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Effect of Employee Dimension

Management of Business Entities

Highlights

Banks and Insurance Companies

Research on Artificial Intelligence

Discovering Thoughts, Inventing Future

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Effect of Employee Dimension of Corporate Social Responsibility on Financial Performance of Listed Consumer Goods Companies in Nigeria

By Prof. Ekoja Benjamin Ekoja, Dr. Saratu L. Jim-Suleiman, Alphonsius Dzeawuni Wirnkar & Aminu U. Yuguda
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Abstract- Despite laudable programs by the Nigerian government and policymakers, the consumer goods sector in Nigeria continues to experience declining financial performance. The research examined the effect of the contribution of the employee dimension of corporate social responsibility on the financial performance of listed consumer goods companies in Nigeria. Descriptive and causal research designs were found appropriate for the study. The secondary source of data collection via panel data was used. Data collection method was corporate responsibility to employee checklist and by extraction from annual reports and accounts of listed consumer goods companies in Nigeria. The inferential statistics of multiple regressions were employed to attain the research objective. The Python 3.8 and E views 10 were the statistical packages used in the study for data analysis. Findings showed a positive and significant effect of corporate responsibility on employees on the financial performance.

Keywords: corporate social responsibility, employees, financial performance, sequence charts, panel data regression analysis.

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Effect of Employee Dimension of Corporate Social Responsibility on Financial Performance of Listed Consumer Goods Companies in Nigeria

Prof. Ekoja Benjamin Ekoja [α], Dr. Saratu L. Jim-Suleiman [σ], Alphonsius Dzeawuni Wirnkar [ρ] & Aminu U. Yuguda [ω]

Abstract- Despite laudable programs by the Nigerian government and policymakers, the consumer goods sector in Nigeria continues to experience declining financial performance. The research examined the effect of the contribution of the employee dimension of corporate social responsibility on the financial performance of listed consumer goods companies in Nigeria. Descriptive and causal research designs were found appropriate for the study. The secondary source of data collection via panel data was used. Data collection method was corporate responsibility to employee checklist and by extraction from annual reports and accounts of listed consumer goods companies in Nigeria. The inferential statistics of multiple regressions were employed to attain the research objective. The Python 3.8 and E views 10 were the statistical packages used in the study for data analysis. Findings showed a positive and significant effect of corporate responsibility on employees on the financial performance. The paper recommends that the consumer goods companies should do more on the corporate responsibility on employees' relations to improve employees' motivation and corporate reputation and image that has the potential to improve financial performance.

Keywords: corporate social responsibility, employees, financial performance, sequence charts, panel data regression analysis.

I. Introduction

The contribution of consumer goods companies is recognized across the globe. In Nigeria, although the consumer goods sector is growing, it is, however, experiencing stiff and fierce competition (Klynveld, Peat, Marwick & Goerdeler (KPMG), 2014; and Osundina, 2014) as cited by Kabuoh, Moibi, Ademilua & Babajide, (2020). To bolster this position, Yinka (2019), Agboifor (2018) and Zwingina and Opusunju (2017) documented that the high rate of collapse of the manufacturing industry especially in consumer goods firms in Nigeria and continuous decline in financial performance (profitability) is attributed to factors such as increased competitive landscape from globalization, the decline in consumers' purchasing power due to the inaccessibility of the dollar in the economy and delayed policy response, which have resulted to weak macroeconomic conditions, weak labour market dynamics (high unemployment and underemployment), reduced disposable income and poor corporate performance. The comprehensive study by Kabuoh, Moibi, Ademilua & Babajide, (2020) covering 2010-2016 indicates that 46% of consumer goods companies reported dwindling performance showing the decline in the percentage increase in sales revenue and profitability. Consequently, this has posed a significant concern for the Nigerian government and policymakers.

To address the declining financial performance of the Nigerian consumer goods sector, the government, and public sector have evolved policies in an attempt to address identified loopholes and bolster the consumer goods sector. Interestingly, in 2017, the Nigerian government restricted or placed bans on certain imports destined for the country, especially in the food, drug, and cosmetics categories, which require some inspections, testing, and reviews, and clearance of imports is typically delayed to the detriment of the importer (International Trade Administration, 2020). Again, the International Trade Administration (2020) states that the Nigerian government has several import substitution policies which aim to increase local production over imports through subsidies, tariffs, quotas, and other trade barriers. Also, that the Federal Government of Nigeria has put in place directive that stipulates that preference be granted to domestic manufacturers in all government procurements. Moreover that at least 40% expenditure for the procurement of manufacturing items such as; uniforms and footwear, food and beverages, furniture and fittings, stationery, motor vehicles, pharmaceuticals, construction materials, and information technology shall

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be on locally manufactured goods. In December, 2019, the Nigerian senate passed an amendment to the Public Procurement Act of 2007 which would, among other changes, compel Federal Government Ministries, Departments and, Agencies to show a preference for local consumer goods and services. Interestingly, despite these laudable programs, the consumer goods sector in Nigeria continues to experience declining financial performance (Kabuoh, Moibi, Ademilua & Babajide, 2020 and Yinka, 2019)

The poor state of the financial growth of consumer goods companies in Nigeria has, therefore, attracted academic research interest to explore the factors responsible for this present situation. However, strategies, organizational structure and systems, social networks, stretched resources, and environmental factors (Baum, Locke & Smith, 2001; Baum &Locke, 2004; Jin & Kirsch, 2015 and Donthu & Gustafsson, 2020); (Freeman, 1984; Peace, 1982; in Hills & Jones, 1992) have been suggested as factors that account for the poor state of financial growth of consumer goods firms. Interestingly, the literature by Carrol and Sabana (2010) and Fu & Jia (2013) explain why the concept of corporate social responsibility (CSR) is crucial in explaining a firm's financial performance in the field of accounting.

Though corporate social responsibility has been researched as a precursor to financial performance, few studies have considered the effects of the dimensions of corporate social responsibility on financial performance. Interestingly, these dimensions, as advanced by The Sino-German Corporate Social Responsibility Project (SGCSRP), (2012) and Inoue and Lee (2011), are employee relations, product quality, community relations, environment, diversity, and human rights. There in annual reports and accounts, corporations in Nigeria have aligned and reported their social responsibility mostly about responding to the environment, energy use, employees, the community and, products and customers. Interestingly, there is now a demand for companies to be socially responsible for prevent of COVID-19 (Ikram, Zhang, Sroufe, and Ferasso, 2020).The current study evaluated the effect of the contribution of corporate social responsibility on employees resulting in motivation, and corporate reputation on financial performance (FP). Interestingly, a search in the current literature on this critical factor from the Nigerian context reveals a lack of studies on the effect of this dimension on corporate reputation on financial performance.

