth has increased, including its territorial distribution;
- ✓ Indicator 12: Percentage of annual increase in the number of traditional knowledge registers.

6. **Strategic Objective SO6:** Strengthen the cooperation and participation of all sectors of the population in the governance of biological diversity. The management indicators are the following:

- ✓ Indicator 13.1: Number of participatory governance agreements for biological diversity;
- ✓ Indicator 13.2: Number of experiences of participatory governance of biological diversity;
- ✓ Indicator 13.3: Number of public-private partnerships to promote the conservation and enhancement of biodiversity.

The Proposal: Sustainable Land Management's Integrated Framework for Interventions (SLMIFI)

Based on the literature reviewed, the Sustainable Land Management's Integrated Framework for Interventions (SLMIFI) was proposed as an integrated framework for the interventions of SLM in the countries with a national, regional, and local approach taking into account the biological diversity, the climate change, and the fight against desertification and drought.

SLMIFI at the national level

Considering the Peruvian National Strategy to Combat Desertification and Drought 2016-2030, the Peruvian National Strategy for Biological Diversity by 2021, and the Peruvian National Strategy on Climate Change, and by taking into account diverse previous studies and management instruments developed at national and international levels, the following objectives and management indicators for SLM are proposed (see figure 1):

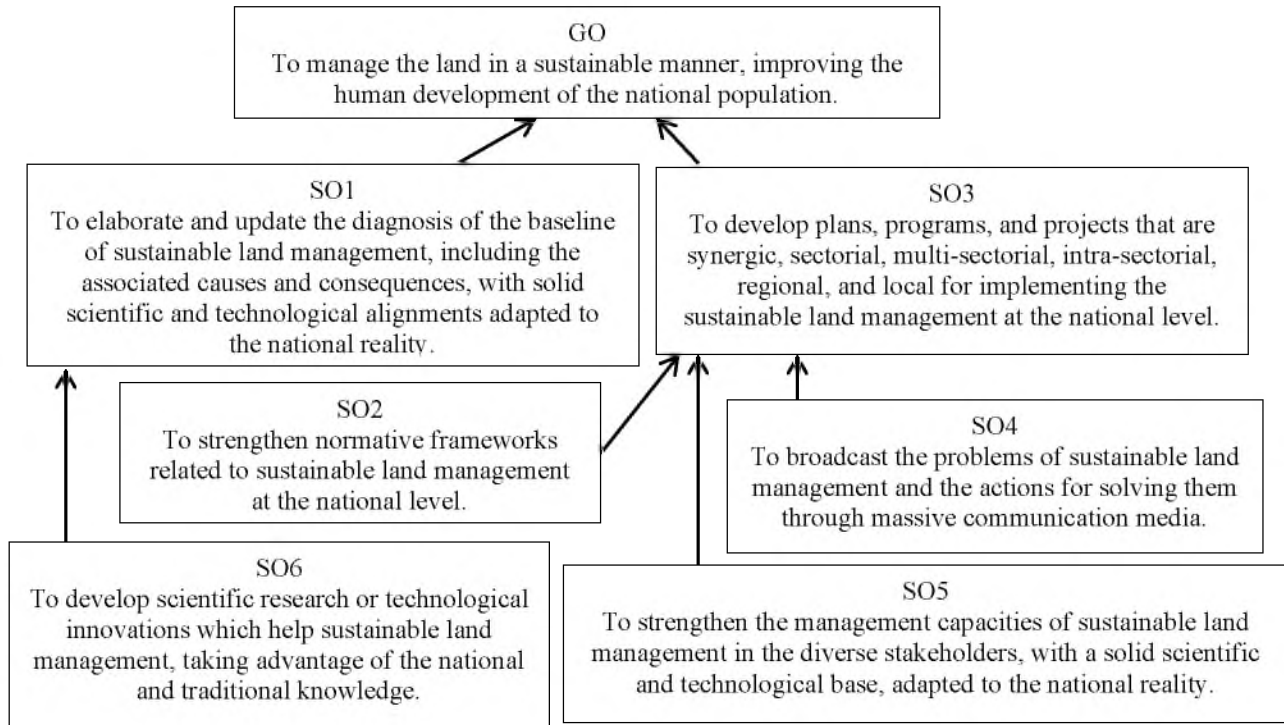


Figure 1. The general objective and the specific objectives of the SLM at the national level, according to SLMIFI.

1. **General Objective (GO):** To manage the land in a sustainable manner, improving the human development of the national population. The management indicators of the GO are the following:

- ✓ IOG-1: Percentage of affected areas (in the terrestrial, marine, and aerial areas) in which interventions have been carried out for the recovery of desertification, land degradation, and the impact of drought, biological diversity, and the effects of climate change (MINAM, 2016; MINAM, 2014; United Nations, 2007);
- ✓ IOG-2: Percentage of areas (in the terrestrial, marine, and aerial areas) in which interventions have been implemented for the prevention of desertification, land degradation, and the impact of drought, biological diversity, and the effects of climate change (MINAM, 2016; United Nations, 2007);
- ✓ IOG-3: Increase in carbon stocks (soil and plant biomass) in the affected areas (MINAM, 2016; MINAM, 2015; United Nations, 2016; United Nations, 2007);
- ✓ IOG-4: Reduction in greenhouse gas emissions in the affected areas (MINAM, 2015);
- ✓ IOG-5: Reduction in environmental pollutants in the affected areas (Basso & Ritchie, 2015; MacLeod & Moller, 2013; Sustainable Forestry Initiative, 2010);
- ✓ IOG-6: Increase in net primary productivity of soils in the affected areas (MINAM, 2016; United Nations, 2016; Basso & Ritchie, 2015; United Nations, 2007);
- ✓ IOG-7: Reduction in the number of people affected by desertification, land degradation and drought, loss of biological diversity, and the effects of climate change, as a result of the

interventions made (MINAM, 2016; Sustainable Forestry Initiative, 2010; United Nations, 2007);

- ✓ IOG-8: Increase in the proportion of households living above the poverty line in the affected areas, as a result of the interventions carried out (MINAM, 2016; MINAM, 2015; United Nations, 2007);
- ✓ IOG-9: Reduction in the proportion of the population that is below the minimum level of food energy consumption in the affected areas, as a result of the interventions made (MINAM, 2016; United Nations, 2007);
- ✓ IOG-10: Reduction in the loss of human lives in the areas affected by the lack of SLM, as a result of the interventions carried out (MINAM, 2015);
- ✓ IOG-11: Reduction in species losses in areas affected by the lack of SLM, as a result of the interventions made (United Nations, 2016; MINAM, 2014);
- ✓ IOG-12: Increase in water availability (potable and non-potable, superficial and underground) in the areas affected by the lack of SLM, as a result of the interventions carried out (United Nations, 2016; MINAM, 2014; Chileshe *et al.*, 2010).

2. *Specific Objectives:*

A. Specific Objective 1 (SO1): To elaborate and update the diagnosis of the baseline of the SLM, including the associated causes and consequences, with solid scientific and technological alignments adapted to the national reality. The management indicator is:

- ✓ IOE1-1: Percentage of regions that have developed and/or updated the baselines of the areas affected by desertification, land degradation, and drought, loss of biological diversity, and the effects of climate change (MINAM, 2016; MacLeod & Moller, 2013; GEF, UNEP, & FAO, 2013; Václavík *et al.*, 2013; United Nations, 2007).

B. Specific Objective 2 (SO2): To strengthen normative frameworks related to SLM at the national level. The management indicators are as follows:

- ✓ IOE2-1: Percentage of entities related to the reduction of desertification, land degradation, and the impact of drought, loss of biological diversity, and the effects of climate change, which have sufficient regulatory frameworks for effective participation (MINAM, 2016; United Nations, 2007);
- ✓ IOE2-2: Percentage of threatened species for which regulatory mechanisms have been developed (MINAM, 2014);
- ✓ IOE2-3: Percentage of invasive or harmful species for which regulatory mechanisms have been developed (MINAM, 2014; MacLeod & Moller, 2013).

