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Productivity and Productivity Information: Towards Optimizing and Balancing Organizational Efficiency and Effectiveness - Tested in the Agricultural Sector

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ABSTRACT

The pressure for information on how a corporation creates value over time to benefit stakeholders is mounting since the 2008 financial crises. The COVID-19 pandemic social and economic impacts and consequences will inevitably force many corporations to report how the available resources are efficiently and effectively utilized. Hence, reflect how the organization's growth and profitability are sustainable. This study attempts to introduce and examine a systematic and integrated productivity-based framework for developing appropriate performance management systems that help resolve the dilemma of central business terms: organizational efficiency and effectiveness. The study builds on productivity, activity-based management, and resources concepts using mathematical and qualitative analytical methods for conceptualization. The study concludes the importance of "Productivity Information" integrated with activity-based management for balancing organizational efficiency and effectiveness. Besides, the study establishes that productivity is superior to all conventional financial measures, and it is the driving force of real business results and outcomes. Moreover, the study shows that "Productivity Information" would help in preparing integrated and sustainability reports. The framework foundations are developed and tested in the context of the agricultural sector. The study calls for further studies to explore the richness of productivity information in enhancing business excellence and performance. A call is also made for developing a new breed of professionals around the productivity involving multi-disciplinary and multi-sectoral professions from the various fields of knowledge.

KEYWORDS

Productivity, Productivity Information, Efficiency, Effectiveness, Activity-Based Management.

الإنتاجية ومعلومات الإنتاجية: نحو تحسين وتحقيق التوازن بين الكفاءة والفعالية التنظيمية – حالة القطاع الزراعي

خلاصة

يتزايد الضغط من أجل الحصول على معلومات حول كيفية قيام المؤسسات بخلق قيمة لإفادة أصحاب المصلحة منذ الأزمات المالية لعام 2008. ان الآثار والعواقب الاجتماعية والاقتصادية لوباء COVID-19 ستجبر العديد من الشركات على الإبلاغ عن كيفية استخدام الموارد المتاحة بكفاءة وفعالية. ومن ثم، تعكس مدى استدامة نمو المنظمة وربحيتها. تحاول هذه الدراسة تقديم واختبار إطار عمل منهجي متكامل قائم على الإنتاجية لتطوير أنظمة إدارة الأداء المناسبة التي تساعد في حل المعضلة الاساسية المتعلقة بإدارة الأداء وهي الكفاءة والفعالية التنظيمية. تعتمد الدراسة على الإنتاجية والإدارة القائمة على النشاط ومفاهيم الموارد باستخدام الأساليب التحليلية الرياضية والنوعية لوضع اطار مفاهيمي. خلصت الدراسة إلى أهمية تكامل "**معلومات الإنتاجية**" مع الإدارة القائمة على النشاط لتحقيق التوازن بين الكفاءة والفعالية التنظيمية. إلى جانب ذلك ، أثبتت الدراسة أن الإنتاجية تتفوق على جميع المقاييس المالية التقليدية، وهي القوة الدافعة لمخرجات ونتائج الأعمال الحقيقية. علاوة على ذلك ، أظهرت الدراسة أن "**معلومات الإنتاجية**" من شأنها أن تساعد في إعداد تقارير أداء متكاملة ومستدامة. تم تطوير أسس الإطار واختبارها في سياق القطاع الزراعي. تدعو الدراسة إلى مزيد من الدراسات لاستكشاف ثراء "**معلومات الإنتاجية**" في تعزيز التميز في الأعمال والأداء. وتدعو الدراسة لتطوير سلالة جديدة من المهنيين من التخصصات و القطاعات المتعددة من مختلف مجالات المعرفة حول هذا الموضوع الهام.

الكلمات المفتاحية : الإنتاجية ، معلومات الإنتاجية ، الكفاءة ، الفعالية ، الإدارة القائمة على النشاط.

1. Introduction

Precision in terminology does matter. Using related words interchangeably, even though they have different meanings, can cause unintended negative consequences for organizations. Efficiency "doing things right' and effectiveness "doing the right things" are used interchangeably (McGee, 2006). They are central terms used in assessing and measuring the performance of organizations. Both terms are used widely throughout the business world to determine improvement levels (Barwise, Marsh, and Wensley, 1989). Besides, they apply to business arrangements such as strategic alliances, joint ventures, sourcing, and outsourcing agreements. Efficiency and effectiveness are two competing, yet complementary approaches to business. Although both are critical to an organization's ability to survive and thrive, their respective desired outcomes often conflict (Termpaperwarehouse, 2015).

Despite the apparent relevance of assessing and measuring performance, it appears that business managers rarely understand the exact meaning of efficiency and effectiveness and rarely assess the full impact of their actions on key financial indicators (Barwise, Marsh, and Wensley, 1989). Managers are often reassured by efficiency indicators achieved by cost-cutting, outsourcing activities, or under-funding marketing or research and development, even if they do not measure effectiveness in the marketplace (Ambler, 2003).

Many company-centered studies focused on competitive advantage issues through value appropriation rather than creating new growth opportunities within business networks. This propensity to efficiency may be attributed to purposive business action is far more applicable to efficiency gains than to the effectiveness by creating new sources of value in a business network (Moran and Ghoshal, 1999).

Dealing with efficiency and ignoring effectiveness, companies neglect the achievement of differentiation and innovation sustainability (Moran and Ghoshal, 1999). The obsession with efficiency gains prevents managers from achieving differentiation and sustainable growth and profitability. Thus, companies need to pay equal attention to efficiency and effectiveness.

The duality of performance measures can be a source of conflict. Effectiveness and efficiency provide a never-ending dilemma for project managers and their team members as well. That is why a balanced approach is preferred, which balance and optimize efficiency and effectiveness.

In the earlier days of mass production, efficiency was the most critical performance indicator for any organization. However, with consumers facing an increasing number of choices, an organization's effectiveness is always questioned. Only being efficient and not meeting the organization's stakeholders' requirements is of little use to anybody. Furthermore, effectiveness may result in success but at what cost? (Manisha, 2011). (Figures 1) show how efficiency and effectiveness of interaction can impact the business.

Figure (1): Efficiency and effectiveness matrix

Source: Solitaire (2012) -https://www.solitaireconsulting.com/2012/02/efficiency-effectiveness-2/

Figure 2 shows another way to illustrate the distinctions and the relationships between efficiency and effectiveness and their impact on business results.

