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Personal Evaluation in Job Search Considering: Vocation, Responsibility and Self-Confidence by Means Of Six Sigma and A Geometric Multivariate Capability Indicator

Tomás José Fontalvo Herrera [1], Fabio Mejía Zambrano [2], Ana Gabriela Banquez Maturana[3]

Abstract

The objective of this research is to evaluate in a technical way the job search performance during the Covid-19 pandemic in Cartagena (Colombia), considering vocation, responsibility and confidence of unemployed people, using Six Sigma and a geometric multivariate capability indicator. As a theoretical foundation, the concepts of Six Sigma metrics, geometric multivariate capability indicator, job search during the COVID-19 pandemic and professional vocation were integrated. As methodology, the study was approached from a positivist-qualitative conception that implied: i) identification of the quality dimensions of the process; ii) approach of the data collection instrument; iii) implementation of the Six Sigma metrics; iv) valuation of the geometric multivariate capability indicator; and, v) rational analysis of the results. As a finding, the performance of the job search is good, having a geometric multivariate capability indicator at 0.67, which is within the range of $0{,}5 \leq MC_p < 0{,}75$.

Keywords: *Multivariate capacity indicator, job search, decision making, professional vocation, responsibility.*

Introduction

In December 2019, a new respiratory virus was warned in Wuhan, Hubei Province (China), named by previous research as coronavirus (Covid-19), which was established as severe acute respiratory syndrome 2 (SARS-COV-2), which generated the declaration of pandemic on March 12, 2020, by the World Health Organization (WHO), and with it the social isolation (Ciotti et al., 2020). To counteract the spread of Covid-19, different international organizations, together with the WHO, developed recommendations such as: constant hand washing, use of masks, avoiding touching the nose, mouth and eyes, social distancing and staying at home in case of feeling any symptoms. Additionally, restrictions such as total quarantines and curfews were implemented (Pérez, 2021). The application of these restrictive measures caused a change in social conditions, since it influenced the development of economic, social and cultural activities. One of the greatest impacts was reflected in the labor market, due to the massive destruction of employment, caused by partial and total closures of companies or organizations, in addition to the decision of employees to resign from their jobs, to safeguard themselves and their families (Priya et al., 2021). According to the International Labor Organization (2020), the sectors that were most affected by the restriction measures taken to prevent Covid-19 were hotels and restaurants, commerce and manufacturing industry. Although in commerce, employment

[1] University of Cartagena
[2] University of Tolima
[3] University of Cartagena

would have been preserved in the sectors that remained in operation, such as those involved in the marketing of basic necessities, i.e. food, medicines, personal hygiene products, among others.

Likewise, the International Labor Organization indicates that around 114 million jobs were lost worldwide, which generated an increase of 33 million unemployed people. In relation to the destruction of employment in Latin America and the Caribbean, the Economic Commission for Latin America (2020) points out that in 2020, 16.2% of working hours were lost, corresponding to 39 million full-time jobs, which was reflected in the decrease in the employment rate by 6.3%, compared to the immediately preceding year, representing an amount of 28 million unemployed people. Regarding the labor market situation in Colombia, the Covid-19 pandemic caused one of the largest drops in the occupation rate, leaving with it a higher unemployment rate in cities such as Neiva with 26.1%, Ibagué with 25.6% and Cúcuta with 23.7%, while the cities that showed a lower unemployment rate were Barranquilla with 12.3%, Cartagena with 14.6% and Pasto with 16.7% (DANE, 2020). Because of this difficult situation facing the labor market, in which there have been a series of changes that welcome and take into account the organizations or companies to require for their work team, in turn considering what applicants are looking for and that should provide their workplace, this research becomes important to be able to understand from the point of view of labor demand, how people take the job search process according to their vocation, their responsibility and self-confidence, through the integrality of the Six Sigma metrics and a geometric multivariable capacity indicator, which allows to evaluate the performance of this process and to establish strategies for a recovery of the economy in Cartagena in the post-pandemic.

In relation to the exposed problematic and the described techniques, the following questions are considered as problems: How to identify the quality dimensions that allow the evaluation of the job search process in Cartagena considering the vocation, the responsibility and self-confidence of the unemployed, by means of a multivariate capacity indicator? How to propose the data collection instrument, how to implement the Six Sigma metrics, how to evaluate the geometric multivariate capability indicator, how to design the operation curves of the process under study, and how to rationally analyze the results? In accordance with the problem questions proposed above, the following specific objectives are proposed: (i) To identify the quality dimensions that allow evaluating the job search process in Cartagena considering the vocation, responsibility and self-confidence of the unemployed, by means of a multivariate capability indicator; (ii) To propose the data collection instrument; (iii) To implement the Six Sigma metrics; (iv) To value the geometric multivariate capability indicator; and, (v) To rationally analyze the results.