C. Specific Objective 3 (SO3): To develop plans, programs, and projects that are synergic, sectorial, multi-sectorial, intra-sectorial, regional, and local for implementing SLM at the national level. The management indicators are the following:

- ✓ IOE3-1: Percentage of related entities that have plans, programs, and projects that are synergistic, multi-sectorial, intra-sectorial, regional, and local to reduce desertification, land degradation, and the impact of drought, loss of biodiversity, and effects of climate change (MINAM, 2016);

- ✓ IOE3-2: Percentage of progress in the execution of plans, programs, and projects that are synergistic, multi-sectorial, intra-sectorial, regional, and local to reduce desertification, land degradation, and the impact of drought, loss of biological diversity, and the effects of climate change (MINAM, 2016; MINAM, 2014);
- ✓ IOE3-3: Percentage of budget execution of plans, programs, and projects to combat desertification, land degradation, and the impact of drought, loss of biological diversity, and the effects of climate change (MINAM, 2016; MINAM, 2015);
- ✓ IOE3-4: Percentage of plans, programs, and projects completed and evaluated that are synergistic, multi-sectorial, intra-sectorial, regional, and local to reduce desertification, land degradation, and the impact of drought, loss of biodiversity, and effects of climate change (MINAM, 2016, MINAM, 2014);
- ✓ IOE3-5: Percentage of interventions in which compensation mechanisms for ecosystem services have been implemented (MINAM, 2014);
- ✓ IOE3-6: Percentage of progress in the implementation and/or updating of a knowledge base and an information system for SLM (MINAM, 2016; MINAM, 2014; Chileshe *et al.*, 2010).

D. Specific Objective 4 (SO4): To broadcast the problems of SLM and the actions for solving them through massive communication media. The management indicators are the following:

- ✓ IOE4-1: Percentage of mass communication media that disseminate the problem and actions to reduce desertification, land degradation, and the impact of drought, loss of biological diversity, and the effects of climate change, periodically (MINAM, 2016);
- ✓ IOE4-2: Percentage of the population that knows the problems and actions to reduce desertification, land degradation, and the impact of drought, loss of biological diversity, and the effects of climate change (MINAM, 2016; MINAM, 2015; MINAM, 2014; Sustainable Forestry Initiative, 2010).

E. Specific Objective 5 (SO5): To strengthen the management capacities of SLM in the diverse stakeholders, with a solid scientific and technological base, adapted to the national reality. The management indicators are the following:

- ✓ IOE5-1: Percentage of government entities related to the reduction of desertification, land degradation, and the impact of drought, the loss of biological diversity, and the effects of climate change, in which its key officials and servants have received training for their effective participation (MINAM, 2016; MINAM, 2014; Sustainable Forestry Initiative, 2010);
- ✓ IOE5-2: Percentage of non-governmental entities related to the reduction of desertification, land degradation, and the impact of drought, loss of biodiversity, and the effects of climate change, in which its officials or key workers have received training for their effective participation (MINAM, 2016);
- ✓ IOE5-3: Percentage of people associated with the theme of desertification, land degradation, and drought, loss of biological diversity, and the effects of climate change, who have received training on this subject (MINAM, 2016; MINAM, 2015; Sustainable Forestry Initiative, 2010).

F. Specific Objective 6 (SO6): To develop scientific research or technological innovations which help SLM, taking advantage of the national and traditional knowledge. The management indicators are the following:

- ✓ IOE6-1: Percentage of progress in the development of scientific research and technological innovations associated with SLM (MINAM, 2016; MINAM, 2015; MINAM, 2014);
- ✓ IOE6-2: Percentage of progress in achieving the goal of publications in indexed journals associated with SLM (MINAM, 2016);
- ✓ IOE6-3: Percentage of progress in the development of scientific research and technological innovations associated with SLM considering the national and traditional knowledge (Critchley & Radstake, 2017; MINAM, 2016; MINAM, 2015; MINAM, 2014);
- ✓ IOE6-4: Percentage of progress in achieving the goal of publications in indexed journals associated with SLM considering the national and traditional knowledge (Critchley & Radstake, 2017; MINAM, 2016).

SLMIFI at regional or local level

The phases for the development of an SLM intervention (see Figure 2) at the regional or local level are as follows:

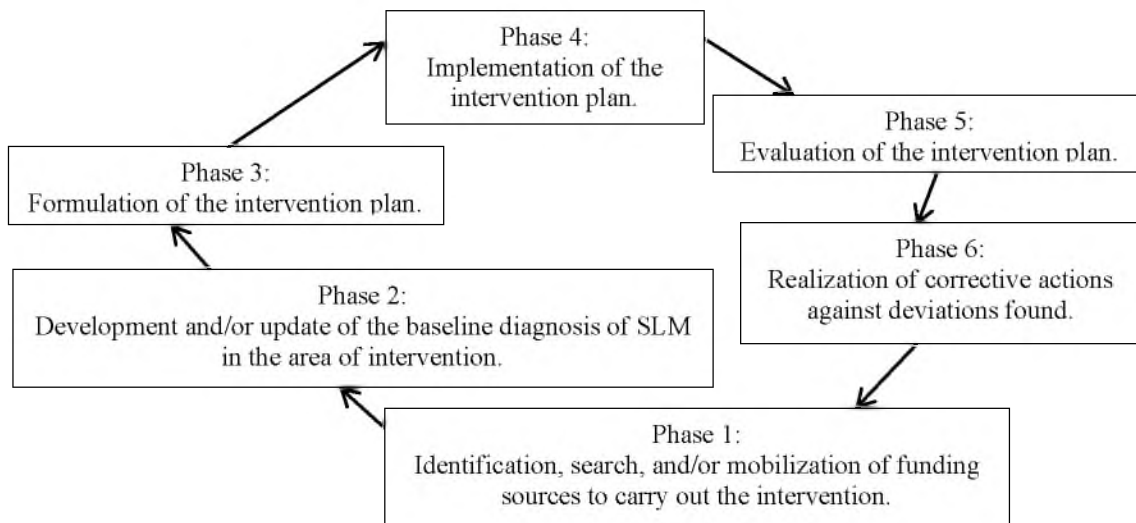


Figure 2. Phases of SLMIFI for the development of an SLM intervention at the regional or local level.

1. **Phase 1:** Identification, search and/or mobilization of funding sources to carry out the intervention. It is necessary to identify the available or accessible sources of funds to perform the intervention related to SLM: ordinary resources, directly collected resources, funds from the national public investment system, resources of international technical cooperation, retribution for ecosystem services, among others.

2. **Phase 2:** Development and/or update of the baseline diagnosis of SLM in the area of intervention. For each affected area, the status of the following aspects associated with SLM must be diagnosed (MINAM, 2014; Václavik *et al.*, 2013; MacLeod & Moller, 2013; Chileshe *et al.*, 2010; Matta, 2008):

- ✓ With respect to land ownership: (a) conflicts over land tenure, (b) expropriation conflicts, (c) restoration of native communities, and (d) loss of religious/cultural areas;
- ✓ With respect to land management: (a) land governance, (b) non-productive land uses, (c) urban expansion, (d) energy sources, (e) overgrazing, and (f) reduction of the rural population;

- ✓ With respect to the characteristics of the land: (a) contamination and degradation of pastures, soil, water (surface and underground), and air; (b) deforestation and loss of native forests; (c) pests, diseases, and weeds; (d) soil quality, net primary soil productivity, carbon sequestration, nutrients, erosion, soil salinity, and soil acidity; (d) quality, productivity, sources and availability of water; (e) diversity, periodicity, and crop yields; and (f) temperature, emissions of greenhouse gases, precipitation and evapotranspiration, among others.