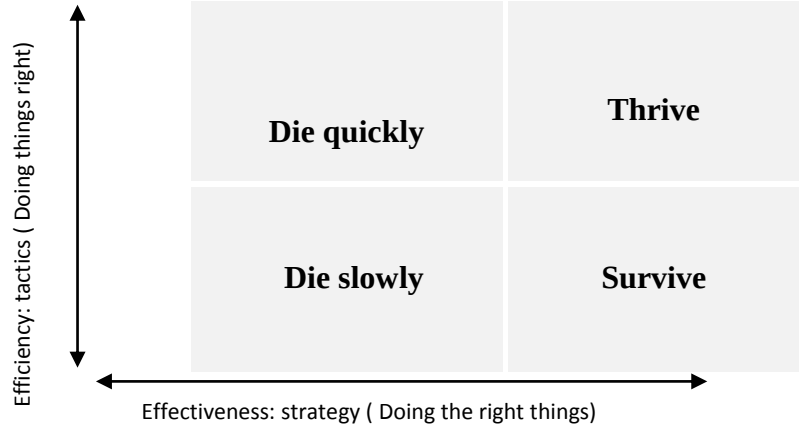


Figure (2): Efficiency and effectiveness matrix

Source: Solitaire (2012) -https://www.solitaireconsulting.com/2012/02/efficiency-effectiveness-2/

Thrive: Highly effective, and highly efficient.

Businesses that pursue the right strategy efficiently thrive. They can meet strategic targets earlier than anticipated and can go on to meet more challenging strategic targets to sustain their ability to thrive.

Survive: Highly effective but inefficient

Many businesses survive.' They show potential but never attain the growth that they desire. That is, it can be due to poor management or inefficient practices.

Die slowly: Ineffective and inefficient

The business lacks a clear vision of what it is trying to achieve and lacks the right strategies or has weak strategies on which to execute. The lack of clear strategies means that short-term plans and tactics are lacking. As such, the business delivers poor results for several years and is in a state of steady decline before the business eventually 'dies'.

Die quickly: Ineffective and highly efficient.

Here, the business is executing very well, but on the wrong strategies, driving it into a rapid decline state. The business leaders are not learning from their mistakes or are not aligned with the market's realities, and by doing so, negatively compound the effects of their wrong strategies.

To thrive, businesses need to get both efficiencies (tactics) and effectiveness (strategies) balanced and aligned. Have the right direction and the right actions to help them bridge the gap between where they are now and where they want to be. Look at what they are doing and where they are going (Solitaire, 2012).

For many years, it has been argued that, for managerial and strategic purposes, the financial evolution of organizations by itself is inadequate. The financial-based approaches and methodologies focus on outcomes to exclude the transformation process within the organization, Chakravarthy (1986).
Over more than two centuries ago , the term productivity was used by (Quesnay 1766) in the Journal de l'Agriculture. Since then, it has been applied in many different circumstances at various aggregation levels, particularly with economic systems (Tangen, 2002a).

Productivity (i.e., yield) is widely adopted by managers and researchers in the agricultural sector to assess and examine the impact of technical and governmental (policies) interventions to improve agricultural products. Unfortunately, the business and accounting literature completely ignores productivity as a measure of organizational performance and information sources for planning and control (Abdalla 1999).

Peter Drucker (1973), who is widely regarded as the pioneer of modern management theory, said:

"The enterprise must utilize wealth-producing resources to discharge its purpose of creating a customer. It is, therefore, charged with the productive utilization of these resources. In its economic aspects, it is called productivity."

Peter Drucker (1973) put the case for productivity measurement as follows:

"Without productivity goals, a business has no direction, and without productivity measurement, a business has no control."

The purpose of productivity measurement, therefore, is for planning and control. Resources must be employed productively, and their productivity has to grow if the business survives (sustain). Hence, there is a need for productivity objectives. Productivity would reflect measures of an organization's ability to convert resources or capital inputs into valued goods and services (value creation). The challenge is to turn the concept into useful measures management can use. (Drucker,1973).

Productivity assists in optimizing the mix of resources and costs in delivering the output of the organization. Productivity translates into creating real wealth, not merely accumulating money by pricing goods or services far above their costs. Most business excellence frameworks have their roots in productivity, but the output is quality (Blocher et al., 2008).

Banker et al. (1989) argued that from empirical observation, companies with extensive cost accounting systems have established productivity measurement systems independent of the accounting systems and have even established separate departments to develop productivity statistics.

Productivity is doing the right things in the right way. Therefore, productivity reflects how effective and efficient the organization is utilizing its resources. Productivity, the primary measure of performance, has been identified in the literature as one of the primary performance constructs.

Based on previous studies and views, Peter Drucker (1973), McGee, (2006), Blocher et al. (2008), Abdalla (1988), (1992) and (1999) regarding productivity, this study attempts to contribute to solving the never-ending dilemma of efficiency and effectiveness. By examining the use of productivity and productivity information to help strike a balance between efficiency and effectiveness. Namely. This study is attempted to:

1. Introduce a systematic and integrated productivity-based framework for developing appropriate performance management systems to balance organizational efficiency and effectiveness.
2. Examine the foundations of the framework and its usefulness and applicability.

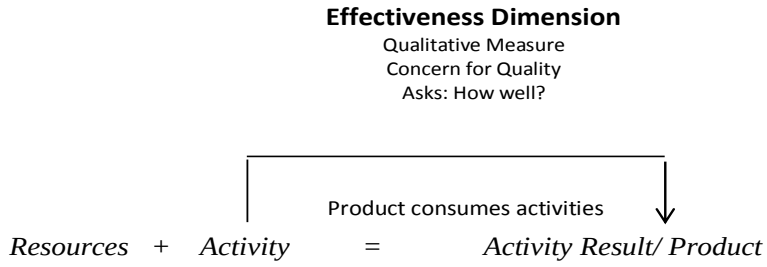
The next section discusses the relevant literature. The third section develops the framework. The fourth one tests the foundations of the framework. The paper ends with conclusions, implications, and further research.

2. Literature review

McGee (2006) study reviewed the elements of a simple systems model. Any system is being composed of three essential elements. The study recognizes that all systems produce results. The results they produce may, at times, be challenging to predict, but systems produce results. Secondly, to achieve results, something must happen; something must be done. In other words, an activity must take place. Third, in order to have activity, resources must be used. The three elements (i.e., input, process, and output) of a system hold whether the system is agricultural, mechanical, electrical, biological, financial, social, or educational.

Adopting Drucker's (1973) view, McGee states "An enterprise can manage what it does – its activities". The starting point for managing activities is to understand the resources currently assigned to today's activities (activity costs), the volume of output (activity measure), and how well the activity is performed (performance measure) (Brimson, 1991).