Literature Review

Six Sigma Metrics

Six Sigma metrics represent a continuous improvement strategy that evaluates the performance of processes with the purpose of optimizing them (Abbes, et al., 2022). This methodology relies on the meticulous analysis of data and metrics to mitigate variations in processes, improving their stability and identifying low yields (Deepa, 2021). In that sense, several authors explain how Six Sigma metrics impact the efficiency of processes in work areas that today work under the idea of industry 4.0 and ecological challenges, so as to increase the efficiency of procedures by employing these tools and identifying the barriers of their application (Kumar et al., 2021; Virmani et al., 2022). In addition, within different fields, the evaluation of the quality status, performance and behavior of relevant variables have been studied in order to reduce waste and defects that arise as a result of mismanagement, and through Six Sigma techniques by identifying the problems and

causes within the statistical study that yield low levels of quality (Maged et al.; 2019). Additionally, the implementation of this tool allows satisfying the needs of the main consumers (Shilpa et al., 2021).

On the other hand, in the area of human resources, the practice of Six Sigma has been so important that researches link the successful training processes to the development initiatives of the company through Six Sigma (Bagherian et al., 2022), so incorporating these methodologies makes possible a better analysis and development of studied components. Also, the coupling of Six Sigma with multivariate analysis has been applied in different industries with the purpose of enriching the treatment of data and obtaining a more rigorous result of performance evaluation in order to take actions for the continuous improvement or optimization of the service, product or variables (Echavez et al., 2021). In this line, the authors Banquez and Fontalvo (2023) in their study implement the Six Sigma metrics to evaluate the performance of service provision in a public company allowing its control and continuous improvement. Likewise, Fontalvo and Banquez (2023) carried out a comparative analysis of multivariate capability indicators supported by Six Sigma metrics to determine the best performance between two production systems.

Multivariate capability indicator

Multivariate capability indicators constitute a fundamental technique in the evaluation of the performance of production and service systems, by providing quantitative measurements of the potential of their processes while simultaneously considering multiple interrelated quality characteristics Rahmer et al. (2020). In this sense, the analysis of these indicators is crucial for business decision making and is based on the observation of historical performance to discern the significance and ranking of selected variables (Bowen & Fosado, 2020). One approach focuses on the relationship between the volume of the tolerance region and the volume of the process region, while another uses principal component analysis (Hadian & Rahimifard, 2019). In addition, the application of indicators incorporating factor analysis is suggested, including the proportion of observations outside the specification margins and their variability in the long and short term. The results obtained indicate that the productive process analyzed does not marginally comply with the established technical specifications, indicating considerable room for improvement. In this context, it is proposed to monitor the characteristics v by applying the multivariate capability index (CMT), which provides a geometric mean of the conforming units in the evaluated processes. This approach, supported by the formulation presented by Fontalvo and Banquez (2023) not only facilitates the evaluation of process conformity, but also makes it possible to understand nonconformities that may impact customers, using Six Sigma metrics as an analysis tool (See equation 1).

$$SM_K^T = \frac{1}{3}\emptyset^{-1}\left\{\frac{(\prod_j^v 1=1P_j)^{\frac{1}{k}}+1}{2}\right\} \quad (1)$$

Job Search During the COVID-19 Pandemic

The prevention measures implemented in response to the Covid-19 pandemic have had a significant impact globally, affecting various areas, with the labor market being one of the most affected Isa et al. (2020). During this period, there was evidence of a decrease in the availability of vacancies. At the same time, unemployed people refrained from actively participating in the job search, due to the uncertainty generated by the spread of the virus (Bacher & Tamesberger, 2021). The decline in active participation and changes in job search behavior raise new questions regarding the policies to be implemented during the Covid-19 crisis in the labor market, as noted by Hensvik et al. (2021). In response, Jang & Lee (2020) reinforce this idea by stating that this critical moment calls for the formulation of strategies to adapt to the present changes, furthermore improving the

efficiency of labor market policies requires considering the new perception of individuals when starting the job search process.