The diagnosis must include the elaboration of geographic base maps with the characteristics of the land, land management, and land ownership, together with social, economic, political, and legal factors, such as: population, educational level of the population, poverty levels of the population, economic activities, gross domestic product, political stability (Václavík *et al.*, 2013; GEF, UNEP, & FAO, 2013), normative framework for SLM in the areas of intervention, as well as the causes and consequences of the associated problem, for obtaining a diagnostic base map of the area of the intervention (GEF, UNEP, & FAO, 2013).

3. **Phase 3:** Formulation of the intervention plan. In this phase, the intervention plan must be formulated in accordance with the policies and procedures of the organization that will execute it or in accordance with the policies and procedures of the entity that will approve the financing. It is suggested to take into account the aspects described in the section titled "Structure of the Plan for an SLM Intervention at Regional or Local Level". The plan must be formulated by taking into account the participation of the various stakeholder groups, as well as the suggested phases of this section.

4. **Phase 4:** Implementation of the intervention plan. In this phase, the intervention must be implemented in accordance with what was planned, taking into account the relevant management indicators for the intervention areas based on the management indicators proposed in the framework at the national level.

5. **Phase 5:** Evaluation of the intervention plan. The evaluation of the intervention plan must be done at least quarterly, so that deviations can be identified with respect to what was planned in a timely manner. For this evaluation, it is essential to calculate the management indicators and contrast the results obtained with the results expected, so that deviations can be identified and corrective actions planned for the future.

6. **Phase 6:** Realization of corrective actions against deviations found. After the evaluation of the intervention plan and the identification of deviations, the pertinent corrective actions must be carried out to tackle the deviations found, which must be done in conjunction with the groups of stakeholders interested in the intervention, so that the necessary consensus is obtained with respect to their implementation.

Structure of the Plan for an SLM Intervention at Regional or Local Level

The components of the plan for an SLM intervention at regional or local level are the following:

1. Diagnosis of SLM in the area of intervention

a. Areas that have been affected in their biological diversity, affected by climate change, or affected by desertification, land degradation, and drought. The geographical, population, social, economic, and political characteristics, among other aspects of the affected areas, should be specified here, taking into account the following information: (i) affected provinces, (ii) affected districts, (iii) type of population, communities or economic sectors affected, (iv) number of people affected, (v) land ownership, (vi) land

management, (vii) characteristics of the land, (viii) causes for which they were affected, and (ix) consequences after being affected.

b. Areas that would be affected in their biological diversity by climate change or by desertification, land degradation, and drought. The geographical, population, social, economic, and political characteristics, among other aspects of the areas that would be affected, should be specified here, taking into account the following information: (i) provinces that would be affected, (ii) districts that would be affected, (iii) type of population, communities, or economic sectors that would be affected, (iv) land ownership, (v) land management, (vi) characteristics of the land, (vii) number of people who would be affected, (viii) causes for which they would be affected, and (ix) consequences after being affected.

c. Projects for SLM in affected areas. The characteristics of the projects in the affected areas should be specified here, taking into account the following information: (i) provinces that would benefit, (ii) districts that would benefit, (iii) type of population, communities, or economic sectors that would benefit, (iv) number of people who would be benefited, (v) title of the project, (vi) amount of the project, (vii) funding source, (viii) status of the projects (proposals, in execution and completed), and (ix) objectives, scope, and stages, among other relevant aspects.

d. Projects for SLM in areas that would be affected. The characteristics of the projects in the areas that would be affected should be specified here, taking into account the following information: (i) provinces that would benefit, (ii) districts that would benefit, (iii) type of population, communities, or economic sectors that would benefit, (iv) number of people who would be benefited, (v) title of the project, (vi) amount of the project, (vii) funding source, (viii) status of projects (proposed, in execution and completed), and (ix) objectives, scope, and stages, among other relevant aspects.

e. Regulatory framework related to biological diversity, actions against climate change, and the fight against desertification, land degradation and drought, as well as other aspects related to SLM that are applicable to the areas of intervention. The international, national, and regional normative framework, related to the fight against damage to biological diversity, fight against climate change, and the fight against desertification, land degradation, and drought, as well as other applicable normative frameworks in the intervention area, and aspects associated with SLM (ownership of land, land management, and land characteristics) for the affected areas and for the areas that would be affected should be explained here.

2. *General objective, specific objectives, indicators, and expected results of the SLM intervention*

The general objective, the specific objectives, the indicators, and the results of the SLM intervention should be placed here. Contributions to the achievement of national, regional, and local objectives should be taken into account, depending on the scope of the intervention.

3. ***Proposed projects related to SLM.*** The profiles of the proposed projects as part of the regional action plan, related to the protection and conservation of biological diversity, the fight against climate change, the fight against desertification, land degradation, and drought in the region should be presented here, as well as other aspects related to SLM, with a planning horizon of at least 15 years. These projects may include diagnosis, prevention, conservation, rehabilitation, monitoring and control, research, dissemination, and the improvement of the related regulatory frameworks. The following aspects must be included for each project (Project Management Institute, 2017):

- a. The scope management. It should include the components of the final result that is expected at the end of the project.
- b. The management of time. The execution schedules (Gantt diagrams) of the project must be specified.
- c. The management of costs. Investments and expenses must be specified, as well as their sources of financing: ordinary resources, resources directly collected, funds from the national system of public investment), international cooperation, or compensation mechanisms for ecosystem services.
- d. Quality management. The rules that must be taken into account for the deployment of the projects, as well as the activities for the following processes, must be specified:
 - i. Quality assurance: activities to give confidence that the project will be carried out in accordance with current regulations and the expected results. Among these activities we have: preparation of plans, development of policies, elaboration of procedures, and training.
 - ii. Quality control: activities to verify that the execution of each stage of the project has met the specifications of the scope. Among these activities we have: verifications (checklists of compliance with the specifications), validations (checklists with the beneficiaries of the project regarding the satisfaction of their needs related to the project) and joint reviews (revisions jointly carried out by the regional government authorities and the community or the supervisory or auditing entities).
- e. The management of human resources: activities associated with recruitment, selection, training, performance evaluation, compensation, and social welfare of project staff.
- f. The management of communications: activities to timely communicate the various aspects of the project to project stakeholders.
- g. Risk management: activities associated with the identification of risks, qualitative analysis of risks, quantitative analysis of risks, determination of the risks that we are going to protect against, measures to mitigate risks, and allocation of resources for the mitigation of risks.
- h. The management of acquisitions: activities for the purchase or contracting of the goods or services that will be required in the project.
- i. The management of project stakeholders. It includes: identification of project stakeholders, planning of stakeholder management, management of stakeholder participation, and control of stakeholder participation.

The proposed projects and the improvements in human and financial resources should be updated in the concerted development plan, in the institutional strategic plan, and in the institutional operational plan at the regional or local level. It must also take into account the action alignments that are applicable, in a synergistic manner.

4. **Human Resources.** The human resources that will be needed to carry out the successful implementation of operations and projects of the SLM intervention should be placed here. It should be noted that the human resources that will participate in the project correspond to those belonging to each of the groups of stakeholders interested in the project.

5. **Budget.** The budget for investments and expenditures that will be needed to successfully implement the operations and projects of the SLM intervention should be placed here.

Discussion and Conclusion

Diverse frameworks for SLM were proposed previously to SLMIFI; however, those frameworks did not have a holistic approach towards fighting against climate change, the conservation of biological diversity, desertification and drought. As can be appreciated from the literature, the conditions for competitiveness must be sustainable; however, SLM is not part of the pillars of the indexes related to competitiveness, a situation that could appear unsustainable. Hence, it becomes imperative for future international, national, or regional competitiveness indexes to include SLM as one of the most important pillars or factors for evaluating the competitiveness of the countries and some of the indicators must be the following: the investment in SLM interventions, the reduction of land degradation, and the improvement of the conditions of the natural resources, among other important indicators of SLM, considering also the regional level for regional competitiveness indexes inside the countries.