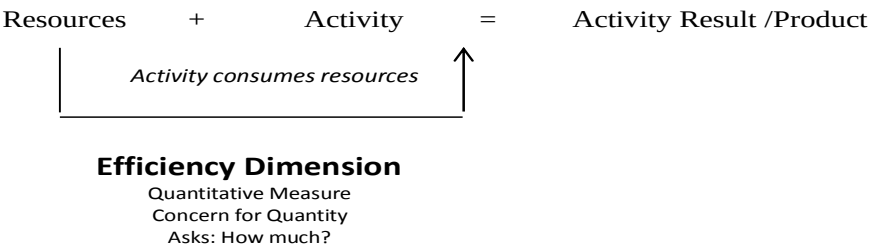
According to (McGee 2006), the next step to understand his approach is to examine the dynamic relationships between a system's elements. He started with the relationship between results and activity (i.e., effectiveness). McGee argues that something is useful only when an activity produces a predetermined result. When something does what it is supposed to (with a high degree of predictability), then and only then are we able to say that it is effective (i.e., doing the right thing). Effectiveness is concerned with "how well" something works (produces predetermined, desired results) as designers of systems must strive first for effectiveness (Figure 3). For, without it, there is little reason to proceed with the design of any system.



Figure(3): Efficiency and effectiveness Dimension

Source: Philip McGee, The Journal of Human Resource and Adult Learning, November 2006 - http://www.hraljournal.com/Page/1%20Philip%20McGee.pdf

Efficiency is the dynamic relationship that exists between resources and activity. Efficiency asks the question, "How much?" (i.e., doing things right) (Figure 4). Always there is an optimum balance within every system: a balance between resources and activity and activity and results. Accordingly, an optimum balance between effectiveness and efficiency exists.



Figure(4): Efficiency and effectiveness Dimension

Source: Philip McGee, The Journal of Human Resource and Adult Learning, November 2006 – http://www.hraljournal.com/Page/1%20Philip%20McGee.pdf

Abdalla (1999) pointed the little attention that productivity measures have received at the organizational level and the significant attention which productivity has received at the more macro level (i.e., public policy level). In contrast, (Abdalla 1999) established that productivity measures are found at a macro level to the organization in a developing country (for instance, the Gezira Scheme in Sudan). His paper shows that the joint consideration of productivity and financial measures in the Public Agricultural Corporations (PACs) in Sudan would resolve (or at least minimize) the incongruences existing between the different parties involved and between the macro policy productivity measures and what is going on in organization or firm. Accordingly, his paper introduced an exciting new concept, namely the "Integrated Production Responsibility Center" (IPRC), in contrast to the traditional financial responsibility centers. The usefulness of the IPRC had been tested with regards to the Gezira Scheme in Sudan. The study found that IPRC and the productivity information it provides reasonably reflect the financial and non-financial performance at the different levels of the Scheme (Figure 5).

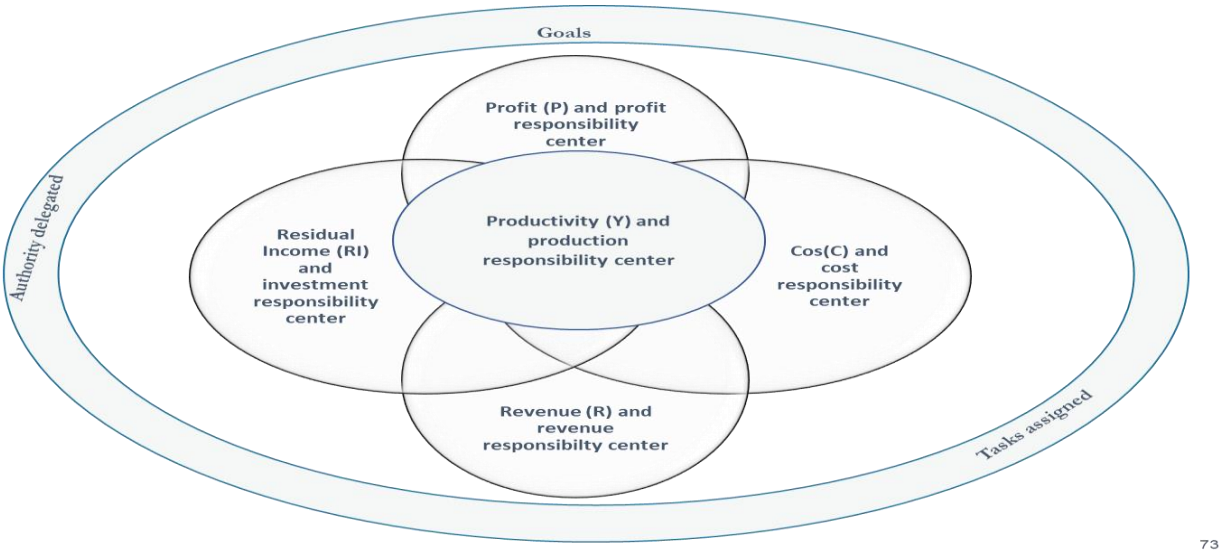


Figure 5: The Integrated Production Responsibility Center (IPRC)
Source: Abdalla (1999)

Abdalla (1992) examined the usefulness and applicability of productivity as a measure of managerial performance in the PAC in Sudan. Based on productivity as a critical success area and source of performance yardsticks (KPIs), the study proposed a framework for developing a managerial performance evaluation system (MPES) aligned with the PACs expectation (mission) and strategic objectives. This would, enhance the completeness and fairness of the existing MPES in PACs.