The importance of the contribution of employees to an organization's financial performance, whether directly or indirectly, is enormous. Consequently, Akintoye (2012), while drawing inferences from some assertions on human capital, concluded that the human element is one of the most valuable inputs in an organization. To bolster this inference, Akintoye (2012) observed, "A team of competent, devoted, and motivated persons can convert a sick concern into a successful one. Consequently on the other hand, incompetent and disinclined personnel may waste the existing physical and financial resources leading the concern to collapse" (p.566&567). The level to which employees are motivated via corporate social responsibility is presumed to have an effect on the financial performance.

Therefore, this research evaluated the degree to which corporate social responsibility on employees affects FP of listed consumer goods companies in Nigeria. Consequently, the hypothesis of the study is:

a) *Corporate Social Responsibility on Employees has No Significant Effect on FP*

Corporate entities will understand the effect of their corporate responsibility initiatives to the employees on financial performance. Consequently, this will necessitate optimal use of corporate responsibility to employees to enhance financial performance. Moreover, corporate employees will also understand the need to align their interests with the CSR posture of their organizations if they have not been doing so. Moreover, academics and students will use this study as referral material during their research. Moreover, this study might also give room for theorizing/hypothesizing other dimensions of CSR that affect FP. The remaining part of this study is divided into: literature review, methodology, results, and discussion of findings.

II. Literature Review

a) *Conceptual Framework*

i. *Corporate Social Responsibility (CSR)*

Many authors have defined the concept of CSR differently. Still, all these definitions convey that CSR is voluntary and encompasses business standards, principles, norms, ethics, policies, and practices integrated into the business culture to benefit stakeholders.

ii. *Employees' Component of Corporate Social Responsibility*

On the employees' component of CSR, CSR Hub in Aggarwal (2013) notes that it includes: disclosure of policies, programs, and performance in diversity, labour- relations and labour rights, compensation benefits, and employee training, health and safety, compliance with national laws and regulations, fair treatment of all employees, disclosure of workforce diversity data, strong labor codes, comprehensive benefits, training and development opportunities, and employee health and safety policies.

Additionally, Boztosun and Aksoylu (2015) remarked that CSR has four policies namely: business, environmental, market, and social policies. Moreover, the business policies of CSR cover the support given for

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long-term career prospects and development of employees, taking measures to prevent any discrimination in employment to promote the participation of employees in management and their contributions to critical decisions, bearing in mind the issues of improved health, security and welfare of employees.

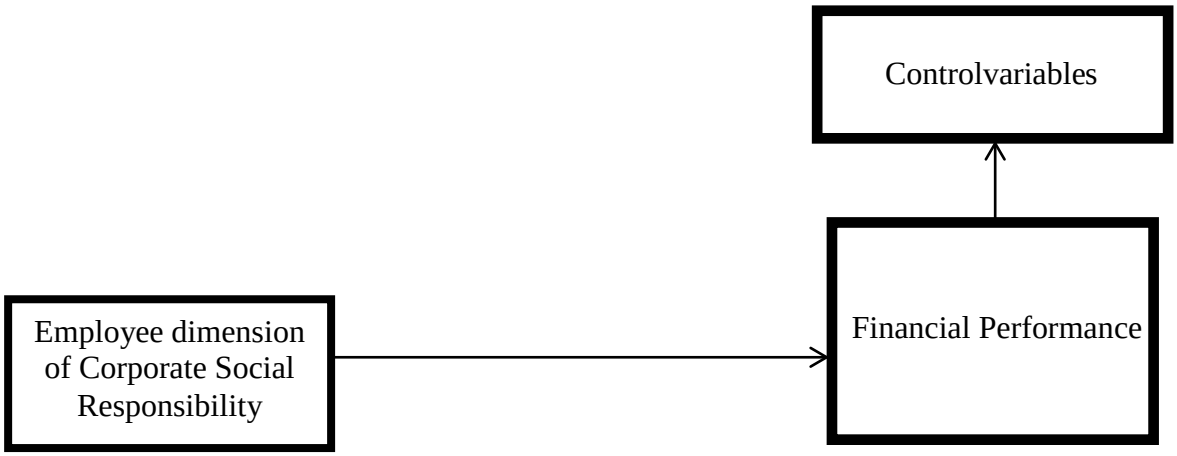
A company's CSR efforts for employees entail providing safeworking conditions, training employees, and having concerns for the general welfare concern for employees.

iii. *Control Variables*

From the literature review, control variables are variables used in research to isolate their effect from the independent and dependent variables relationship. Most researchers in the literature have controlled in their CSR methodology, Research, and Development (R and D), Industry type, Company size, age, and leverage.

iv. *Financial Performance*

Financial performance (FP) measures how well a company has used assets from its primary mode of business to generate revenue. Cochran and Wood (1984), as cited by Boaventura, Da Silva and, De-Mello (2012), noted that the definition of FP is not debated in the literature, but that there is disagreement concerning the best way to measure FP such as market-based measures (Share Price, Price to Earnings Ratio, Market Share, Dividend Payout Ratio) and accounting based measures (Return on Assets, Return on Equity, Earnings per Share, Return on Investment). Boaventura, Da Silva and, De-Mello, (2012) observed that return on assets (ROA) is rated highest in the frequency of use in empirical research to measure FP. Many strategies and diversities in workforce combination must be harnessed to enhance and sustain financial performance for the well-being of a corporation. Financial performance might be affected by corporate responsibility (CR) to employee. The conceptual framework diagram is contained in Figure 1.



Source: Researcher's Conceptualization (2022)

Figure 1: Conceptual Framework on the Link between Employee Dimension of CSR and FP

The employee dimension of Corporate Social Responsibility is the independent variable. The company's efforts toward employees by providing safe working conditions, training employees and, the general welfare concern of employees might enhance the commitment level of employees, resulting in to increase in the rate of retention of employees. An increase in the commitment level of employees would result in operational effectiveness of employees, which could lead to good quality products. Moreover, an increase retention level means a reduction in the cost of recruitment of new employees. These are hypothesized to have an effect on financial performance. Employee dimension of Corporate Social Responsibility is the independent variable in Figure 1.