SLMIFI is an integrated framework for interventions of SLM at national, regional, and local levels. Some managerial implications are the urgent needs for integrating the management structures or global conventions in the United Nations (UNCCD, UNFCCC, and UNCBD) and the respective areas in the governments such as: international organizations of countries, ministries of environment or similar institutions, regional governments, local governments, and the nongovernmental organizations that manage the fight against climate change, the conservation of the biodiversity, and the fight against desertification, land degradation, and drought as a whole, considering SLMIFI or other future integrated frameworks for interventions of SLM at local, regional, national, and international levels. Additionally, pre-degree and post-degree environmental management programs in universities must include courses about how to integrate SLMIFI or other comprehensive frameworks or methodologies in SLM projects. It is important to notice also that future regulations at diverse levels must include a holistic vision of SLM in environmental projects, accompanied by integrated frameworks such as SLMIFI or other comprehensive frameworks.

Some limitations of SLMIFI are as follows: (a) the generalization of biological species in grouped indicators; nonetheless, considering the diverse reality of every country, the adaptation of the indicators in view of the species might be necessary; (b) the application of SLMIFI could require a holistic vision that environmental project managers might not have; and (c) the lack of integration of SLMIFI with disaster recovery management and the resilience of countries and regions. Finally, future avenues for research could include: (a) the validation of SLMIFI with real projects for improving it and taking into account the critical success factors in applying it; (b) the evaluation of the results of SLM interventions with and without the application of SLMIFI and comparing SLMIFI with other comprehensive frameworks or methodologies; (c) the evaluation of the results of the applications of the improvements of SLMIFI adapted according to the realities of diverse countries and regions; and (d) the improvement and validation of SLMIFI considering disaster recovery management and the resilience of countries and regions.

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Lay-Off to Hats-Off: The Strategic Turnaround of Public Enterprise

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Abstract

It was a strenuous tight-rope walk in a short period for the Kerala Minerals and Metals Ltd. (KMML), the largest public sector undertaking, to turn around from the verge of lay-off, by improving productivity and market competitiveness, with a unique approach and outlook. An alarming stock of about 10,000 MT of pigment worth US\$ 25 million was piled up and the loss-making company was operating on overdraft to the tune of US\$ 8 million, towards the end of 2015-2016. The company was on the brink of lay-off, threatening the lifeline of 280 officers and around 3,000 workmen employed by KMML permanently and on an outsourced basis, following the heavy loss suffered in the fiscal year 2014-2015. The future was looking bleak. But KMML could circumvent this crisis by adopting a series of interventions with the support and cooperation of employees and the concerted efforts taken up by the management in close collaboration with the employees. There was no change in the technology, there was no change in the process, and challenges and opportunities remained the same; but there was definitely a change in the approach and attitude of the employees, which really turned the company around. The sea-change was wrought in a short span of time with the dedication, determination, and will power of both the company management and the employees; everyone was determined that they were not going to allow the company to falter in its course of growth and development in the interest of the nation and also the company's workforce.

Keywords: Turnaround, strategy, production, productivity, management, public enterprise.

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Introduction

Kerala Minerals and Metals Ltd (KMML), the first and only integrated Titanium Dioxide Plant in the world having all the operations, from mining to mineral separation, synthetic rutile, and pigment-production plants, started the production of Titanium Dioxide Pigment using chloride technology in 1984. Apart from producing rutile grade Titanium Dioxide Pigment for various types of industries, KMML also produces other products, such as Ilmenite, Rutile, Zircon, Sillimanite, Synthetic rutile, among others. The annual business transaction crosses US\$ 150 million, which includes average sales to the tune of US\$ 100 million and purchases of more than US\$ 50 million. An average amount of US\$ 25 million is being paid to the government annually in terms of various taxes. The different grades churned out by KMML under the brand name KEMOX is being sold in both domestic and international markets. The research work done by the R&D department has also helped KMML to add more colours to its portfolio.

KMML is now in the aerospace industry and defence applications, with the commissioning of the Titanium Sponge Plant. The US\$ 25 million Titanium Sponge Plant (TSP) is a joint venture of KMML, Vikram Sarabhai Space Centre (VSSC), and the Defence Metallurgical Research Laboratory (DMRL). With the commissioning of TSP, India becomes the 7th country in the world to have the technology for producing titanium sponge, which is the raw material for titanium metal. Titanium sponge, a metal of the 21st century, is known for its high strength and low weight, making it an ideal material for aircraft manufacturing, including fighter aircraft. Today, with over 3000 employees and a range of products, KMML has become part and parcel of local and international life.

The bleak scenario at the end of 2015-2016 began changing for the better for the loss-making company, following the launching of a series of interventions, taking the employees into confidence. The concerted efforts made by the management with the cooperation of the trade unions and the employees saved the day for one of the most proud public sector units by registering an operational profit of US\$ 5 million in 2015-2016. The overdraft was brought down from US\$ 8 million to NIL and the company opened a Fixed Deposit of US\$ 4 million on May 31st, 2016. Furthermore, the stock position was brought down from 10,000 MT to 5,600 MT as of May 31st, 2016 and to 3900 MT within few more weeks. This paper gives an insight into the strategic interventions taken at various levels, which finally turned KMML's position around.

The Problem

An alarming stock of titanium pigment worth US\$ 25 million was piled up and the company was operating on overdraft to the tune of US\$ 8 million, towards the end of 2015-2016. The payments to the suppliers were inordinately delayed and they were pressing for releasing the payments. Some of the eligible benefits due to the employees were also remaining denied because the poor financial condition of the company. KMML, the loss-making company, was staring at the possibility of a closure.

Methodology

A series of strategic interventions were brought in by the management by prioritizing the targets with a clear mission to make the company a profitable venture at the earliest. The spheres of production and marketing were given the top priority as they were key to the survival of the company. The huge stock of products offered the company a big opportunity to earn revenue. The management took the employees into confidence and they were assured that they would be compensated at the appropriate time. The management and the workforce then stood shoulder-to-shoulder and scripted a new golden chapter in the history of KMML.

The various methodologies adopted to streamline the core operations to bring out the spectacular change are given below:

Streamlining Production

In order to achieve the target of maximum production, special focus was put on Beneficiated Ilmenite and Tickle (Titanium Tetra Chloride). A special task force was formed to monitor the consumption of major raw materials, namely, LPG, Furnace Oil, Calcined Petroleum Coke, Hydrochloric Acid and Hydrated Lime, which amounted to more than US\$ 25 million per annum and constituted about 30% of the cost of production. A task force was also formed to monitor steam consumption, digester operation, and product quality. This was done as part of the strategy to reduce costs and avoid wasteful expenditure. Owing to this successful monitoring, the company could save around US\$ 3 million.

Ilmenite Beneficiation Plant - IBP

A thorough review of the production revealed that in order for KMML to survive, the company had to improve the production and quality of production, and reduce the cost of production. The company management focused on these factors.