In line with this perspective, Isa et al. (2020) point out that the current trend in labor supply focuses on the skills and know-how of professionals. Therefore, they propose the implementation of university curricula aimed at the development of these skills. Finally, Al-Jarf (2022) suggests that universities should offer specific courses for the development of interpersonal skills and training in job search techniques, adapted to the new work environment. These measures are crucial to prepare individuals for the emerging challenges in the labor market in times of health crisis.

Professional vocation and confidence in the search for employment.

Professional vocation is understood as the preference of people towards a specific profession, which involves their aptitudes, tastes and interests, defined by the personality of individuals and which facilitates the choice of their profession in adulthood (Arreola et al., 2018). According to Marian & Budeanu (2019), professional vocation is related to people's motivation in the work environment, to efficiency in the workplace and personal satisfaction, since the use of people's innate abilities is relevant for the development of work-related activities, i.e. they facilitate people's performance in the professional environment, which reflects in employees an emotion of happiness. Considering that people's lives are composed of a high percentage of time at work, it is essential to understand the role played by the formation of a concrete professional identity, as it leads to the change of vision that employment is more than just a job (Chan, 2019), leading to the realization of it as a form of vocation, which creates an appreciation what is done, which transforms the behavior of employees by reducing illness and absenteeism (Ejebu & Skåtun, 2018). Thus, it can be noted that career vocation is of vital importance for understanding meaningful work, well-being, job satisfaction and engagement of people in the labor market (Ronkainen et al., 2018). The above, leads to the theory of Pesch et al. (2018), which exposes that job search readiness, as a means for decision making can be effective, because it involves the interests and job satisfaction of applicants. Similarly, Georgiou et al. (2019), state that the search for information of applicants is a positive resource, since it facilitates the job search process, in addition to increasing the chances of success. On the other hand, another relevant factor when looking for a job is self-confidence, since it allows confidence in our abilities and thus enables effective decision making (Guerra, 2019). For their part, Abdullah et al. (2018) argue that there is a direct relationship between decision-making, self-knowledge and professional research, so it is essential that professionals evaluate their self-confidence, self-knowledge and professional inclination in order to maintain a positive attitude that motivates them, since the job search process may require constant dedication, and skills such as self-confidence can be a determining factor in achieving employment.

Method

This research was approached from a positivist-qualitative conception that involved: i) identification of the quality dimensions that allow evaluating the job search process in Cartagena considering the vocation, responsibility and self-confidence of the unemployed, through a multivariate capability indicator; ii) design of the data collection instrument; iii) implementation of the Six Sigma metric; iv) evaluation of the multivariate geometric capability indicator; and, vi) rational analysis of the results.

Table 1. Description of the study dimensions. Own elaboration.

Dimension	Description of the dimensions to be evaluated
Forward thinking	The percentage of people who consider what their future will be like when looking for a job is measured.
Preparation for the future	The percentage of people who prepare for the future in their job search is measured.
Awareness of educational and vocational options	The percentage of people who have become aware of the educational and vocational choices they must make in their search for employment is measured.
Own decisions	The percentage of people who make decisions on their own in the search for employment is measured.
Responsibility	The percentage of people responsible for job search actions is measured.
Self-confidence	The percentage of people who are self-confident in their job search is measured.

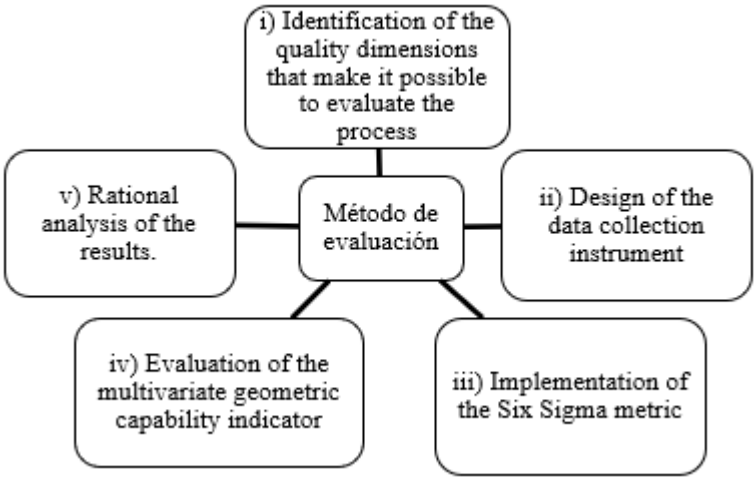

Figure 1. Methodology for evaluating the quality dimensions of the job search process. Own elaboration.