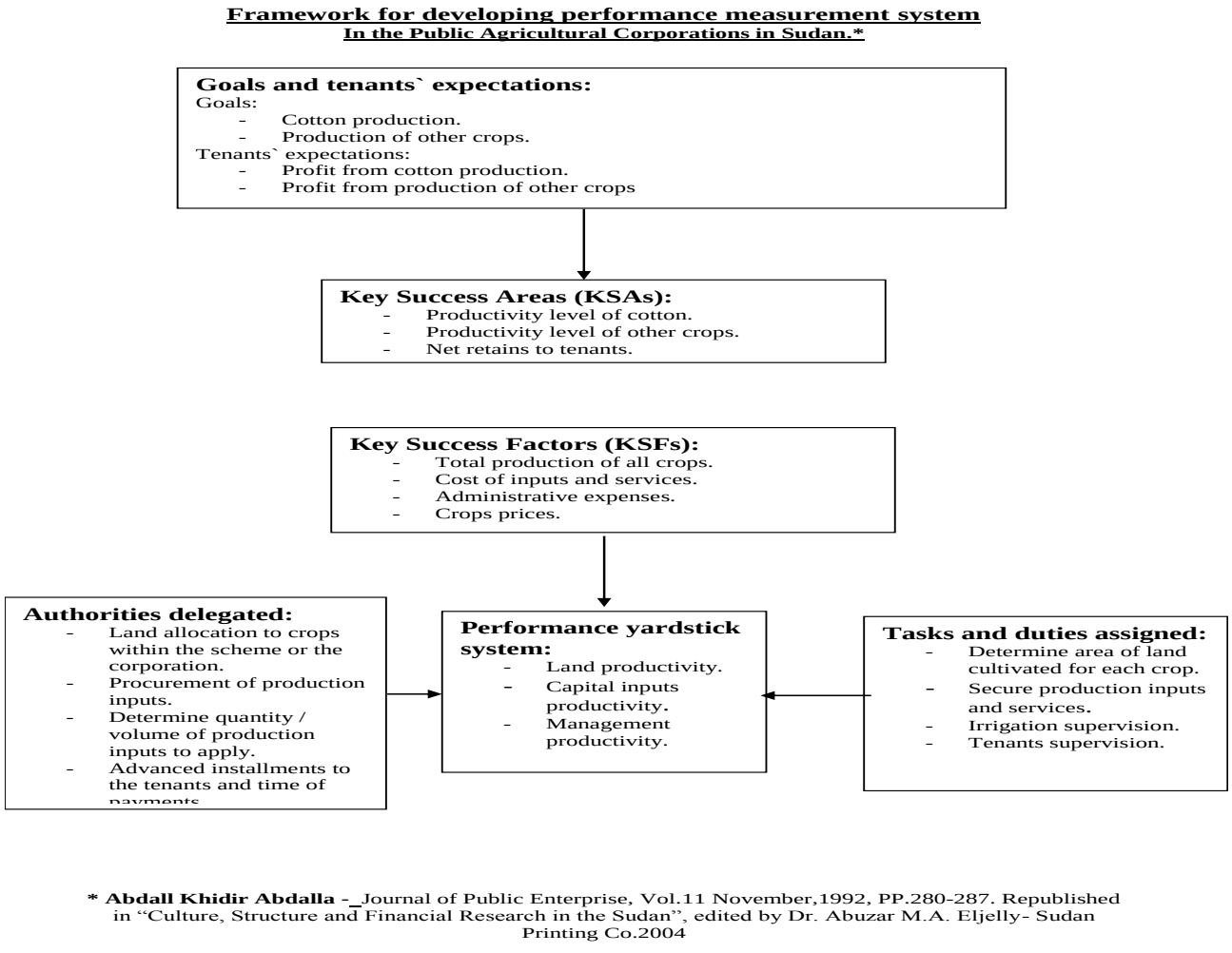


Figure 6: Framework for developing a performance measurement system in PACs in Sudan.

Sources: Abdalla1992.

Abdalla (1989) used cotton productivity to examine the impact of the change in the agricultural production relations and profit-sharing systems between the parties (i.e., government, tenants, and managing board) in the Gezira Scheme in Sudan. It was found that this change had improved the association between effort and reward, which led to a significant increase in cotton productivity across the different levels of the Scheme.

Moreover, Blocher et al. (2008) discussed the term "productivity accounting" and argued that it could consistently address the issue of productivity of all resources and thus assist in optimizing the mix of resources and costs in delivering the organization's output. That is, productivity translates into creating real wealth, not merely accumulating money by pricing goods or services far above their costs. According to (Blocher et al.,2008), most business excellence frameworks have their roots in productivity.

Hayzen and Reeve (2000) developed a framework called "productivity accounting. The authors argued that since productivity is a measure of an organization's ability to convert labor, capital, and materials into finished goods and services, it substantially correlates with profitability. This approach measures the change in total resource productivity and its effects on the corresponding change in business profitability. According to this framework, profit is explained by a change in productivity and price recovery change. Productivity is defined as the ability to turn inputs into outputs.

Corporations or business units can analyze changes in profit in terms of a change in productivity and a change in price recovery. Thus, productivity improvement will translate directly into profit improvement Hayzen and Reeve (2000).

Productivity was measured as a ratio of what was produced (sold) to what was required to produce (or sell). Usually, this ratio is in the form of an average and is expressed as a percentage (i.e., average productivity).

Over the world, the productivity of crops (i.e., yield) is widely used. The Food and Agriculture Organization (FAO) and other UN organizations, researchers, and practitioners employ productivity (see, for example, Seman et al., 2020; Nagat et al., 2020; Fahmi et al., 2017; FAO, 2018; Sanders et al., 2019; Sharad et al., 2018; Thompson et al., 2019; Teklay et al., 2020; Amare et al., 2019; R Core Team, 2019; Visarada et al., 2019; Abiad and Meho, 2018; Working et al., 2020; Oyange et al., 2020).

Productivity metrics are a quantity based output/input ratio of a production process. The main classes of productivity metrics include partial factor productivity (PFP), total factor productivity (TFP), and total resource productivity (TRP). PFP measures output per unit of one input and is the most straightforward and most widely used productivity metric. TFP is a ratio of the total marketable outputs to total marketable inputs in a production process. TFP provides more valuable information than PFP on economic efficiency but does not include environmental inputs or outputs that are not priced in the market place. TRP extends TFP to include nonmarket ecological goods and services used in agricultural production. Few empirical applications of TRP currently exist, however. Moreover, none of these metrics address the essential dimensions of environmental sustainability, such as resilience (Laure et al., 2016).

Therefore, we can reasonably argue that productivity is the backbone of any business type because it can holistically measure and reflect how efficient, effective, and profitable the organization is.

We argue that productivity is misplaced in the structure or the hierarchy of the organizational performance constructs. Consequently, underestimating the real impact of productivity dimensions and measures in developing organizational performance and reporting systems.

The literature reviewed above indicates a shortage of comprehensive and systematic frameworks adopting productivity and activity-based management notions to develop a suitable framework to help strike a balance between organizational efficiency and effectiveness.

Having accepted that productivity is the driver of main dimensions of performance in terms of efficiency and effectiveness, the next section, based on productivity and activity-based management concepts, is devoted to constructing an integrated framework for developing an organizational performance management system. That enhances balancing organizational efficiency and effectiveness as the main criteria.

3. **Productivity and productivity information**:

an integrated performance management system framework for balancing organization efficiency and effectiveness.

The first step in building up the framework is, understanding and appreciating the relationship between productivity (as a real and actual process) and the central business conventional financial measures (i.e., cost, revenue, profit, and residual income). Then, develop a framework conceptualizing such a relationship. For the sake of illustration, the framework is developed tested in the context of the agricultural sector.

Recognizing that activity efficiency and effectiveness may be expressed in financial or monetary value, the starting point in developing such a framework is the standard definition of profit, which given as:

(1) $P = R-C$

Where P being profit, R is revenue, and C is the cost in the usual notation.

Revenue is given in the usual manner as:

2) $R = qQ$

Where q is the price of the product, and Q is the quantity sold. In the agricultural sector, the total output can be considered average productivity of land (y) multiplied by the given crop area (A). Thus, it indicates how effective (how well) the targeted production and revenue are achieved. Thus, have revenue as:

(3) $R= qyA$ = Output / Results of activity (ies).

The total cost of agricultural production (e.g., cotton) is usually looked at as being composed of two parts: an area-related cost and a volume of production-related cost. Each category of cost the resources (capital inputs) consumed by the agricultural activities. Hence, it indicates how efficient the targeted production and revenue are achieved (how much it costs). Thus, they have a cost:

(4) $C = zA + vQ$ = Resources consumed by the activity (ies) = Inputs.