There were two roasters with a capacity of 20 MT reduced Ilmenite /Hr, but the online storage bin could only store 500 MT. Since the bin capacity was not sufficient to store the reduced Ilmenite produced, it was a regular practice to stop one roaster in between to match the production with the storage. At the same time, when seven digesters were in operation, there was a shortage of reduced Ilmenite, which resulted in a shortage of leached Ilmenite and very often one of the two Calcinors were idle. This was a cyclic issue, ultimately affecting the production of Beneficiated Ilmenite; the company ended up purchasing Beneficiated Ilmenite from outside. The purchase amount was about US\$ 4 million per year and when compared to the low in-house production cost, it was giving an additional burden to the company to the tune of US\$ 2 million. This was one of the main factors for the high cost of production and when the company had adequate capacity to produce the required quantity of Beneficiated Ilmenite, there was no question of purchasing the same from outside. The management was determined and openly declared in a meeting of the Co-ordination Council (re-named the “*trade union-management meeting*”, as the Co-ordination Council wanted to convey a message that employees are also a part of management, which helped) that no purchase of Beneficiated Ilmenite would be made from outside and that the company would produce the entire requirement in the plant itself and that the employees should co-operate and support and take up additional responsibility to accomplish this task. Since the intention of the management was clear, the employees accepted the suggestion and extended their full support.

With persistent involvement in the plant, staff became very enthusiastic and took extra care in increasing the production; the company finally registered a Beneficiated Ilmenite production of 39,075 MT during 2015-2016, which was an all-time high figure, and 4,567 MT of Beneficiated Ilmenite production was achieved in May 2016, which was the highest monthly production ever. By eliminating the purchase of Beneficiated Ilmenite from outside, the company could save about US\$ 1.5 million per year.

Unit 200

The scrubber column was getting choked frequently and the entire plant had to be stopped for two days for dismantling, cleaning, and re-fixing. Engineers struggled a lot to find out the reason for choking, but their

efforts were in vain; even scientists from other research organisations that they consulted could not suggest any effective measures to solve this issue. The company, however, could not afford this situation of stopping the scrubber column for two days since it was affecting the monthly production target and the cost of production. After a detailed interaction with the company management, engineers and operators installed the spare scrubber column in parallel, and commissioned the same within two weeks. With this on-line arrangement in place, the time needed to take care of the scrubber column was reduced from two days to eight hours, which in turn significantly improved the productivity.

Unit 400

Unit 400 is the final stage of TiO₂ production, where the pigment slurry is dried, powdered, and bagged in three shifts. On several occasions, the company noticed that the workers were idle as no bagging was done due to shortage of slurry, and this unit was in operation continuously irrespective of the availability of slurry. On further analyzing the data, it was observed that the annual production capacity of the Titanium Pigment Unit (TP) was 40,000 MT and Unit 400 could easily produce 150 MT /day. From this, it was clear that Unit 400 did not need to be operated every day since the maximum production that could be achieved in the TP unit was of only 40,000 MT /year. So, it was noticed that Unit 400 could be given a break for one day every three days and still could achieve this production. A discussion was initiated on this subject in the next Planning and Review meeting and the management was asked to work out the possibility of re-scheduling the production in Unit 400 based on the availability of the slurry; the management agreed to do it on an experimental basis. One day break per week amounted to 52 days per annum, which meant a lot in terms of cost savings on electricity, steam, manpower, overtime wages, maintenance, and so on. This translated into about US\$ 0.52 million per year savings.

In the monthly coordination council meeting with the trade unions, the management discussed the actions taken to improve the performance of the company to get their feedback. They were asked to question the management and correct their actions if they felt that the company was going in the wrong direction. Interestingly, however, they never questioned any action, but rather extended their unconditional support, appreciating that everything was done in a transparent manner and in the best interest of both the company and the employees.

Research & Development

The Research & Development (R&D) Department of the company played a key role in keeping and maintaining the quality of the products of the company in tune with the international standards, as the competition in the international market was very tough. Realizing the pivotal role being played by the R&D wing, the department was restructured and a technical consultant was engaged to improve the pigment quality.

TiO₂ pigment is made from the Slurry. The slurry from overflow or choking due to machinery breakdown, power failure, and so on, was pumped and stored in a pond and the same was later re-mixed in the main stream at the rate of 5 to 10 %, which affected the quality of the main grades. With the support of the R&D team, the company could develop and introduce a Special Grade RC-820 exclusively using the slurry from this pond. The mixing of old slurry with the new slurry was stopped completely, which in turn helped in improving the quality and consistency of the main grades and thus the customer complaints regarding the quality of main grades dropped drastically. The NABL accreditation awarded by the Ministry of Science and Technology in New Delhi was another boost up for the R&D team.

Augmentation of Marketing Network

The company management launched several measures to strengthen the marketing network as it was highly essential for the speedy sale of the products. Meantime, several measures were also initiated to plug the loopholes in the marketing sphere. Some of the major initiatives taken to strengthen the marketing field were:

- (a) the Pricing Committee re-constituted with more members, including a Manager (Internal Audit);
- (b) the Special price scheme was introduced for direct/small customers;
- (c) the Customer Care Cell was opened for assisting the customers and clearing their queries;
- (d) one officer was appointed exclusively for attracting new customers to expand the market network;
- (e) special attention was given to the marketing of Tickle & Plastic grade pigment;
- (f) four new stockists were appointed for sales in India, raising the total number of stockists in India to nineteen.

The company also appointed two promoters for sales of the pigment overseas. The major paint companies could be brought back to KMML after a gap of five to nine years for sourcing their requirements, which widened the market.

Import Duty

The Import Duty of Titanium Pigment at 10% was being retained in the Union Budget in 2016-2017, also. The KMML made several representations to the Union Government in this regard and followed up vigorously to retain the duty at 10% whereas for similar products, the import duty was reduced to 7.5% by the central government in the Union Budget. This helped the company to have an edge on competitors, especially the Chinese ones.

Safeguard Duty

To arrest the heavy influx of Chinese pigments, the company started, for the first time, working towards getting a safeguard duty imposed on the Titanium Pigment imports from the Director-General of Safeguards. After couple of initial meetings with the Director General, the company could convince him about the urgency of imposing a safeguard duty and the application for the same was finally accepted. This created an impression in the domestic market that the Government was planning to impose a safeguard duty and it indirectly helped in improving the price of pigments. After few months of vigorous interventions in production, quality, and marketing, the company reached a stage wherein the KMML pigments were sold above the cost of production with a profit margin. The selling price of pigment gradually increased from US\$ 0.2 million to US\$ 0.3 million per MT. As the situation improved further over the following few months, the management could not convince the Director General on the need of imposing a safeguard duty on imported pigments and the application for the same became infructuous. KMML could stand on its own feet and the company became more confident on its strength.

Sales Tax Refund

The sales tax refund from the Government had been pending for many years as the assessment was not completed. KMML could complete the sales tax assessment for two years (2009-2010 and 2010-2011) and with constant follow up, the company received an initial refund of US\$ 1.2 million from the Department of Commercial Taxes. The company could further get a refund of another US\$ 1 million in the following few months, which eased the financial crisis to a certain extent.

Refund of Loan Given to PSUs

KMML had given about US\$ 15 million to various state PSUs over the years but nobody repaid the amount, due to various reasons. Nonetheless, with constant follow up, KMML could recover the loan provided to one PSU, to start with.

Waiving of Interest

Few years back, an amount of US\$ 5 million was given to Kerala State Textile Corporation as a loan at 7% interest rate, as per the Government's direction. But Kerala State Textile Corporation have neither repaid the principal amount nor the interest. With proper follow-up at various levels, the Government finally issued orders to convert the loan of US\$ 5 million given to the Kerala State Textile Corporation to an interest-free loan with retrospective effect, by which KMML saved around US\$ 0.5 million towards the payment of income tax towards the accrued interest of the above loan, as the interest had to be accounted as income.

Pre-Audit

A committee was formed to pre-audit all bills above US\$ 0.2 million for releasing the payments, so as to ensure their correctness and genuineness. The committee did its job meticulously and did not give any room for complaints.