Figure 1 shows the different activities associated with the methodology proposed to assess the job search performance of unemployed people in the context under study, which allowed a multivariate evaluation of the different dimensions established in this research. Equations (2) through (5) establish the quantitative criteria related to the measurement of the six sigma indicators of the dimensions established for this study.

$$\text{DPMO} = \frac{\text{n}}{\text{U x O}} \text{ x } 1.000.000 \quad (2)$$

$$\text{Y} = (1 - \frac{\text{n}}{\text{U x O}}) \quad (3)$$

$$\text{Z} = \text{f(DPMO)} \quad (4)$$

$$\text{Z} = \sqrt{29{,}3 - 2{,}221 * \ln(\text{DPMO})} + 0{,}8406 \quad (5)$$

Results

Forward thinking

Table 2. Evaluation of the future thinking dimension. Own elaboration.

Sample	U	n	DPMO	Z	Y	Y Average
1	20	1	50000	3,15	95%	95%
2	20	0	0	6,00	100%	
3	20	0	0	6,00	100%	
4	20	1	50000	3,15	95%	
5	20	0	0	6,00	100%	
6	20	3	150000	2,54	85%	
7	20	1	50000	3,15	95%	
8	20	1	50000	3,15	95%	
9	20	1	50000	3,15	95%	
10	20	0	0	6,00	100%	
11	20	1	50000	3,15	95%	
12	20	3	150000	2,54	85%	
13	20	1	50000	3,15	95%	
14	20	0	0	6,00	100%	
15	20	1	50000	3,15	95%	
16	20	0	0	6,00	100%	
17	20	1	50000	3,15	95%	
18	20	0	0	6,00	100%	
19	20	1	50000	3,15	95%	
20	20	2	100000	2,79	90%	
21	20	1	50000	3,15	95%	

A detailed analysis of the future thinking dimension shows that the average performance is a high 95%, emphasizing the relevance of this factor when looking for work in the midst of the covid-19 pandemic. Likewise, it is observed that when reaching a sigma quality level (Z) at 6, there are no defects per million opportunities (DPMO), while a Z at 3.15 generates 50000 DPMO, as well as a Z at 2.79 significantly increases the DPMO that oscillate between 0 and 150,000.

Preparation for the future

Table 3. Evaluation of the future preparedness dimension. Own elaboration.

Sample	u	n	DPMO	Z	Y	Y Average
1	20	1	50000	3,15	95%	
2	20	0	0	6,00	100%	
3	20	0	0	6,00	100%	

4	20	3	150000	2,54	85%	
5	20	1	50000	3,15	95%	
6	20	3	150000	2,54	85%	
7	20	1	50000	3,15	95%	
8	20	0	0	6,00	100%	
9	20	0	0	6,00	100%	
10	20	1	50000	3,15	95%	
11	20	2	100000	2,79	90%	
12	20	1	50000	3,15	95%	95%
13	20	1	50000	3,15	95%	
14	20	3	150000	2,54	85%	
15	20	0	0	6,00	100%	
16	20	2	100000	2,79	90%	
17	20	0	0	6,00	100%	
18	20	0	0	6,00	100%	
19	20	2	100000	2,79	90%	
20	20	0	0	6,00	100%	

As shown in Table 3, the future readiness dimension presents a high average performance of 95%, highlighting the impact of this factor on job search, as well as the fact that an increase in the level of sigma quality (Z), which ranges between 2.54 and 6, manages to completely reduce the defcets per million opportunities from 150,000 to 0.

Awareness of educational and vocational options

Table 4. Assessment of the dimension of awareness of educational and vocational options. Own elaboration.

Sample	u	n	DPMO	Z	Y	Y Average
1	20	1	50000	3,16	95%	
2	20	0	0	6,00	100%	
3	20	0	0	6,00	100%	
4	20	0	0	6,00	100%	
5	20	2	100000	2,80	90%	
6	20	3	150000	2,55	85%	
7	20	1	50000	3,16	95%	96%
8	20	1	50000	3,16	95%	
9	20	0	0	6,00	100%	
10	20	0	0	6,00	100%	
11	20	1	50000	3,16	95%	
12	20	0	0	6,00	100%	

13	20	0	0	6,00	100%	
14	20	2	100000	2,80	90%	
15	20	0	0	6,00	100%	
16	20	1	50000	3,16	95%	
17	20	0	0	6,00	100%	
18	20	1	50000	3,16	95%	
19	20	5	250000	2,18	75%	
20	20	0	0	6,00	100%	

Based on Table 4, it can be affirmed that the average performance of the vocational dimension was excellent at 96%, highlighting its importance in the job search.