Where z is the per unit area cost of production (e.g., seeds, land preparation, fertilizers) and v is the per-volume cost of production (e.g., cotton picking labor, transport, and ginning). The two components of production cost are reformulated in terms of area and yield in the following fashion:

(5) $C = zA + vAy$

$= (z+vY) A$

The total cost of production (resources consumed) is now a function of productivity in a direct fashion with an intercept of za and a slope of vA.

Substituting (3) and (5) for (I) give profit as:

(6) $P = qyA-(z+vy)A$

= (qy-z -vy) A

So that profit per unit area is given by:

(7) P/A = h = qy – vy -z

= (q - v) y - z

Thus (7) shows that profit per unit area is also a function of the productivity with a slope of (q -v) and a negative intercept of z.

Residual income is used to measure the financial performance of the investment responsibility center. It is calculated by deducting the cost of capital employed from the net profit earned by using that capital. Thus, it gives:

(8) X = P - I

Where X is the residual income, P is profit, and 1 is the cost of capital.

Substituting for P as given in (6) gives:

(9) (X) = [qy - z - vy] A- I

= qyA - Az - vyA -I

= (q - v) Ay - (zA - I)

Where residual income is also a function of productivity in a direct fashion with a slope of (q-v) and a negative intercept of (zA + I)

Equations (3), (5), (6 and 7), and (9) show respectively that revenue, cost, profit, and residual income and, in turn, (profitability), depend directly on productivity.

From another perspective and conceptualization and knowing that:

I. Effectiveness = Doing more (i.e., outcome) with the same (i.e., resources).
II. Efficiency = Doing the same (i.e., outcome) with less (i.e., resources).
III. Productivity = Doing more (i.e., outcome) with less (i.e., resources).

If we remove (The same) from the two formulas I&II, we remain with:

IV. Effectiveness = Doing more (outcome); and
V. Efficiency = Doing with less (resources).

Hence, substituting (IV) and (V) by (III) we get: Productivity = Doing more (outcome) with less (resources). That is, we have:

VI. Productivity = Effectiveness + efficiency

Thus, productivity, as well , is the driver of business and value creation.

accordingly, we can argue that productivity, which has been disregarded by the financial and control literature, underlies all the financial measures and economic events. Hence, it drives organizational efficiency, effectiveness, and profitability (Figures 7, 8, and 9).

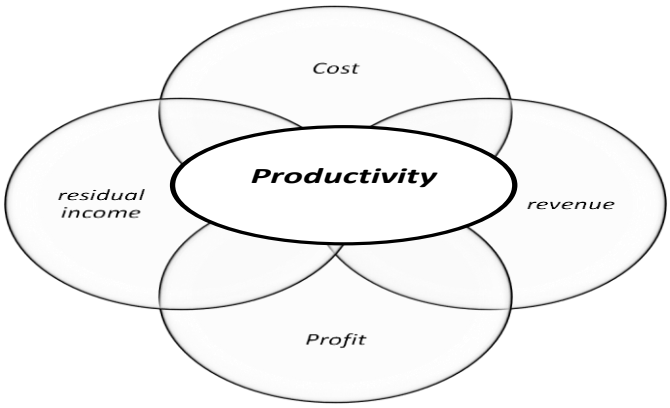


Figure 7: The relationship between productivity and conventional financial measures.
Source: Author's elaboration.

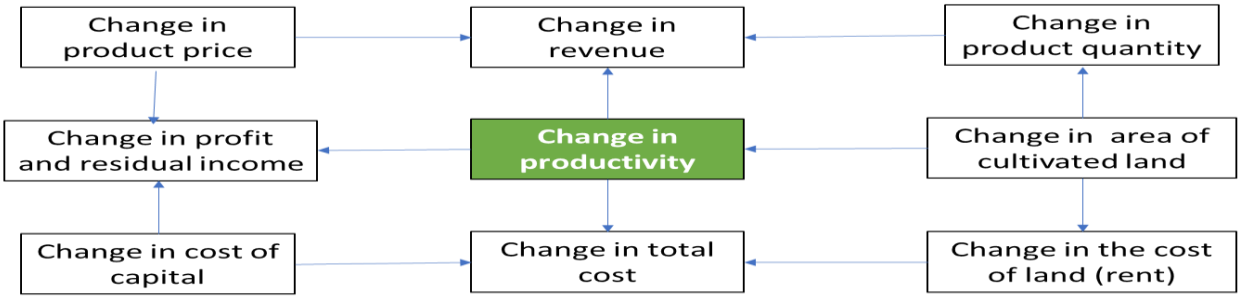


Figure 8: The interaction between productivity and other financial and non-financial measures.
Source: Author's elaboration.

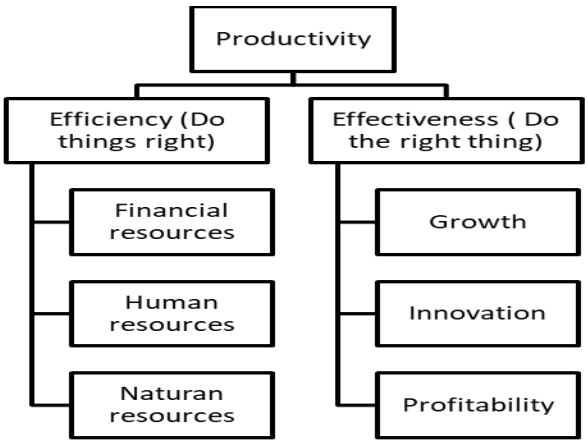


Figure 9: Productivity position in the hierarchy of organizational performance constructs.
Source: Authors` elaboration

The break-even yield of cotton (Y) is given as Y=Z/(q-v)=Kantar/Feddan

Where:
Y= break-even yield in kantar/feddan
Z= area-related cost per feddan (fixed cost)
Q= the average price per Kantar
V= production-related cost per Kantar (variable cost)

The break-even formula illustrates the interaction between productivity and the other financial measures (e.g., fixed cost, the variable cost, price, and the contribution margin). In turn, it provides more evidence for the appropriateness of the productivity information for designing control and information in the agricultural sector. Hence shows the usefulness of productivity information for attention-directing problem-solving.

Combining the effectiveness and efficiency dimensions, we get the following formula:

$$\frac{\textit{Activity Results}}{\textit{Resources consumed}} = \frac{\textit{Activity Output}}{\textit{Activity inputs}}$$

Merely, this is the standard measure of productivity. Therefore, we can talk about "Productivity of Activity" as a new concept in business and accounting literature (Figure 10).

Thus:
Productivity of Activity = Activity efficiency + Activity effectiveness
That is, activity efficiency and effectiveness, which are the main determinants of performance, are now, in a direct fashion, a function of productivity. Thus, they are derived by the productivity level achieved.