Power Savings

The KMML entered into agreement with the Power Trading Corporation (PTC) and registered with the Indian Energy Exchange through PTC in November 2015, for power bidding on a daily basis. On account of this, KMML saved around US\$ 0.2 million a day and the total saving as of 31st of May 2016 was around US\$ 0.5 million, which further touched US\$ 0.8 million within the following couple of months.

Loyalty Scheme

The direct customers, irrespective of size and order volume, were benefited by the introduction of the new monthly Loyalty Scheme. The extension of the existing stockist-centric quarterly Loyalty Scheme was also made applicable to them. These measures encouraged the direct customers and they started lifting more quantity.

Employees

The management must realize that the growth and development of the company depends on its workforce. The morale of the workforce should be kept very high in order to increase the performance of the company. Welfare measures for the employees are highly essential to keep their morale high. Despite the financial crunch, the company took several measures for giving them the due benefits, among which the following:

- (a) the two pending DA installment arrears were cleared;
- (b) an ad-hoc salary revision was given to both workers and officers starting from February 2016;
- (c) about 70 workers and 40 officers were given promotions/higher grade, without much financial burden to the company;

- (d) the pending Leave encashment payment was released and also re-started the vehicle loan which was discontinued years before due to the financial crisis;
- (e) “We Care Scheme” was launched to provide one-time financial support to the employees, on the occasion of the marriage of their daughters.

Overall, these measures helped in boosting up the morale and confidence of the employees.

Apex Council

The management had to deal with a lot of issues related to the affairs of the company. In order to deal with these in an effective manner, an apex council was set up with the top-level officers. The formation of the council went a long way in successfully handling several issues which had cropped up in the administration and management of the affairs of the company, which inculcated a feeling among the senior officers that they were also part of the decision-making process. This helped in the speedy and smooth implementation of the decisions in the interest of the company.

Co-ordination Council

A good relationship between the management of a company and its employees is absolutely essential for the growth and development of the company, as well as the welfare of the employees. In order to foster and nurture cordial and smooth relationships between the management and the employees, a Co-ordination Council was constituted with representatives of the management and the Trade Unions. The meetings of the Council were being conducted once a month. All issues of importance were discussed at these meetings and solutions wherever necessary were being ironed out at these meetings. No thorns were allowed to come in between the management and the employees. The improved Management-Employee relationship contributed substantially to the KMML’s turnaround.

One of the suggestions which came up at one meeting was that there should be a scheme for giving a gift to the employees at the time of marriage of their daughters. This was accepted. As previously mentioned, the “We Care Scheme” was launched as a joint contributory scheme of the employees and the management. The acceptance of a welfare measure suggested at the meeting boosted the morale of the employees. The winning over the confidence of the employees was a milestone in putting the company on the track of recovery and development.

Intellectual Talk Series

Prominent people who excelled in various professions were invited for interaction with senior officers and trade union leaders. This was a unique opportunity for the employees to re-orient their outlook in line with the requirements of the outside world and the series of meetings helped in gradually changing the approach and attitude of the employees.

Vision 2025

In view of all the actions and strategies implemented by the management in close coordination with the employees, the future turned bright for KMML once again. Now, it can scale higher peaks in the sphere of growth and development. The sky is the limit. Currently, the company is in the process of preparing a Vision Statement for 2025 with the participation of the employees. It is specifically intended to define an ambitious

target regarding where KMML want to be by the year 2025 in terms of purpose of business, in terms of its core values, and in terms of how the company should stand out in its business domain.

Result

The strategic interventions made at various levels, as explained above, resulted in the improvement of the overall performance of the company, which are highlighted below:

Production

The Mineral Separation Unit, the Titanium Pigment Unit, and the Titanium Sponge Unit ramped up to peak performance and the key production figures touched all-time records, which included 65,630 MT of Ilmenite, 39,075 MT of Beneficiated Ilmenite, and 5,346 MT of Zircon. As for Titanium pigment, the production figure of 33,625 MT was the highest in five years.

Sales

The company could make major gains in marketing during 2015-2016. The sales of 5,088 MT of Titanium Tetra Chloride and 5,557 MT of Zircon are again all-time-high figures.

Finance

The operating profit of the company during the year 2015-2016 was US\$ 5 million, with a gross turnover of US\$ 90 million, against an operating loss of US\$ 4 million incurred in 2014-2015. The Titanium Pigment Unit registered a profit of US\$ 0.4 million against a loss of US\$ 4 million from the previous year and the Mineral Separation Unit has increased its profit to US\$ 4 million compared to the previous year. Overall, the operational profit increased by US\$ 7 million. The financial performance of KMML gained more significance, especially because 2015-2016 was the worst year for the global TiO₂ industry in the last 10 years and many companies across the globe recorded negative earnings, as reported by TZMI, the international agency for cost comparison of Titanium Products.

Conclusion

The strategic and timely approach adopted in augmenting the production as well as productivity, thereby reducing the cost of production and increasing the market competitiveness, played a pivotal role in making the company earn profit. The major credit for the successful turnaround in a short span of time ultimately goes to the unstinted support and co-operation of the employees within the organisation. The management realised that the employees are the pillars of the organisation and that they should be taken into confidence before bringing in any strategic interventions.

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Stakeholder Involvement for Public Sector Productivity Enhancement: Strategic Considerations

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Abstract

Measuring public sector productivity has never been an easy task and despite continuous efforts, no simple or single solution has been found. This seems to be mainly due to the intangible nature of public services and the complexity of public service outputs. Yet, in view of the contribution it makes to the economic performance of a country, every public organisation faces the challenge of improving its productivity. In this short paper, we evaluate the various definitions of productivity in view of their implications for public sector productivity measurement and then derive a comprehensive framework that integrates the various understandings and stakeholders. We further discuss the strategic implications for practice of the proposed framework. Our approach is theoretical, although we draw upon both theoretical and empirical research studies. The present effort contributes to the existing debate on the topic of public sector productivity enhancement and should be of interest to both researchers and practitioners alike.

Keywords: Productivity, performance measurement, public sector organisations, strategy.

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Introduction

The topic of productivity of the public sector is a contemporary concern of every country. In view of the contribution it makes to the economic performance of a country, every public organisation faces the challenge of improving its productivity on a continuous basis. Nevertheless, in order to foster improvement and design policy, it is necessary to understand what underlies and drives productivity growth and performance in the public sector in the first place. A review of existing literature on the topic highlights that there is no simple or single solution neither to defining nor to measuring public sector productivity; therefore, there is no unique mechanism to increase public sector productivity. Views on public sector productivity are not only diverse, but also often simplified, misinterpreted, contradictory, and misapplied (Holzer & Seok-Hwan, 2004).

Thornhill (2006) identified three main reasons why public sector productivity is important: (1) the public sector is a major employer in the economy; (2) the public sector is a major provider of services in the economy, offering mainly social services and business services (affecting, thus, labour quality and costs of inputs, respectively); and (3) the public sector is a consumer of tax resources. All of this means that any changes in public sector productivity has the potential to significantly impact the economy of the country. Apart from these reasons, there are potentially other ones, which are more context-based, such as for example, the fact that in developed countries, there is a downward trend in labour supply, which makes the acceleration of productivity growth even more important (Waller, 2006).

Public Sector Productivity: Definition, Measurement, and Key Issues

Generally, common wisdom has it that productivity is a measure of the amount of output generated per unit of input utilised. Nevertheless, Pritchard (1995) distinguished between three main views regarding productivity:

- (1) Productivity seen as a measure of efficiency, calculated as a ratio between output and input; this is the basic view, also called the techno-economic approach, which ignores output quality, but clearly distinguishes between the concepts of productivity, efficiency, and effectiveness.