Financial performance is the dependent variable, which is hypothesized to be explained by CSR to employees as indicated in the Figure 1.

b) Theoretical Framework

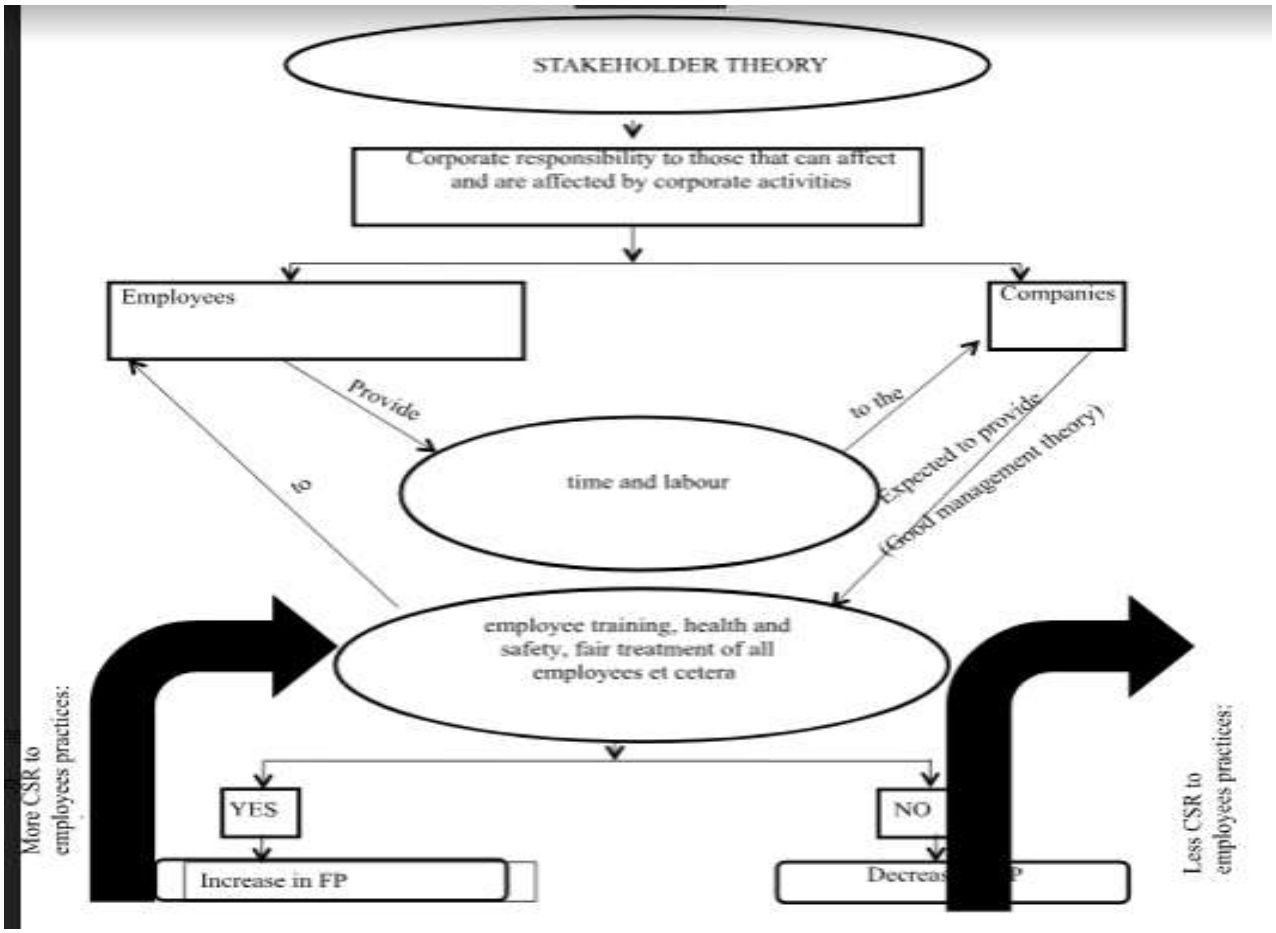
Although several different theories have been used to explain the association between corporate social responsibility (CSR) and financial performance (FP), Suttipun and Stanton (2012) noted that the most embracing theoretical perspective in the environmental accounting literature, which explains corporate motivations for reporting, is based on Legitimacy and Stakeholder theories. Tilling, (n. d) stated that Legitimacy Theory has become one of the most cited theories within the social and environmental accounting area. However, there remains deep skepticism among

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many researchers that it offers any real insight into the voluntary disclosure of corporations. This research concerns the interplay between a corporation and its stakeholders and how the corporation can affect and is affected by these stakeholders. Accordingly, this research is anchored on stakeholder theory.

c) Stakeholder Theory

This theory, propounded by Freeman (1984) asserts that organizations have accountability toward a broad range of stakeholders. Matten, (2003) in Hashimu and Ango (2012) opined that Stakeholder Theory is considered a necessary process in the operation-alization of corporate social responsibility as a complementary rather than conflicting body of literature. The term, 'stakeholders' refer to groups of constituents who have legitimate claims on the firm (Freeman, 1984; Pearce, 1982; in Hills & Jones, 1992). According to Hills and Jones (1992), legitimacy is established through the existence of an exchange relationship and, stakeholders include: stockholders, creditors, managers, employees, customers, suppliers, local communities, and the general public. Following March and Simon (1958) as cited by Hills and Jones (1992), each of these groups can be seen as supplying the firm with critical resources (contributions), and in exchange, each expects its interests to be satisfied (inducements). Stockholders provide the firm with capital, and in exchange they expect the firm to maximize the risk-adjusted returns on their investments. Moreover, all stakeholders have right to be treated fairly by organizations and corporate social responsibility helps in strengthening stakeholders' relations. There are two broad arms of stakeholder theory: Good Management Theory and Slack Resource Theory. These two theories look at the direction of the causal relationship between CSR and FP. While Slack Resource Theory states that CSR depends on FP, Good Management Theory states that FP depends on CSR. Given the peculiarity of this research, "Effect of Employee Dimension of Corporate Social Responsibility on Financial Performance of Listed Consumer Goods Companies in Nigeria; it is anchored on Stakeholder Theory as we assess the reciprocal effect of CSR on employees (a stakeholder) in affecting FP. Moreover, FP is the dependent variable while CSR to employees is the independent variable, and as such, the study is anchored specifically on Good Management Theory as contained in Figure2.