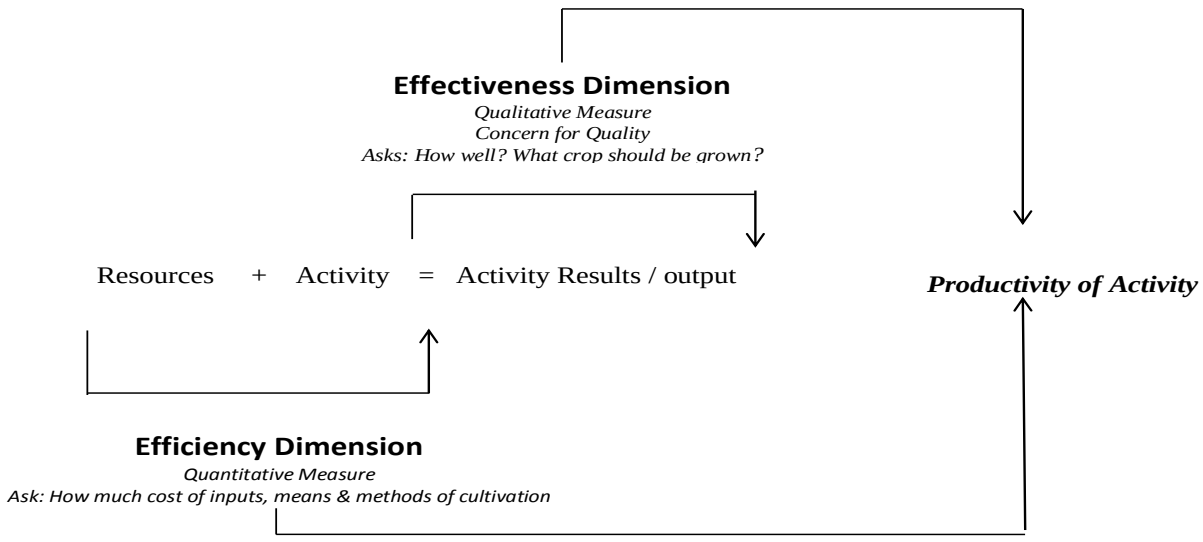


Figure 10: Productivity of Activity Dimension.

Source: A modified version of Philip McGee, The Journal of Human Resource and Adult Learning * November 2006 - http://www.hraljournal.com/Page/1%20Philip%20McGee.pdf

Having recognized and accepted this central position for productivity in the business process, we can expand our concept by incorporating business events' financial measures (Figure 11). The figure shows how profitability, efficiency, and effectiveness are directly derived by productivity. That is, productivity is the driver of all economic events. Hence, productivity is the driver of the business as a whole.

Productivity is created in the actual process, and productivity gains are distributed in the income distribution process. These two processes constitute the business process. The business process and its sub-processes: the entire process and income distribution process coincide. Only the business process is identifiable and measurable by traditional accounting practices. Productivity is the primary determinant of income distribution to the different parties involved in the business.

Moreover, productivity as a measure and source of information would provide financial and non-financial information (integrated report) that meets the different stakeholders' information needs.

Therefore, we can reasonably argue that productivity is the backbone of any business type because it can holistically measure and reflect how efficient, effective, and profitable the organization is.

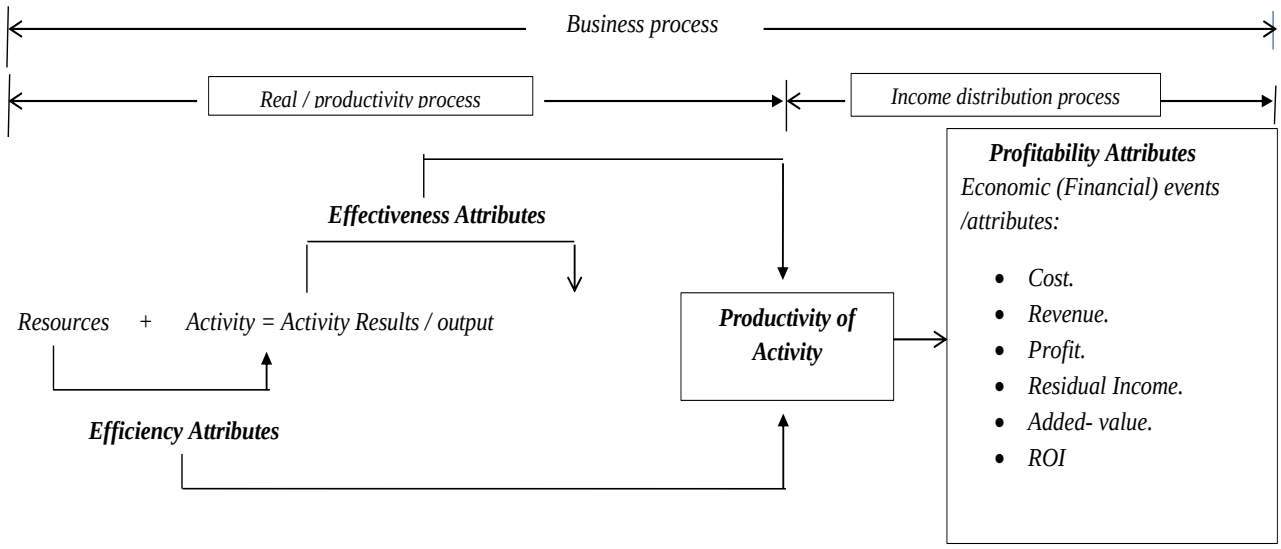


Figure 11: "Productivity of Activity" - The Integrated Framework.

Author's elaboration

Essentially, productivity measurement is the identification and estimation of the appropriate output and input measures. The output could be in the form of goods produced or services rendered. The output may be expressed in physical quantity or financial or monetary value. At the operational level, where products or services are homogeneous, the output can be measured in physical units (e.g., number of customers served, the

number of books printed). Such measures reflect the physical effectiveness and efficiency of a process and are not affected by price fluctuations.

At the organization level, the output is seldom uniform. It is usually measured in financial value, such as sales, production value (i.e., sales minus change in inventory level), and value-added.

The critical management indicators at the top are broad indicators that relate to the organization's goals. Such indicators are usually financial, value-added-based ratios that provide management with information on productivity and profitability. They are then broken down into activity and operational indicators.

Activity indicators provide a snapshot of costs, activity levels, and resource utilization rates, particularly for middle and higher management. Operational indicators are usually physical ratios that address the operational aspects that need to be monitored and controlled.

The objectives are based on the organization's overall productivity goals and key productivity levers at the management level. Productivity levers are areas or actions that an organization can focus on to improve productivity significantly. Examples include obtaining higher value from products through service excellence and labor optimization through the workforce's effective deployment.

