

Technical Report for the Instituto Tecnológico Superior de la Región Sierra in productivity matters

Informe técnico del Instituto Tecnológico Superior de la Región Sierra en Materia de Productividad

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Abstract

Measuring and improving productivity in today's organizations is of utmost importance, since the context in which we live is very dynamic and organizations are facing accelerated changes. It requires responsiveness to adapt to the demands of the markets and to be competitive. For this reason, companies must implement philosophies that allow continuous study with a comprehensive approach using techniques for measuring productivity. Such is the case of the present research where the performance of public higher education institutions is analyzed, considering the Tecnológico Nacional de México Campus of the Sierra Region, through the promotion of a technical report, where the instrument "Integral Productivity Evaluation Technique (TIEP), which consists of ten elements that favor productivity including context variables, is developed. The implementation of this tool allows the development of an integral diagnosis that is the basis for the proposal of a productivity improvement model.

Integral approach, Productivity improvement, TECNM Campus Sierra Region

Resumen

Medir y mejorar la productividad en las organizaciones actuales es de suma importancia, ya que el contexto en el que vivimos es muy dinámico y las organizaciones se enfrentan a cambios acelerados. Requiere capacidad de respuesta para adaptarse a las demandas de los mercados y ser competitivo. Por ello, las empresas deben implementar filosofías que permitan un estudio continuo con un enfoque integral utilizando técnicas de medición de la productividad. Tal es el caso de la presente investigación donde se analiza el desempeño de las instituciones públicas de educación superior, considerando el Campus del Tecnológico Nacional de México de la Región Sierra, a través de la promoción de un informe técnico, donde el instrumento "Técnica de Evaluación Integral de la Productividad (TIEP) , que consta de diez elementos que favorecen la productividad incluyendo variables de contexto, la implementación de esta herramienta permite desarrollar un diagnóstico integral que es la base para la propuesta de un modelo de mejora de la productividad.

Enfoque integral, Mejora de la productividad, TECNM Campus Sierra Regions

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Introduction

The importance of measuring and improving productivity lies in something continuous, that is to say, something that has no end, which is why it is necessary to create a culture that leads to a constant evolution in organizations, since it is considered as an antecedent of creativity and innovation, which gives a guideline to the competitiveness of companies.

Similarly, measurement is a metric that seeks to measure the efficient performance of processes looking for results that allow identifying areas for improvement, therefore, productivity is a key factor to identify certain deficiencies in companies. In order for this to be done, a performance measurement system is required to quantify the vital signs of the organization and processes.

Likewise, the Integrated Productivity Evaluation Technique (TIEP), (Dantés, 2021), is an instrument that has its foundations in ten fundamental elements for any organization, since it allows to identify not only tangible aspects, but also intangible aspects, which are those where knowledge and attitudes to do things are linked, these aspects are important for the measurement and improvement of productivity. In addition, another significant aspect is that it allows the analysis of external and internal contexts, since they identify the behavior of the variables of the context. This is why its implementation requires a systemic and integral approach.

The research work is focused on analyzing the performance of the Instituto Tecnológico de la Región Sierra, considering as a first mechanism the measurement to know how the institution is working, which will help us to show through the application of an integral instrument of productivity evaluation the detection of needs or circumstances that are impeding the quality of service, generating an integral diagnosis that will be the basis for the proposal of a productivity improvement model, to contribute to a better functioning of the areas and thus increase productivity. It is important to point out that there is no record or history of any similar study having been carried out in this institution. Therefore, there is an area of opportunity for the results obtained to contribute to improved performance.

Having said the above, the general objective is to analyze productivity in higher education in order to propose a productivity improvement model.

Description of the method

The instrument, Integral Evaluation Technique for Productivity (TIEP), is structured by ten elements, priorities for any organization, these elements have the purpose of knowing tangible and intangible aspects, fundamental to be able to carry out the measurement. These elements are listed below:

No.	Elements
1	Conceptual approach to the company
2	Process knowledge
3	Social scope of the organization
4	Planning management
5	Management participation
6	Organizational creativity and innovation
7	Knowledge of the client(s)
8	Technological development
9	Macroeconomic knowledge
10	Integral development of human resources

Table 1 Elements that favor productivity

Source: Authors' elaboration (2021)

For the application of the tool it is necessary for the evaluator to have a systemic and integral approach, as well as knowledge of the external and internal context of the organization, in order to be able to carry out the study according to the profile of the basic elements of productivity.