Own decisions

Table 5. Evaluation of the own decisions dimension. Own elaboration.

Sample	u	n	DPMO	Z	Y	Y Average
1	20	1	50000	3,15	95%	
2	20	1	50000	3,15	95%	
3	20	1	50000	3,15	95%	
4	20	3	150000	2,54	85%	
5	20	0	0	6,00	100%	
6	20	2	100000	2,79	90%	
7	20	1	50000	3,15	95%	
8	20	3	150000	2,54	85%	
9	20	0	0	6,00	100%	
10	20	0	0	6,00	100%	
11	20	1	50000	3,15	95%	
12	20	2	100000	2,79	90%	
13	20	1	50000	3,15	95%	
14	20	1	50000	3,15	95%	94%
15	20	1	50000	3,15	95%	
16	20	0	0	6,00	100%	
17	20	0	0	6,00	100%	
18	20	2	100000	2,79	90%	
19	20	2	100000	2,79	90%	

From the analysis of Table 5, it can be inferred that self-determination is a determining factor when looking for a job, with an average performance of 94%.

Responsibility

Table 6. Evaluation of the dimension of responsibility. Own elaboration.

Sample	u	N	DPMO	Z	Y	Y Average
1	20	1	50000	3,15	95%	97%
2	20	0	0	6,00	100%	
3	20	0	0	6,00	100%	
4	20	0	0	6,00	100%	
5	20	0	0	6,00	100%	
6	20	3	150000	2,54	85%	
7	20	0	0	6,00	100%	
8	20	0	0	6,00	100%	
9	20	0	0	6,00	100%	
10	20	0	0	6,00	100%	
11	20	1	50000	3,15	95%	
12	20	1	50000	3,15	95%	
13	20	1	50000	3,15	95%	
14	20	0	0	6,00	100%	
15	20	2	100000	2,79	90%	
16	20	0	0	6,00	100%	
17	20	0	0	6,00	100%	
18	20	0	0	6,00	100%	
19	20	2	100000	2,79	90%	
20	20	2	100000	2,79	90%	
21	20	1	50000	3,15	95%	

As can be seen in Table 6, the relevance of the responsibility of the unemployed when looking for work is quite significant with an average performance at 97%.

Self-confidence

Table 7. Evaluation of the self-confidence dimension. Own elaboration.

Sample	U	n	DPMO	Z	Y	Y Average
1	20	0	0	6,00	100%	
2	20	0	0	6,00	100%	
3	20	0	0	6,00	100%	
4	20	0	0	6,00	100%	
5	20	1	50000	3,15	95%	
6	20	4	200000	2,34	80%	

7	20	0	0	6,00	100%	
8	20	1	50000	3,15	95%	97%
9	20	0	0	6,00	100%	
10	20	1	50000	3,15	95%	
11	20	0	0	6,00	100%	
12	20	0	0	6,00	100%	
13	20	0	0	6,00	100%	
14	20	1	50000	3,15	95%	
15	20	1	50000	3,15	95%	
16	20	1	50000	3,15	95%	
17	20	0	0	6,00	100%	
18	20	1	50000	3,15	95%	
19	20	2	100000	2,79	90%	

In detailing Table 7, it can be seen how self-confidence, with an average performance of 97%, highlights its importance when looking for a job.

Analisis comparativo de las metricas seis sigma

Based on the equations proposed in this research, periodic calculations were made, which were then holistically integrated through averages of these six sigma metrics, contextualizing and valuing all the dimensions Table 8.

Table 8. Comparative analysis of quality dimensions. Own elaboration.

Quality dimensions	DPMO Average	Z Average	YAverage
Responsibility	33333	4,70	97%
Self-confidence	34211	4,59	97%
Awareness of educational and vocational options	45000	4,46	96%
Preparation for the future	52500	4,15	95%
Forward thinking	45238	4,03	95%
Own decisions	57895	3,76	94%

The results obtained in Table 8 show the performance behavior of the study dimensions evaluated, from which it can be inferred that the best performance was reflected in the study dimensions responsibility and self-confidence in the job search process with an average performance (Y) of 97% in both dimensions, an average sigma level (Z) of 4.70 and 4.59, and an average DPMO of 33333 and 34211 respectively, followed by the study dimension awareness of educational and vocational options with an average performance (Y) of 96%, an average sigma level (Z) of 4.46 and an average DPMO of 45000, then the study dimensions preparation for the future and thinking about the future, with an average performance (Y) of 95% in both dimensions, an average sigma level (Z) of 4.15 and 4.03 and an average DPMO of 52500 and 45238 respectively. Lastly, the dimension of self-determination study is located with an average performance (Y) of 94%, a sigma level (Z) of 3.76 and an average DPMO of 57895. From the data analyzed it can be deduced that

the study dimensions considered most important in the job search process are responsibility, self-confidence (a) and awareness of educational and vocational options with sigma levels above 3 and performance above 95%.