An important mention to be made here is that:

In many countries, public sector productivity has been assumed to be zero in the national accounts. The output of the government sector has been measured as equal in value to the total value of inputs. This output = input convention has increasingly come under scrutiny in recent years. The challenge is to devise alternative estimates based on output measurement in a public sector context – where collective services are provided and where there is, in most instances, no market transaction in services provided to individuals (Boyle, 2006). (Linna, Pekkola, Ukko, & Melkas, 2010, p. 301)

- (2) Productivity as a combination of efficiency and effectiveness; in other words, attention is paid to the relationship between productivity (outputs/inputs) and quality (outputs quality/goals). Efficiency is generally seen from the perspective of quantitative changes, while effectiveness is seen from the perspective of qualitative changes, paying more attention to the value creation for the customer (Tangen, 2005).
- (3) Productivity as a broader concept that makes an organisation function better; this definition, although the broadest, confuses productivity with drivers of productivity.

In addition to the above, there are works that have proposed that productivity should actually be replaced with or complemented by concepts that are indicative of clearer and stronger paths toward improvement: for example, Jackson (1999) and Stainer and Stainer (2000) proposed the use of the term “performance” and Brax (2007, cited by Linna *et al.*, 2010) the term “effectiveness”. There is an important mention that should be made with regard to the relation between the productivity of public sector services and the effectiveness of public expenditure. In the words of Simpson (2009):

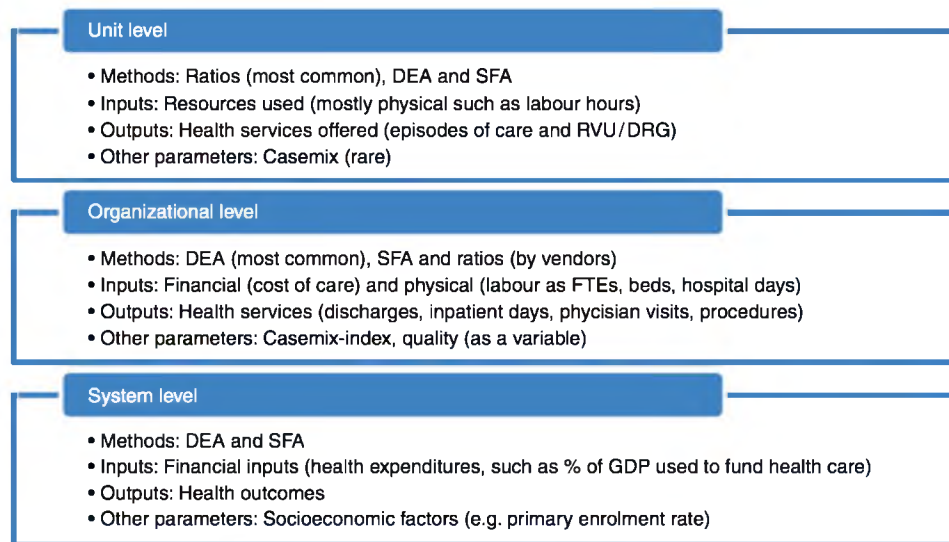
Measuring productivity differs from a cost–benefit analysis, which might be used to assess the ‘value for money’ of a new government programme. While measuring the productivity of public services is certainly of interest, society may prefer the public sector to deliver more services or improvements in the quality of service even at the expense of a decrease in productivity. Equally, an increase in productivity may not be welcome if it came at the expense of a decrease in the output of public services. However, falling productivity unaccompanied by any increase in output might raise concerns [...]. (pp. 250-251)

The inclusion of the term “outcomes¹” brings up a different view on public sector productivity, which has to do with the general question of what value people receive from public services in return for the utilisation of public funds (Linna *et al.*, 2010). This last view has been opposed by Putnam (1993), who argued that outcomes involve changes over which governmental institutions have no control. Nonetheless, a recent investigation points in a different direction. Based on interviews and workshops with municipal authorities in Finland in the areas of special healthcare services, basic healthcare and social services, and educational services, Linna *et al.* (2010, p. 300) found that there is a “certain mismatch between perceptions concerning productivity and the potential that lies in this concept as a functional tool in the public sector’s development efforts. Public sector productivity cannot be developed and discussed without taking into consideration the issue of effectiveness”.

The point we wish to make at this stage is that public sector productivity measurement is a complex issue, which depends not only on who defines it, but also on factors such as the public sector area in question and the level of analysis. For the purposes of exemplification, Figure 1 depicts productivity measurement at unit, organisational, and system level in the healthcare area, as identified by Kämäräinen, Peltokorpi, Torkki, and Tallbacka (2016).

The measurement of productivity of public services is different from that of private sector services, which results in additional concerns. As Simpson (2009, p. 250) stated, “compared to measuring productivity in the private sector difficulties arise because the output of public services is often un-priced and because some public services are consumed collectively. A key problem is measuring the full range of outputs and quality improvements delivered by public sector organisations that are valued by society”. She further draws attention that without comprehensive measures of output productivity statistics may be misleading. Indeed, it is rather hard to quantify what customers perceive as value creation for them, especially because there are usually no limits as to how effective an organisation can be (Tangen, 2005).

¹ According to Mills-Scofield (2012), “Outcomes are the difference made by the outputs”. Furthermore, “Outputs are important products, services, profits, and revenues: the What. Outcomes create meanings, relationships, and differences: the Why. Outputs, such as revenue and profit, enable us to fund outcomes; but without outcomes, there is no need for outputs.”



Source: Taken from Kämäräinen, Peltokorpi, Torkki, and Tallbacka (2016).

Figure 1. Productivity measurement at different levels in the healthcare sector.

Private sector organisations generally pursue profit maximization. It is true that these same organisations can also pursue more CSR-oriented objectives, but these are mainly developed to assist the main objective, which is profit maximization. On the other hand, public sector organisations generally pursue objectives different from profit maximization, and are usually oriented towards providing education, healthcare services, and so on. In this sense, then, stakeholders' expectations are also different. Customers and shareholders, the main stakeholders for private sector organisations, expect the best possible products and services and the highest profitability, respectively. In the case of public sector organisations, the population of a country, which represents the stakeholders, expects the delivery of products and services in an adequate manner. Furthermore, because public sector organisations are generally funded by taxpayers' money, they are also subject to greater scrutiny when compared to private sector organisations.

What existing literature is pointing towards is that generally, there are various ways of understanding, defining, and measuring public sector productivity. But the question is how compatible are all these views and the productivity measures with each other? They all have advantages and shortcomings and they all reflect different interests of different groups of actors involved in the decision-making process. The existing mismatch indicates that it might be more rewarding integrating the views of the various stakeholders in an attempt to provide a holistic perspective to productivity measurement and enhancement.

Stakeholder Involvement for Public Sector Productivity Enhancement

Today's complex process of globalization and opportunities created and enabled by Internet technologies and exponentially increasing data (for some information of interest on the topic of big data and associated challenges, see Charles & Emrouznejad, 2018; Charles & Gherman, 2013, 2018; Charles, Tavana, & Gherman, 2015; and Emrouznejad & Charles, 2018) have enabled changes in the expectations that the civil society has from public sector organisations; in consequence, public sector organisations have gradually been transforming themselves. Marche and McNiven (2003) captured this phenomenon when they stated that:

Public administration has a general reputation for functional insularity, what we now often call “silos” or “stove-piping.” This refers to the tendency to not integrate service provisioning across government departments when responding to citizens’ needs. In part, this has been driven by deeply entrenched practices and cultures, supported by the tradition of ministerial accountability. In part, it was driven by the fact that it was administratively very difficult to integrate systems and practices between departments. However, citizens see large bureaucracies such as utility companies, telecommunication companies, and banks cooperating in ways that permit cross-organisational services such as Internet bill presentment and payment in ways chosen by the customer. They have now begun to make similar demands of government. (p. 75)

The points discussed so far call for more innovative solutions to the issue of public sector productivity enhancement. One such solution could be the creation of “collaboratories”, or powerful action-learning environments or platforms that bring together multiple stakeholders, wherein stakeholders are “any group or individual who can affect or is affected by the achievement of the organisation’s objectives” (Freeman, 1984, p. 46). Figure 2 depicts the actors of these platforms in the context of the public sector.