Source: Researcher's Conceptualization (2022)

Figure 2: Conceptual Framework Flow Chart Showing the Flow of Activities from CSR to Employees that are Hypothesized to Affect FP

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d) Empirical Review

Doutimiareye (2022) studied "Corporate Social Responsibility and Financial Performance of Listed Consumer Goods Firms in Nigeria." The researcher adopted an ex post facto research design, and the CSR dimensions surveyed were community development cost and employee training cost. The researcher found adverse and significant effects of these CSR costs on FP as measured by ROE. Here, CSR to employees was restricted to employee training cost, but CSR to employees is more encompassing than only looking at the monetary value of it.

Gugong and Ayuba (2018) examined "Corporate Social Responsibility and Financial Performance of Listed Consumer Goods Firms in Nigeria." The researchers applied the correlational research design and CSR was measured using expenditures of the CSR dimensions (community and employees) studied while FP was measured using ROE. The findings, are negative and significant effects of expenditures on CSR dimensions (community and employees) on FP. CSR to employees was only limited to spending on CSR to employees.

Pan, Sha, Zhang, and Ke (2014) conducted a study on, the "Relationship between Corporate Social Responsibility and Financial Performance in the Mineral Industry: Evidence from Chinese Mineral Firms' using panel data for 228 listed Chinese mineral listed firms from 2010 to 2013 with Pooled Least Squares regression analysis. They found different effects of each sublevel CSR issue on FP. Overall, shareholders, employees' responsibilities, environmental response-bilities, suppliers, customers, and consumers' obligations have significant impacts on FP, which are the stakeholders who have the closest linkage with firm operations. In contrast, public accountability outside the firm does not show significant interaction with FP. This study was on listed firms in China.

Albahussain (2015) applied Correlation and the T-Test on, "A suggested conceptual agenda for market orientation and corporate social responsibility towards the business performance of Saudi Industrial organizations," and among other findings, he found a statistically significant positive relationship among all the CSR (customers, employees, community, shareholders, suppliers, and environment) initiatives and financial performance.

Usman and Amran (2015) studied corporate social responsibility practice and corporate financial performance: evidence from Nigerian companies with a focus on the nature and trend of corporate social responsibility (CSR) practices and the relationship between the dimensions of CSR disclosures and corporate financial performance (CFP) among Nigerian listed companies. Content and regression analysis were used respectively to extract CSR and financial data from annual reports of 68 companies listed on the Nigeria Stock Exchange and to examine the association between corporate social responsibility and corporate financial performance. The results show that the listed companies used CSR initiatives to communicate social performance to their stakeholders and that community involvement disclosure, product and customer disclosures, and human resource disclosures were found to enhance CFP. The results also revealed a negative relationship between environmental disclosure and CFP, which indicates that disclosure of ecological impact information could be value-destroying in Nigeria. This study was on all listed companies in Nigeria.

Aggarwal (2013) applied Multiple Regression analysis to research "Impact of Sustainability Performance of Company on its financial performance: A Study of Listed Indian Companies''. The researcher used secondary sources of data collection, i.e., corporate annual reports for the accounting-based performance measures of ROA, ROE, ROCE, PBT, and GTA and CSR hub database for corporate sustainability measures of governance, communities, employees, and environment rating data and among other findings, the research found that Overall Sustainability Ratings (OSR) has positive but insignificant impact on the financial performance of a company; community- related performance has positive and insignificant effect on the company's financial performance; employee-related performance has negative and significant effect on financial performance; environment-related performance has negative and significant effect on the company's financial performance; and governance-related performance has positive and significant effect on the company's financial performance.

Kaskeen (2017) examined Corporate Social Responsibility and Corporate Financial Performance: Case Study of Pakistan, and among other findings, the researcher found that employee relations had a positive effect on ROA.

Among researchers that found no link between CSR and FP are: Iqbal et al., (2012) in Enahoro, Akinyomi, and Olutoye (2013). They used secondary data, Correlation, and Regression Analysis to examine the impact of corporate social responsibility on the financial performance of corporations in Pakistan. As proxies, they used return on assets and return on equity for financial performance on the one hand and CSR; they used business ethical principles, corporate governance, environmental compliance, social compliance, disclosure of environmental and social report, product integrity, and corporate giving and community investment. They found that CSR does not affect financial performance.

III. Research Method

The descriptive and causal research designs were found appropriate. The population comprised

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twenty-eight (28) consumer goods companies that were listed on the Nigerian Stock Exchange as of 2019. The entire population was used as a sample; nonetheless, due to insufficient data from some of the listed consumer goods companies (CGC), the sample was reduced to 17 companies using a filter. The data was retrieved from a secondary source: CSR to employee, control variables and financial performance. Data for CSR to the employee was collected using CSR checklist (See appendix B). The CSR checklist was adopted from Jitaree (2015). The annual report of each CGC was perused using content analysis for each practice (item) in the checklist for measurement accordingly. The total CSR to employee index or score for each company for each year was the ratio of the total score obtained to the total score (16) attainable and accordingly computed for the CSR to the employee. This index ranges from 0 to 1.

$$\text{That is, } CSR_{empl}I_j = \frac{\sum_{i=1}^{n} x_{ij}}{n_j} \ldots \quad (1)$$

where,

$CSR_{empl}I_j$= Corporate social responsibility to employee index of the j^{th} firm, where, j =1-17. i=1-16

n_j= Total number of CSR to the employees' items for the j^{th} firm, n = 16,

x_{ij} = 1 if the i^{th} item was disclosed,

0 if theith item was not disclosed

So that $0 \leq CSR_{empl}I_j \leq 1$

Data for financial performance was measured using one accounting-based measure of ROA, which has the highestfrequency as a proxy used in the past to measure financial performance in studies on corporate social responsibility and financial performance relationship (Boaventura, Da Silva & De-Mello, 2012).
The formula for financial performance is,

$$ROA = \frac{PROFIT\ \ BEFORE\ \ TAX}{TOTAL\ \ ASSETS} \times 100 \ldots \quad (2)$$

Where, ROA=return on assets = dependent variable = Financial performance

Data for proxies of control variables (age of the firm, leverage, and company Size) were obtained from the annual reports. The data needed for control variables were: age (number of years since listed on the Nigerian Stock Exchange); leverage (total debt and equity capital); for company size (logarithm of total assets). In this study, sequence charts of bar charts and the parametric inferential statistics of multiple regressions were found more appropriate to depict the trend in the independent and dependent variables and to test the study's hypothesis respectively. The panel data procedure for regression analysis was adhered to, because multiple regressions conducted without having subjected the data to some diagnostic tests may lead to invalid results. Moreover, the choice of the regression model was robust pls (common effect).