Objectives at the organizational and management levels are cascaded down to the objectives of specific functions, processes, activities, and individuals.

Organizations should monitor and analyze their productivity performance in terms of the productivity level measured by the various productivity indicators. Productivity levels reflect how efficiently and effectively an organization's resources are used. Comparisons of productivity levels must be made between similar entities, such as two companies within the same industry.

Besides, organizations must track their productivity growth, which indicates the change in productivity level over time. Productivity growth indicates dynamism and the potential for achieving higher productivity levels in the future. It is expressed as a percentage.

4. Test of the proposed framework for balancing and optimizing effectiveness and efficiency.

Having accepted the conceptualization developed in the previous sections, we can conceptualize how productivity would balance effectiveness and efficiency. As mentioned before, the productivity balancing model will develop and be tested regarding the agricultural sector.

The agricultural System (A) {see figure (12)}, which is neither effective nor efficient, cannot be said to be productive. System (B), while very effective, cannot be said to be productive because it is not efficient (i.e., unprofitable growth). System (C), while efficient, is not effective. Therefore, it cannot be considered productive (i.e., Ephemeral profitability). Only system (D), which is effective and efficient, can be productive (i.e., sustainable profitability). In application, it is possible to set performance standards for any system in terms of effectiveness and efficiency and determine corrective action courses when evaluative data is generated and graphed.

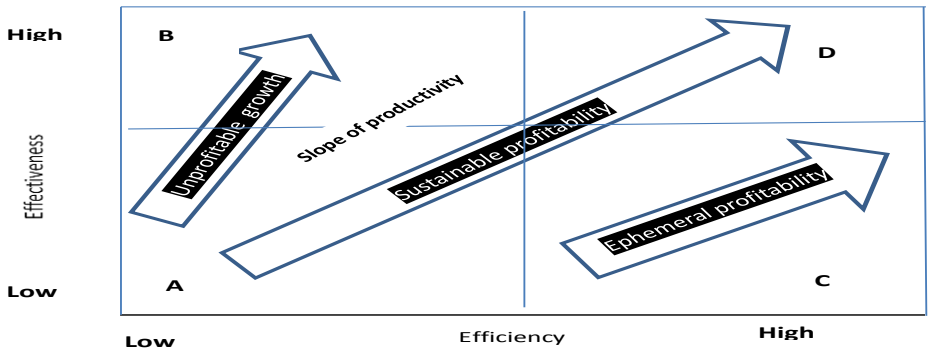


Figure 12. The effect of different levels of efficiency and effectiveness.
Source: Stefanos Mouzas, September (2006)

If we are to measure and improve a crop's productivity, we must focus our attention on two different measures. The first is the physical production (yield/result/output), i.e., what should be produced (cotton, wheat, rice)?. Furthermore, the second is the quantity of resources (inputs: land, seed, water, fertilizers, labor) needed to produce the crop, i.e., by what means and methods used to produce the crop?

Let us expand on this concept. The crop yield (quantity and quality) is the primary concern of agricultural sector development in any country. Crop selection answers the question, "What should be grown?" {i.e. Grow the right crop}(i.e., Do the right thing). During the crop selection process, a performance standard for the crop is established (i.e., productivity), and the related operation and activities and inputs are identified.

On the other hand, inputs quantity falls into the domain of cultivation strategy, which determines and selects the most efficient method and media for growing the crop. The goal of the cultivation strategy adopted is to answer the question, "By what means should the crop be grown?" {i.e., Do thing right}. Again, a performance standard must be established by which to measure this dimension. Common standards are land, seeds, water, fertilizers, labor, equipment required, i.e., agricultural resources. The following are the primary cotton farming operations (activities):

1. Cultivation
2. Sowing
3. Fertilizer and application
4. Herbicide and application
5. Insecticide and application
6. Irrigation
7. Harvesting
8. Cartage to gin
9. Ginning

Each farming activity has inputs and outputs. How efficient and effective these activities are carried out could be determined by comparing their output with inputs (i.e., the productivity of activity). We can talk about the productivity of cultivation, sowing, fertilization, herbicide irrigation. by comparing the cotton yield (output) and the amount of inputs used in each farming activity. In turn, the output and the inputs and the productivity of activity could be measured in physical quantities or monetary terms.

To determine the productivity of a crop, we must consider both the results (yield) produced and the agricultural resources used in growing the crop (e.g., cotton). Keep in mind that productivity is a ratio or composite measure of both the system's effectiveness and efficiency.

For example, let's say that we have agricultural land in which 95% of the tenancies achieved the targeted output (the set standard) using means and methods (inputs) to grow the crop, which cost $125 per tenancy (Figures 13 and 14).

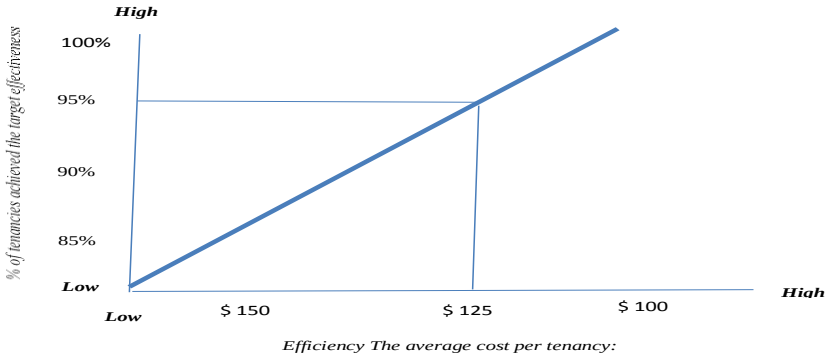


Figure 13: Farm(tenant) efficiency and effectiveness
Source: A modified version from Philip McGee (2006)

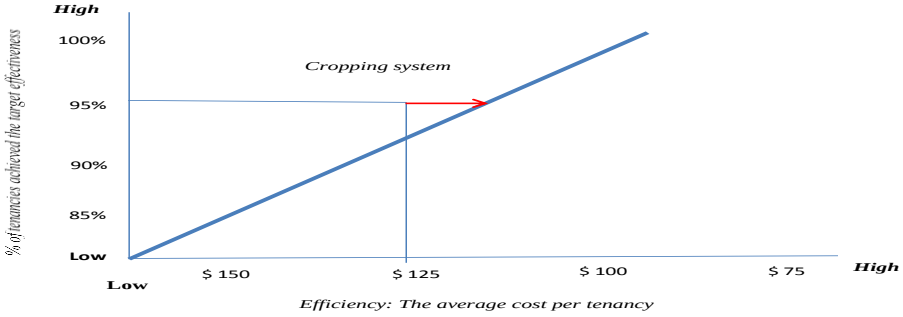


Figure 14: Efficiency and effectiveness of the dropping system.
Source: A modified version from Philip McGee (2006),

The power of this evaluation framework is that it enables tenants and managers to identify where they should take corrective action concerning the efficiency attributes (i.e., reducing the cost of growing the crop) or the effectiveness attributes (i.e., performance objectives, work setting, tasks, operations) or both efficiency and effectiveness attributes. Thus, it can be seen that to improve the cropping system; attention should be focused upon decreasing the cost of growing the crop through controlling the cost of farming activities (e.g., cultivation, sowing, fertilizer & application, herbicide & application, insecticide & application, irrigation or harvesting).