Figure 2. Actors involved in public sector strategizing and policymaking.

The platform would allow the participation and efficient social and civic dialogue between various stakeholder groups. It is important to note that each of the actors involved would serve a dual role of both facilitator and learner; everyone can learn something from the other and everyone can contribute to the debate and offer viable solutions to contemporary issues in public sector productivity measurement and enhancement. Regardless of whether the platforms are physical or virtual, the key issue is to ensure the necessary dynamics to enable the decentralisation of the learning process.

One of the challenges would be the correct identification of stakeholders, which may be difficult because who has a stake in a particular policy is often unclear. Another challenge would be to identify at what stage of the policy cycle the various stakeholders should be involved (see Figure 3); how and when to incorporate key stakeholder input into policy decision-making.

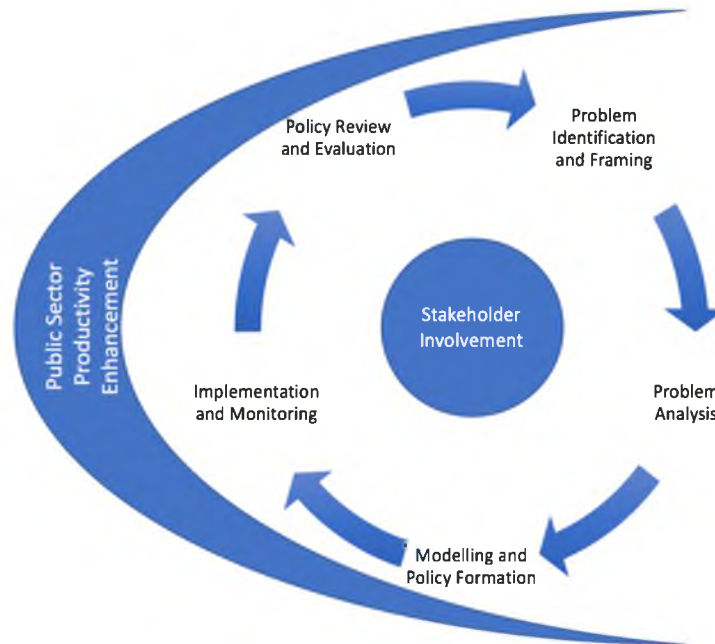


Figure 3. Stakeholder involvement for public sector productivity enhancement.

It is important to note that this is not a one-way-fits-all model. Stakeholder participation takes many different forms and the level of empowerment that each group can have depends on a variety of factors. Our mere proposition is that opportunity and quality of dialogue and cooperation between stakeholders and public authorities may be pivotal in identifying new means of public sector productivity enhancement. The learning process would be a dynamic experience, as stakeholders would not be just passive recipients of information (as has generally been the case), but also active contributors. Furthermore, these platforms would allow different stakeholders to play a greater role in public sector strategizing and policymaking; in other words, stakeholders will become active partners with public sector organisations. More than anything, this framework is a multi-stakeholder learning platform conducive to responsible public sector management.

A Comprehensive Framework: Strategic Implications

The idea of creating “collaboratories” is not new. For example, it is well-known that various governments around the world are nowadays providing web-based services to their citizens under the concept of “e-governance”, which is defined as:

... the public sector's use of information and communication technologies with the aim of improving information and services delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective. E-governance involves new styles of leadership, new ways of debating and deciding policy and investment, new ways of accessing education, new ways of listening to citizens and new ways of organizing and delivering information and services. E-governance is generally considered as a wider concept than e-government, since it can bring about a change in the way citizens relate to governments and to each other. E-governance can bring forth new concepts of citizenship, both in terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen. (UNESCO, 2011)

Compared to existing solutions, our proposed model calls for (1) including additional stakeholders (beyond the civil society) and (2) in view of the functional view of productivity, which emphasizes links between productivity, efficiency, effectiveness, quality, outcomes, and performance. This would provide a holistic framework (Figure 4) for assessing key stakeholders and their interests, knowledge, positions, expectations, resources, power, and importance. Performing a stakeholder analysis would be extremely useful in both making sure that interests are aligned among the stakeholders and in identifying potential areas of resistance at the moment of strategizing and policymaking and policy implementation.

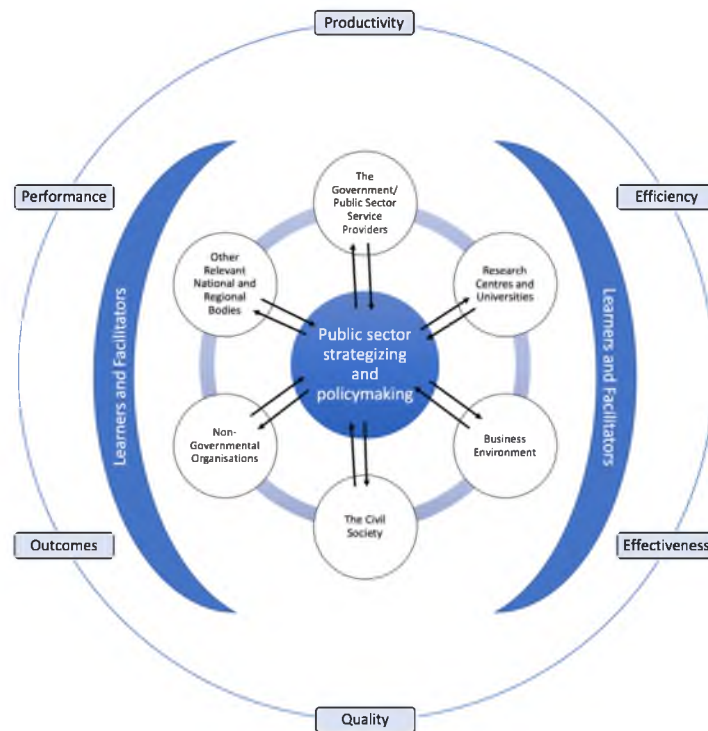


Figure 4. Comprehensive framework.

Although we consider the inclusion of an extended list of stakeholders, we do draw attention to the fact that much work needs to still be done in relation to the level of engagement that these stakeholders should have. Indeed, there is a difference between informing, consulting, involving, collaborating, and empowering stakeholders and these relationships need to be thoroughly thought of. Nonetheless, we consider that a more

inclusive list of stakeholders can help at least expand and renovate the role that public-sector organisations play in a country. While it is true that some stakeholders have more power and resources than others to participate in public policymaking and this should be regulated, in a highly interconnected and complex reality, it is time we rethink the relationships that are being forged, a consideration that might help in bringing specific and contemporary problems on the public agenda table and advance discussions of public service productivity in the future. As Linna *et al.* (2010, p. 316) stated, “networking and collaboration in the advancement of productivity thinking and in creating a common, realisable understanding are needed at an individual organisation and more widely”. Access to policymaking for the purposes of enhancing productivity should, of course, be underpinned by transparency principles. Diversity and evolution are other key concepts. The diversity and evolution of both stakeholders and contexts implies that influencing policymaking needs to be adapted.

Many partial public sector productivity measurement methods exist, but holistic ways of measuring the same are rather missing. In this short paper, we have aimed to provide such a framework by means of bringing together not only multiple stakeholders (beyond the civil society), but also their different expectations, which are reflected in the definitions attached to public sector productivity measurement. We join the calls for the creation of transparent platforms and mechanisms that enable the civil society, the business environment, research centres and universities, and other relevant national and regional bodies to be engaged in dialogue regarding public policy initiatives meant to increase the productivity of the public sector.

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