a) Model Specification for Multiple Regressions

$$ROA_{it} = \alpha + \beta_1 CSR_{emplit} + \beta_2 AG_{it} + \beta_3 LE_{it} + \beta_4 CZ_{it} + \varepsilon_{it6} \ldots\ldots\ldots \quad (3)$$

Where,

i= company 1 to 17, t= the year 2009 to 2019 = 11 years, $CSREmpl_{it}$ = Corporate Social Responsibility to employeefor company 1 to 17 over 11 years, ROA_{it}= Return on Assets for company 1 to 17 over 11 years, α_{it} = autonomous change in the dependent variable that is not explained by the independent variable for company 1 to 17 over 11 years, β= the proportionate change in the dependent variable arising from a unit change in the independent variable, AG_{it}= Age of the firm = the first control variable for company 1 to 17 over 11 years, LE_{it}= Leverage= the second control variable for company 1 to 17 over 11 years, CZ_{it}= Company Size= the third control variable for company 1 to 17 over 11 years, εi_{it} = assumed error magnitude of the predictive variable(s) in explaining the criterion variable or the error term that accounts for other factors affecting the dynamics of the dependent variable not captured in the model for company 1 to 17 over 11 years.

b) Decision Rule

P-value: we reject the null hypothesis, if the p-value is less than 5% (P<5%) otherwise, we do not accept the null hypothesis. Alternatively, at a 5% significance level, we reject the null hypothesis if $|t| \geq 1.96$ otherwise we accept the null hypothesis.

The data was restricted to secondary data, which was extracted from annual reports and accounts of 17 listed consumer goods companies in Nigeria. The study covered a period of eleven years (2009-2019) yielding for the research, 187 observations, that is, 17 x 11.

Data was scrutinized for missing values, but all the expected observations per constructs were intact. Followed by, was the detection of outliers. Outliers were detected in constructs (ROA, CSREmpl, AG, LE, and CZ), (see Figure 3 below for outliers in ROA). Outliers were removed using the outlier removal code: *new_y=@recode((y>@quantile(y,0.95))+(y<@quantile (y,0.05)),NA,y).* Also, to get rid of NA (not available) or to retain the total number of observations in the sample data, AsifAhsan@which is the best method to remove outliers in a data *set@www.researchgate-net* states that a straight forward way to remove outliers is first to identify the outlying observations and replace them with the median value. The researcher thus obtained the median values in the descriptive statistics for those data

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sets plagued with outliers and applied the modifiedoutlier removal code to: *new_y=@recode((y>@quantile(y,0.95))+(y<@quantile (y,0.05)),median,y)*

Figure 3 below shows outliers in return on assets (ROA)

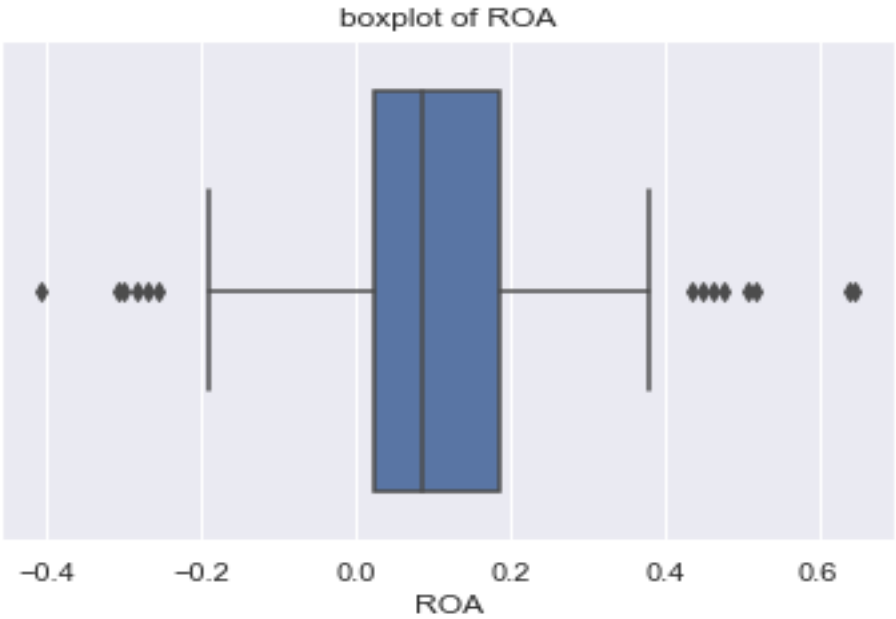
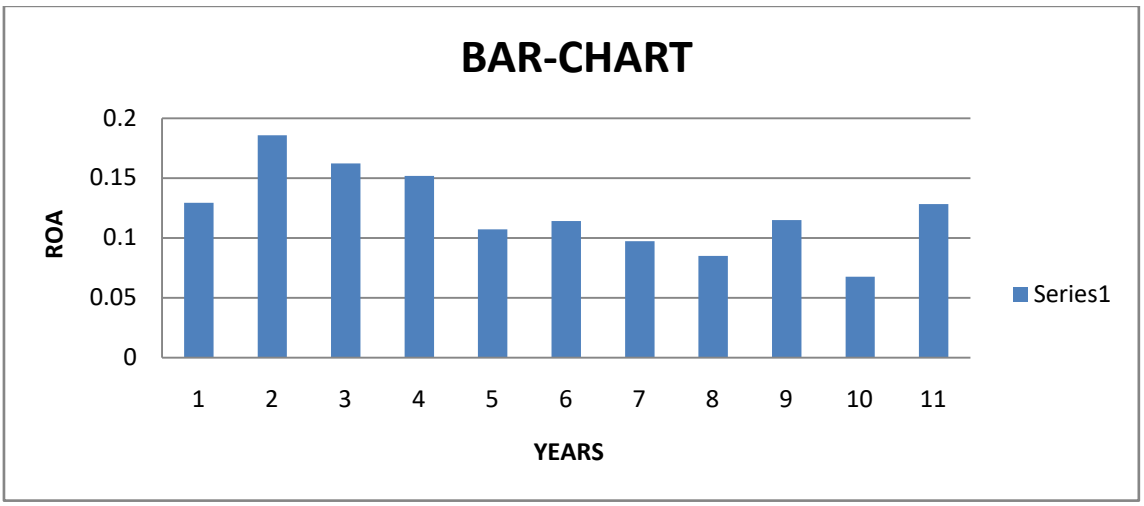