Evaluation of the multivariate geometric indicator

With the averages of the performance metrics and equation (1) defined above, the geometric multivariate indicator is calculated.

$$\mathrm{MC_p} = \frac{1}{3}\emptyset^{-1}\left\{\frac{[0{,}97\times\ldots\times 0{,}94]^{1/6}+1}{2}\right\}=0{,}67$$

According to the following analysis criteria to evaluate the performance of the geometric multivariate indicator:

1. If $\mathrm{MC_p} = < 0{,}5$ performance is poor.
2. If $0{,}5 \leq \mathrm{MC_p} < 0{,}75$ performance is good.
3. If $\mathrm{MC_p} \geq 0{,}75$ performance is excellent.

It can be deduced that the job search process considering the dimensions: responsibility, self-confidence, awareness of educational and vocational options, preparation for the future, future thinking and own decisions, presents a good performance, since an integral performance of 0.67 of the multivariate geometric statistical indicator was obtained. It can be asserted that this performance of 0.67 is good and holistically assesses the job search process of the unemployed, considering the dimensions of study.

Discussion

In relation to what was analyzed in this research, other authors highlight self-confidence as one of the primordial skills to be able to initiate the job search process, by virtue of allowing to know the skills, knowledge and attitudes, facing with confidence the job offers present in the labor market, in addition, it facilitates decision making based on the confidence of the skills (Armour & Howes, 2019), which contributes to a conviction in the search, of a proactive and motivating behavior, likewise, it is considered fundamental to succeed in the acquisition of the job (Klehe & Hooft, 2018). In the same line, Fonseca et al. (2019), points to responsibility as a vital factor for making decisions focused on solving problems, understanding the conditions in the social context, as presented in this study.

While authors such as Guerra (2019) considers as one of the most relevant aspects of self-decision making for job search, since this involves elements such as assertive communication, good relationship management, understanding of emotions, which leads to favor decision making in the difficulties that arise in daily life. Now, from an applicative approach, several researchers (Fontalvo et al, 2022) have applied statistical techniques of multivariate analysis as in the present study, to recognize the performance and significance of the variables studied in order to enhance the optimization and use of the same, such as the continuous improvement of those components that show a percentage below the level of performance in different areas, Therefore, this model with multivariate statistical rigor to measure the job search during the pandemic considering the components studied, makes it possible to understand the changes perceived at the moment of integrating into the labor market field for the job search, understanding from the subjective space of the applicants the factors that affect the determination of attainment and scope of employability. Finally, within other contexts (Bowen & Fosado, 2020; Fontalvo et al., 2022), the proposals of statistical multivariate analysis together with other measures acquire a value and points of view that encourage the adaptation of multivariate statistical quality tools in the aspects involved in the job search.

Conclusion

This research generates as a theoretical contribution the articulation of concepts related to job search, professional vocation, self-confidence for decision making, future preparation and responsibility in the job search process, combined with the concepts of metrics and indicators of multivariate statistical control considering the dimensions: responsibility, self-confidence, awareness of educational and vocational options, preparation for the future, future thinking and own decisions, to quantitatively evaluate the job search during the Covid-19 pandemic.

As a methodological contribution, a model is presented to assess the dimensions: Responsibility, self-confidence, awareness of educational and vocational options, preparation for the future, thinking for the future, own decisions, in a global way, which relates periodically, systematically, sequentially and complementarily, univariate and multivariate statistical control criteria.

As a practical and operative contribution, this research allowed a punctual and integral analysis of the dimensions involved in the job search, it also made it possible to measure the performance of all the dimensions holistically from the point of view of the demand and how people take the job search process according to their vocation, their future, their responsibility and self-confidence.

As future research, the scientific, academic and/or business community is invited to replicate the proposed method, since it is effective in the evaluation of processes and in the generation of statistical control of systems. Likewise, it has applicability in various fields of study.

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