Another essential aspect for the execution of the instrument is the broad understanding of the context variables, in order to identify the participation of each one of them in the organization. The context variables that make up the instrument are:

No.	Variables
1	Economics
2	Politics
3	Environmental
4	Cultural
5	Technological
6	Social

Table 2 Context variables

Source: Authors' elaboration (2021)

Finally, according to the scenario studied, the evaluator will examine all the results obtained from the elements that make up the technique used and analyze which variables are impacting the company.

Analysis based on the method

In order to carry out the study and apply the TIEP, the organizational structure of the institute was first identified through the organizational chart, analyzing and selecting the areas with the highest hierarchical levels, since they are the ones that should have a systemic approach to the organization. The departments selected were: *the directorate of planning and liaison, the sub-directorate of liaison, the sub-directorate of planning and the sub-directorate of administrative services*. Subsequently, the representatives of each area were interviewed.

To carry out the comprehensive evaluation, the quantitative evaluation criterion was established by assigning a score from 1 to 10 according to the profile and knowledge of the evaluated element with a weighting in relation to the weight and degree of importance of the context variable $\sum P = 1$.

For the development of the study, four instruments were applied, that is, one instrument for each department. The following is an example of the instrument applied to the liaison department.

Element	TIEP (Integral Productivity Evaluation Technique)										W/S	W/C		
	Economic variable		Political variable		Environmental variable		Cultural variable		Technological variable				Social variable	
	W	E	W	E	W	E	W	E	W	E			W	E
1. Conceptual approach to the company	0.1	9	0.11	8	0.11	8.5	0.12	8	0.04	8	0.12	8.5	8.33	0.85
2. Process knowledge	0.1	9	0.1	9	0.14	8	0.1	8.5	0.1	8	0.15	9	8.58	0.99
3. Social scope of the organization	0.11	9	0.13	8.5	0.1	8.5	0.1	8	0.06	8	0.15	8.5	8.42	0.92
4. Planning management	0.12	8	0.09	8	0.1	8	0.05	8	0.1	8	0.12	8	8.00	0.77
5. Management participation	0.13	8.5	0.13	8.5	0.1	8.5	0.17	8	0.12	8.5	0.08	8	8.33	1.01
6. Organizational creativity and innovation	0.12	8	0.08	8	0.08	8	0.12	7	0.16	7	0.05	8	7.67	0.79
7. Knowledge of the clients	0.05	8	0.08	8.5	0.06	8.5	0.09	8.5	0.07	8	0.1	9	8.42	0.64
8. Technological development	0.06	7	0.08	7	0.12	7	0.1	7	0.14	7	0.08	7	7.00	0.68
9. Macroeconomic knowledge	0.15	7	0.11	7	0.1	7	0.07	7	0.11	7	0.09	7	7.00	0.74
10. Integral development of human resources	0.06	8	0.09	8.5	0.09	8.5	0.08	8.5	0.08	8	0.05	8.5	8.33	0.63
	1	8.15	1	8.1	1	8.05	1	7.85	1	7.75	1	8.15		

W = Weighting $\sum P = 1$
 E = Quantitative Evaluation Range E = 1 - 10

Figure 1 Example, application of the instrument to the liaison department
 Source: (Dantes, 2021).

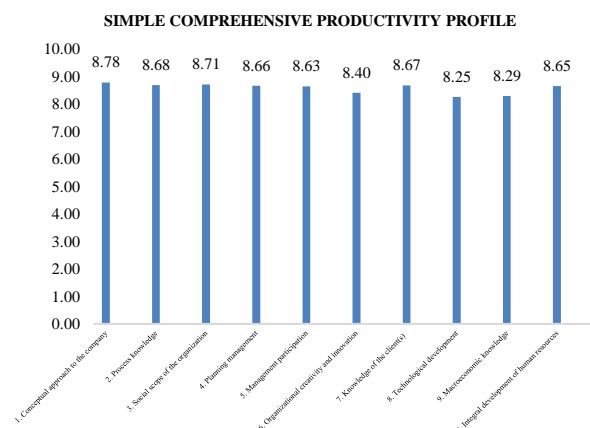
Results

After the evaluations, simple and composite averages were obtained for each department, these being the basis for the design of the institute's comprehensive productivity profiles. The results with a low impact of the integral profile of the departments by simple averages were as follows:

Elements	Simple integral profile	Evaluation range for elements
Technological Development	8.25	1 - 10
Macroeconomic knowledge	8.29	
Organizational creativity and innovation	8.40	

Table 3 Low results of simple integral profile
 Source: Authors' elaboration, (2021)