Agricultural managers are often asked to compare and contrast two or more cropping systems and recommend them. Using the Productivity Model, this becomes a simple task, as illustrated below.

Let us say that we have two agricultural systems that produce the same crop. 85% of the cropping system A achieves the targeted output for an average cost of $100 per tenancy. However, 95% of the tenancies where the cropping system B is applied to achieve targeted output using media and methods have a per tenant cost of $125. Now then, which is the most productive cropping system of the two being applied? To determine this, we must graph out the two cropping systems (Figure 15).

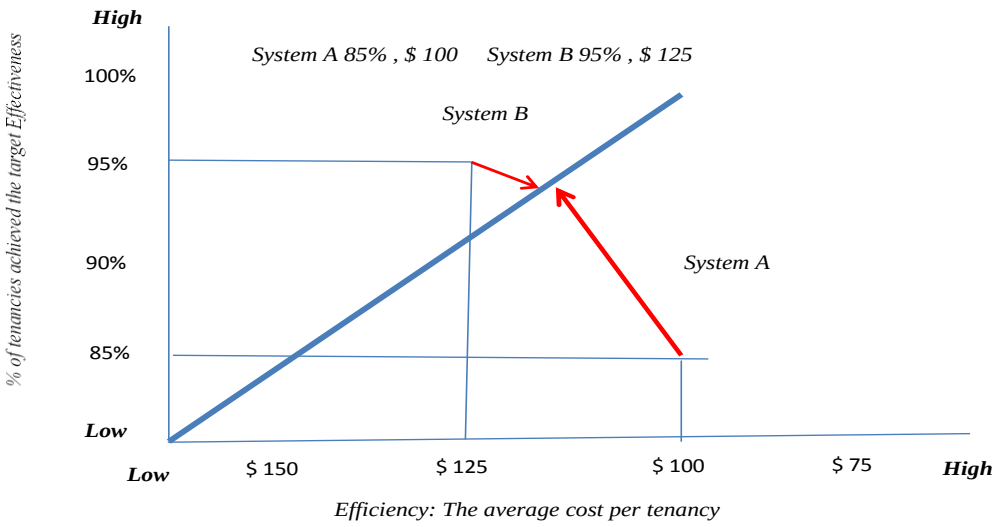


Figure 15: Slope of productivity.
Source: Philip McGee(2006)

It can be seen in the above graph that cropping system B falls higher and closer to the line we call the "Slope of Productivity," and therefore is the more productive and sustainable choice.

5. Conclusions, implications and further research

Depending on the perspective from which we see them, different conclusions can be drawn from the results and findings.

When integrated with activity-based management concepts, the attributes possessed by the productivity information render it to occupy a central role when developing organizational performance management systems. Significantly, productivity information would help strike a balance between the central business terms, known as efficiency and effectiveness. Hence, resolving the dilemma of organizational efficiency and effectiveness. The study proved that productivity is superior to all conventional financial measures, and it is the driving force of real business results and outcomes. It would enhance reporting on organizational profitability, growth, efficiency, effectiveness, accountability, and sustainability. Besides, the paper shows that productivity information would help in preparing integrated and sustainability reports. Therefore, meeting the mounting pressure for information disclosure requirements on how a corporation creates value over time benefits stakeholders. The COVID-19 pandemic social and economic impacts and consequences will inevitably force many corporations to prepare integrated and sustainability reports to explain and communicate their responses to such impacts. Thus, productivity information can be part of the solution.

The paper also shows that the joint consideration of productivity and financial measures through an integrated approach for designing control and information systems would resolve (or at least minimize) the in-congruencies existing between the different parties involved and between macro policy productivity measures and what is going on in organizations or firms. As a criterion, the designer of a performance and control system should choose those measures and documents of a system that lower cognitive differences between the parties interested in the organization, Abdalla (1999). That minimizes the perceptual difference between the parties and the encouraging behavior that resolves such conflict with positive results for system performance. The method of conflict relationship is based on the concept that many organizational conflicts can be resolved to both parties' satisfaction. These are known as an integrative or win-win method, Ansari (1977).

Productivity information and productivity of activity focus on the organization's transformation process rather than on the outcomes as the conventional financial information does. Hence, Productivity Information is more useful than conventional financial measures' information because it possesses many distinguishing characteristics. It provides real efficiency gains: a ratio of output produced to input consumed from improved production and management procedures abstracting away from change caused by variation in the relative price of input and output. Hence, the analyst can separate variances due to relative price changes from those due to changes in production efficiency resulted from a change in skills, effort, or innovation. Productivity measures are more objective because both the evaluator and the performer can agree on them. That is due to the standardization of its components (e.g., feddan, hectares, Kantar, Tons, Kilos).

The productivity information discussion shows how it would enhance the various aspects of planning and control systems. Namely, it is used for recording, budgeting, performance, evaluation, break-even analysis, and policy evaluation. Therefore, it could be concluded that productivity measures can be adopted at a more macro level to the firm rather than just at the production floor and at the more macro level (i.e., Public Policy Level), Abdalla (1999).

The study also shows how the integration of productivity and activity-based management (ABM) and accounting concepts and their joint and simultaneous consideration would enhance the power of integrated frameworks.

Since it helps to balance and to optimize organizational efficiency attributes (i.e., use quality inputs(seeds, fertilizers, apply advanced technology) and the effectiveness attributes (i.e., performance objectives, work setting, tasks, and operations), it could be argued that productivity information support is employing, simultaneously, the six sigma and lean manufacturing methodologies.

Building on, McGree (2006), Abdalla (1999), Hayzen and Reeve (2000), Etemadi (2001), Blocher et al. (2008) and others views and insights and acknowledging the central position that productivity is occupying in the hierarchy of organizational performance constructs, this study calls for developing a new paradigm or breed of professionals around the productivity. Such a paradigm or breed needs to include multi-disciplinary professions with broad knowledge and skills in accounting, economics, mathematics, statistics, operations research, engineering, agriculture, environment, and business management.

The framework developed in this study represents the starting point to establish a comprehensive and integrated organizational performance and reporting system that simultaneously considers productivity and other performance constructs. However, further studies might be conducted to reflect on the possibility of introducing a new concept through integrating productivity and activity-based management, which would enrich the integrated and sustainability reporting body of knowledge.

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