Figure 3: Outliers in ROA

IV. Sequence Charts Analysis of Data

a) Bar Chart of ROA

Note (1=2009, 2=2010,3=2011,4=2012,5=2013,6=2014,7=2015,8=2016,9=2017,10=2018 and 11=2019). This shows the trend in return on assets (ROA)



Source: Researcher's Computation from Data using Python Programming Language

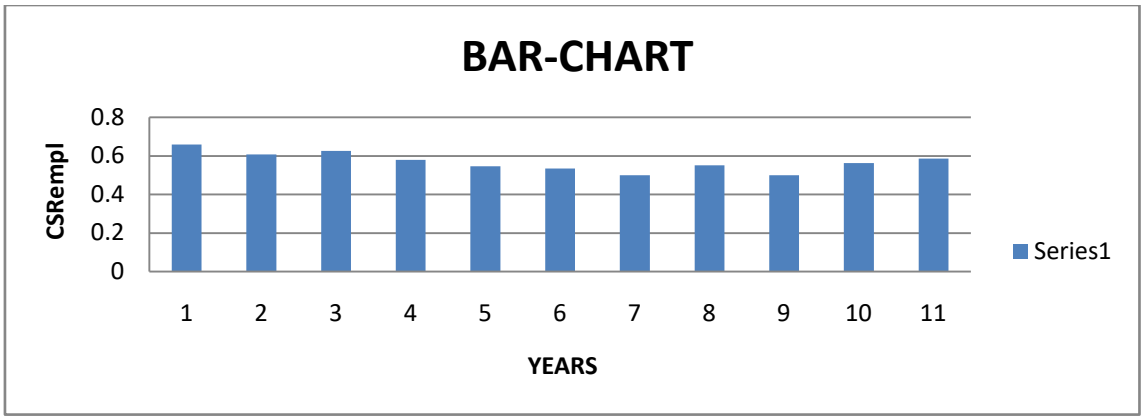
Figure 4: Bar Chart of ROA

As can be seen in the figure above, ROA was highest in 2010 followed by 2011, 2012, 2019, 2009, and 2017. There is noticed a trend of decline in ROA, a proxy of financial performance over the years (2009 to 2019).

b) Bar Chart of CSRempl

This shows the trend in Corporate Social Responsibility to the employees (CSRempl)

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Source: Researcher's Computation from Data using Python Programming Language (2022)

Figure 5: Bar Chart of CSRempl

In the Figure 5, CSRempl was highest in 2009, followed by 2011, 2019, 2009, and 2018, and lowest in 2017 and 2015.

V. Results and Discussion of Findings

Table 1: (Extract). Random, Fixed, Common and Robust Ols Results

EFFECT	RANDOM		FIXED		COMMON		ROBUST OLS	
VARIABLE	COEF.	PROB.	COEF.	PROB.	COEF.	PROB.	COEF.	PROB.
C	0.458562	0.0611	0.436000	0.1306	0.546902	0.0286	0.479788	0.0488
CSREMPL	0.099788	0.3372	0.073944	0.5826	0.232878	0.0259	0.267168	0.0087
AG	-0.003277	0.0133	-0.008551	0.0329	-0.004194	0.0002	-0.004604	0.0000
LE	0.040776	0.3104	-0.007149	0.8732	0.107557	0.0140	0.092173	0.0300
CZ	-0.056332	0.0881	-0.015768	0.7289	-0.072086	0.0313	-0.058578	0.0728
R^2	0.142033		0.575509		0.238182		0.252857	
R^2 Adjusted	0.056237		0.450659		0.162000		0.178143	
F-Statistics	1.655466	0.122437	4.609600	0.000001	3.126498	0.003988	33.45147	0.000051

Source: Researcher's computation using Eviews 10 (2022)

The effect of CSR on employees is positive and significant. That is, a unit increases in CSRempl results in a 0.27 increase in ROA.

Table 2: Summary of Regression Results and Discussion

Hypothesis	Regression model	Results	Results in agreement with that/those of	Results in disagreement with that/those of
Effect of CSR to employee	robust pls (common effect) results	Positive and significant	Pan et al., (2014),Albahussain (2015),Usman and Amran (2015), Aggarwal (2013) negative and signicicant, Doutimiareye (2022) significant but negative, Gugong and Ayuba (2018)	Iqbal, et al, (2012) in Enahoro et al., (2013)

Source: Researcher's Computation (2022)

The effect of CSR on employees is positive and significant. This finding agrees with those of Pan et al. (2014), Albahussain (2015), Usman and Amran (2015), Aggarwal (2013) significant but negative, Doutimiareye (2022) significant but negative, Gugong and Ayuba (2018) significant but negative.This finding disagrees with that of Iqbal, et al., (2012), as cited in Enahoro et al. (2013). That is, a unit increases in CSRempl results in a

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0.27 increase in ROA. This finding is by, following, per, under the theoretical expectation that an increase in CSR on employee relations would lead to an increase in financial performance. The implication of this finding is that increase in CSR to employee (complying with health and safety standards and regulations, providing information on education/training of employees on health and safety, providing information on accident statistics, providing low cost health care to employees, employees training/giving financial assistance to employees in educational institutions or continuing education courses, providing recreational activities /facilities, providing staff accommodation/staff home ownership schemes, food, fuel, other benefits, information about support for day-care, maternity and paternity leave, holidays and vacations, disclosing policy for company's remuneration package/schemes, providing information of employees share purchase scheme, providing information on number of employees in the company/branch/subsidiary, providing information on qualifications and experience of employees recruited, providing information on the stability of the workers' job and company's future, reporting on company's relationship with trade unions/workers and providing information on recruitment/employment of minorities /women/special interest groups) would result to an increase in financial performance.

VI. Conclusion

The results of the study are determined by the validity of information collected via the CSR checklist and by extraction from annual reports and accounts of listed consumer goods companies in Nigeria. Research of this nature with increased sample size and or covering more years should be conducted on listed consumer goods companies in Nigeria. Moreover, there are other dimensions of CSR, including the latest one (COVID-19) that warrant their effects on financial performance to be researched.The paper recommends that listed consumer goods companies should do more on corporate social responsibility on employees to improve workers' motivation and corporate reputation and image that can potentially improve financial performance.