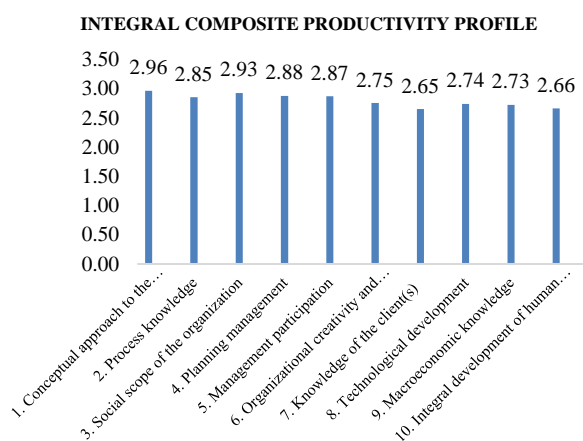
In relation to the integral graph by simple averages of the evaluated areas of the institute, it is possible to observe the general behavior for each element in correlation to the departments of the "planning and liaison directorate, liaison sub-directorate, planning sub-directorate and administrative services sub-directorate". The first thing that can be diagnosed is that they know considerably what the systemic approach is and that they work with all the basic elements of productivity. However, the element that has a slight impact on the profile of the areas evaluated is technological development and then macroeconomic knowledge; therefore, it is recommended that these elements be reinforced.



Graphic 1 Integral Profile of the departments evaluated, by simple averages
 Source: Contribution, simple integral profile, 4 persons interviewed

All the observations made above are concluded with the graph of the integral profile of productivity by composite averages, since the average obtained is the quantitative evaluation for each of the qualified departments, being averaged together with the weightings of each of the elements in relation to the variables of the context. Now, the graph expresses numerically how the variables affect the elements that strengthen productivity, which is why it is so important to analyze it, since it is the basis for the proposal of the improvement model.

Therefore, the knowledge of customers and the integral development of human resources are the lowest in the results obtained, considering the degree of importance that the political, social and cultural variables have on the elements, it can also be observed that the elements, macroeconomic knowledge, technological development and organizational creativity and innovation are being impacted, so it is important to consider them, therefore the elements with higher weights can be observed, being those with the highest scores, the social scope of the organization and the conceptual approach of the company.



Graphic 2 Integral profile of the departments evaluated, by composite averages

Source: Input, composite comprehensive profile 4 persons interviewed, 2021

Proposals

One of the fundamental objectives of any organization is to provide resources through goods or services, for this reason, it is important that it satisfies the needs and expectations of its customers. Goods or services are the result of a set of activities, which must be mutually interconnected with the elements that transform inputs into outputs, which is the resource with the attributes required by the market.

Therefore, the purpose of this study is to analyze the behavior of the organization using tools that give results to diagnose and propose improvements in its productivity.

- a) Implement the productivity improvement model.
- b) Sensitize the personnel to promote an environment of organizational culture.
- c) Sensitize all human resources regarding the knowledge of the institutional philosophy, mission, vision, values, purpose of the institution, why it is important to know it and above all to comply with it.
- d) Promote the development of the integral approach and the work through identified processes, make them known and look for those responsible, and monitor through the evaluation for the identification of risk, measurement systems should be implemented.
- e) Create systemic thinking in all the human resources of the institute, seeing it as a system and not working in isolation.
- f) Observe and analyze the variables of the economic, political, social, cultural, technological and environmental context periodically as they impact the institution.
- g) Seek links with society.
- h) Promote projects for organizational creativity and innovation through proposals for improvement in administrative and educational processes.
- i) Promote projects for technological development. As well as, to update the technology in laboratories and training of the same to the personnel.
- j) Promote transversal communication between departments, that is, not only with the hierarchically dependent units, but also with those that might not seem to be related, this promotes the organizational social environment.
- k) Promote training according to profiles and positions in all units of the institute.

Model for productivity improvement

Models are graphic representations that allow showing elements and their interactions among them, with the purpose of expressing ideas or critical thoughts.

The productivity improvement model expresses the results and analysis of the study conducted for the Tecnológico Superior de la Región Sierra. The information and design is the researcher's perception, since, derived from the studies obtained and the results captured in the graphs were the basis for this model. It should be noted that the structure is circular with arrows in one direction and others that indicate reciprocity between the external and internal contexts of the system.

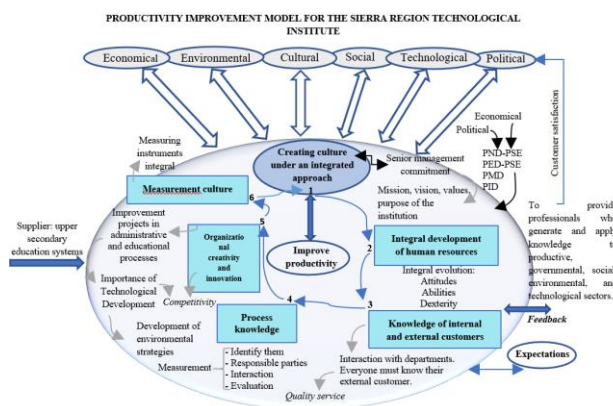


Figure 2 Productivity Improvement Model
Source: Researcher's perception, 2021

The proposal of the present Model for the Improvement of Productivity for the Instituto Tecnológico Superior de la Región Sierra, its main purpose is to create the culture of the integral approach according to the following structure, first of all, it has to keep in mind that it is due to the demands and needs of the variables of the cultural, social, political, economic, technological, and environmental context, which demand a human resource that has the specific and appropriate competencies for each requirement. Therefore, the institute must provide a main actor that generates and applies knowledge to the demanding sectors and conforms to market expectations. It is important to achieve successful results, i.e. outputs, and for this reason an input element is required, in this case there is a main provider, which is the higher education system.

Now, it is significant to mention that the Institute is governed by objectives and guidelines with which it also has a commitment to assume, and this is, through the federal, state and municipal development plans, where there are educational sectorial programs, under which an institutional development plan is formulated, since they will be a key factor for the promotion and development of the institution. In the center of the model, which is the starting point for the improvement of productivity, there is a two-way arrow indicating reciprocity, which will be reflected with element one, which is the culture under the integral approach, as well as the effect with the variables of the context. For the beginning of the approach, it is necessary and very important the commitment of the top management, since one of the first actions will be the review of the mission, vision, values and purpose of the institution, to identify how attached they are working to the institutional philosophies and to implement tactics for all staff to know and practice them. The second approach requires an integral development of human resources in the search for continuous improvement of attitudes, skills and abilities. This will allow them to identify their internal and external customers and lead them to provide a quality service. The fourth element is fundamental, since it can be said that they work with an integral approach if they have identified their processes, if there are people responsible for them and above all if they are evaluated to identify risks and seek better results, it is important that they implement integral measurement systems for continuous monitoring. The fifth element is organizational creativity and innovation, one of the strategies is the proposal of projects to improve administrative and educational processes, which will be the door to technological development, and alternatives for the environment, this will be key to the competitiveness of the institute. The sixth element is to seek a culture of measurement by means of instruments that allow the organization to be measured integrally, that is, tangibly and intangibly, and finally, the institution must satisfy the needs of the client.

Conclusions

It is essential for organizations to be attentive to the dynamics of the world, since very rapid changes are being observed and, therefore, they must adapt to improve their external and internal context. Consequently, today the variables of the context have become very vulnerable to radical changes, as they demand better goods and services, and above all attributes that can have an impact and benefit them.

For this reason, a key factor in companies is their human capital, so the concern should be its integral development, since it depends on it that productivity achieves satisfactory results, therefore, it is not only looking for the tangible, but also the intangible, as could be analyzed in the application of the instrument, the ten elements that strengthen productivity, are very strategic, as they give the guideline to evaluate the organization in a comprehensive manner and have results to know which variables affect more on the elements.

Within the results obtained for the institution, the elements that have the greatest impact are the knowledge of its clients, in this aspect influences the type of service offered, which is the formation of human capital, for this reason it is very important that the sum of all the elements should focus on meeting all the attributes for the client, another element that impacts is the integral development of human resources, this means that it is essential that people develop competencies of attitudes, skills and abilities, which will help to an integral evolution. Other significant elements are technological development. It is worth mentioning that the institution's purpose includes promoting technological education and conducting scientific and technological research in the entity, which is why the institution should not lose sight of these approaches, as they are important for its clients. The last element that has an impact is macroeconomic knowledge, this element is very important for the high hierarchical levels of the institute, since they must be well informed about the political and economic changes at national and global level, the institution depends on the public treasury, so it must pay special attention to economic changes that affect the country. Finally, the elements with the highest percentage are fundamental to promote the elements mentioned above.

In conclusion, it is recommended that the institution implement the productivity improvement model, since it will help to find areas for improvement and strengthen the institution, it is urgent to analyze how the variables of the context affect the entire institution and to know the reciprocity that exists between them.

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