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An Empirical Study on Factors Influencing Job Satisfaction of Human Resource in Banks and Insurance Companies of Nepal

By Biplav Poudel
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Abstract- Job satisfaction is the positive emotional feeling of an employee towards their job. It is one of the most important outcomes of an organization depends on the various motivational factors. Out of different motivational theories, this research work has used Herzberg's Two Factor Theory of motivation to understand the impact of motivational factors on job satisfaction of human resource working in bank and insurance companies of Nepal. Due to the use of the theory, the assumed 15 motivational factors are classified into two groups- i.e, hygiene factor and motivator factor, and later on, each of the motivational factors are further grouped into motivational and de-motivation factors to meet the assumption of independent sample t-test through IBM SPSS 25 version. To test the internal consistency reliability of questions related to 15 constructs, the Cronbach Alfa (α) coefficient has been calculated. To create consistency with the sample size assumed in Herzberg's theory of motivation, this research paper has collected primary data from 200 respondents through a face-to-face interview method with a structured questionnaire. Results of this research work have partially accepted the conclusion of Herzberg's theory of motivation.

Keywords: job satisfaction, herzberg's two factor theory, bank, insurance companies, human resources, motivational factors, Nepal.

GJMBR-A Classification: LCC code: HD58.7



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An Empirical Study on Factors Influencing Job Satisfaction of Human Resource in Banks and Insurance Companies of Nepal

Biplav Poudel

Abstract- Job satisfaction is the positive emotional feeling of an employee towards their job. It is one of the most important outcomes of an organization depends on the various motivational factors. Out of different motivational theories, this research work has used Herzberg's Two Factor Theory of motivation to understand the impact of motivational factors on job satisfaction of human resource working in bank and insurance companies of Nepal. Due to the use of the theory, the assumed 15 motivational factors are classified into two groups- i.e, hygiene factor and motivator factor, and later on, each of the motivational factors are further grouped into motivational and de-motivation factors to meet the assumption of independent sample t-test through IBM SPSS 25 version. To test the internal consistency reliability of questions related to 15 constructs, the Cronbach Alfa (α) coefficient has been calculated. To create consistency with the sample size assumed in Herzberg's theory of motivation, this research paper has collected primary data from 200 respondents through a face-to-face interview method with a structured questionnaire. Results of this research work have partially accepted the conclusion of Herzberg's theory of motivation. The development of the independent sample t-test, it has been found that relation with colleagues and allowances do not significantly affect on the level of job satisfaction of human resources, whereas the remaining 13 motivational factors- i.e, salary, bonus, vehicle facility, training, job promotion, work environment, rules & regulations, loan facility, relation with superior, awards, challenging job, relation with subordinate and job security do significantly effect on job satisfaction of human resources. The research paper concludes that to improve the job satisfaction of human resource, the bank and insurance companies of Nepal should increase their time, effort and finance on the remaining 13 motivational factors rather than on the two motivational factors.

Keywords: job satisfaction, herzberg's two factor theory, bank, insurance companies, human resources, motivational factors, Nepal.

I. Introduction

Job satisfaction is one of the major outcomes of an organization which means positive, emotional and pleasurable response of employees towards their particular job or organization. Job satisfaction increases the efficiency and productivity of the business organization. When employees receive expected rewards and incentives from their job it helps to satisfy them (Poudyal & Pradhan, 2018). For example, paying workers high salaries can enhance satisfaction and reduce turnover, but it also may detract from bottom-line performance (Griffin & Moorhead, 2017). Therefore, job satisfaction is an essential dependent variable that companies always expect to make positive by making favorable changes in the organization's motivational factors for its employees with the view of achieving various organizational goals like; reduction in the organization's cost of training employees, increment in organization's productivity, reduction in workplace stress of employees, reduction in inter-personal, intra-personal and inter-group conflict in organization, etc. Companies provide various motivational forces to their employees working in different managerial levels.

According to 'Herzberg's Two Factor Theory' of motivation, the job satisfaction of employees is determined by mainly two factors. He named the factors as hygiene factors and motivator factors. This study uses the hygiene (extrinsic) factors and motivator (intrinsic) factors of Herzberg to determine the level of job satisfaction of employees working in existing banks and insurance companies of Nepal. Intrinsic factors, such as achievement, recognition, the work itself, responsibility, advancement and growth seem to be related to job satisfaction (Aswathappa, 2017). On the other hand, when they are dissatisfied, they tended to extrinsic factors, such as company policy and administration, supervision, work conditions, salary, status, security, and interpersonal relations (Aswathappa, 2017). However, this research study has undertaken salary, bonus, vehicle facility, work environment, relation with colleagues, allowances, rules and regulations, loan facility, relation with superior, relation with subordinate and job security as hygiene factors of job satisfaction, whereas training, job promotion, awards and challenging job are considered as motivator factors of job satisfaction of employees working in bank and insurance companies of Nepal.

In summary, Nepal has witnessed a noticeable growth of banking and financial institutions after economic liberalization and intensified competition

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among the banks (Yukongdi & Shrestha, 2020). As a competitive tool, banks have restored to a strategy of attracting talented human resources from rival firms by offering lucrative compensation packages, training, and career development opportunities (Bista & Regmi, 2016). So, this research paper examines whether or not the hygiene factors and motivator factors of Herzberg's Two Factor Theory significantly impact the job satisfaction of human resources.

II. Literature Review

Locke (1976) concluded that job satisfaction is a positive emotional feeling attributed to the appraisal of one's job or job experiences. Benefit, as a significant consideration in the reward and motivation system, conveys a message to employees about what the organizations believe to be essential and worth encouraging (Lawller, 1986). Job satisfaction is associated with increased output, efficiency of the organization, loyalty to the organization, and reduced absenteeism and earnings (Ellickson & Logsdon, 2001). Job satisfaction positively affects the ability, effort, and capability of the employees (Wright & Davis, 2003). Pension and profit-sharing plans are positively associated with job satisfaction (Bender & Heywood, 2006). Positive and favorable attitudes toward the job indicate job satisfaction similarly, negative and unfavorable attitudes towards the job indicate job dissatisfaction (Amstrong, 2006). Armstrong (2006) classified job satisfaction has multi-dimensional facets consisting of attitude toward salary, promotion, working experience, working environment, and nature of work.

Job satisfaction is the collection of feelings and beliefs that human resources have about their current job (George & Jones, 2008). A satisfied worker tends to be less absent from their job, contributes to the company's benefit, and would like to stay in the organization (Adhikari, 2009). An effective reward system with adequate performance recognition creates employee job satisfaction and enhances favorable working conditions, which serve as crucial motivators (Danish & Usman, 2010). At the time, the Imperial Bank of Kenya was experiencing low profitability due to dissatisfied employees and high turnover, still after investing in some of the precious resources like benefits, decision-making authority, training, and development, they began to enjoy the benefits of such policies (Newman et al., 2011). Salary and remuneration is the most essential factor ranked by employees of commercial banks (Gautam, 2011).Banks must demonstrate a satisfactory commitment to their employees through benefits, decision-making authority over how to accomplish the goal, and the use of employees' knowledge, skills, and competencies (Walia and Bajaj, 2012).

In previous years, factors such as a lack of physical stress on the job, a lack of tangible and intangible compensation, a lack of supervision, and so on were widely regarded as deterrents to job satisfaction (Iqbal et al., 2012). Keith (2013) explained the factors influencing job satisfaction depend upon the nature of the work and working environment. An increase in the level of financial benefit, performance appraisal system, promotional strategies, training, and development program improves the overall satisfaction of human resources (Sharma et al., 2014). Dissatisfied employees, on the other hand, are unwilling to accept any pressure for their work, in contrast satisfied employees are always willing to complete their job, even if it is difficult to perform (Simes et al., 2019). As a competitive tool, the banks have resorted to a policy of poaching talented human resources from the competing banks by offering better incentives (Bista & Regmi, 2016). Employee job satisfaction has a significant impact as it leads to increased productivity of the employees, a decreased employee turnover rate, and, consequently a profit margin (Santis et al., 2018).

Based on the literature review, this study has been conducted to test the following assumptions:

H1: There is a statistically significant mean difference in the level of job satisfaction due to the difference in level of hygiene factors.

H2: There is a statistically significant mean difference in the level of job satisfaction due to the difference in the level of motivator factors.

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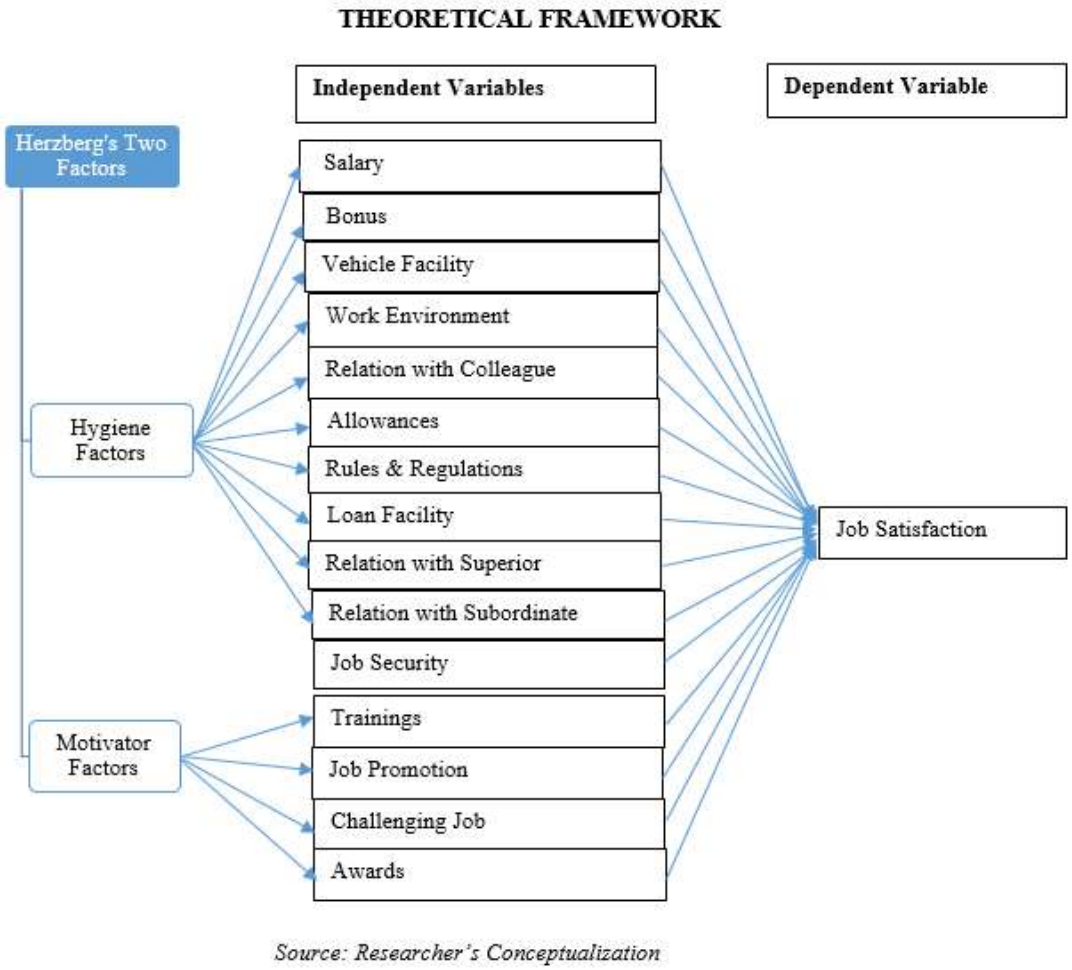


Figure 1: Theoretical Framework

III. Methods

In this research work, the population has been considered as a total number of human resources who are currently working in different positions of banks and insurance companies of Nepal. The Sample size of this research work has been considered as 200 human resources who were randomly enrolled during a field survey conducted in October 2022 in different bank and insurance companies located in major cities of Nepal- i.e, Itahari, Biratnagar and Birat Chowk. To collect primary data, the researcher has used a structured questionnaire with close-ended questions and he used one to one physical interview method of data collection with the view of minimizing sampling error. The questionnaire was developed in a five-point Likert scale as (1) No effect, (2) Low, (3) Moderate, (4) High and (5) Very High to all dependent variables, whereas (1) Poor, (2) Fair, (3) Average, (4) Good and (5) Excellent to all independent variables.

This research paper uses IBM Statistical Package for Social Science (SPSS) version 25 software to process and analyze the collected primary data. In IBM SPSS software, at first, the variables are coded with specific code, and then after, as per the requirement of the research, to depict answers of the research questions, to meet the stated objectives and to test the setup hypothesis, the data are analyzed and evaluated with the help of statistical tool-i.e, independent sample t-test. To meet the assumptions of an independent sample t-test at first, the Likert scale data related to independent variables are categorized into two groups- i.e, motivational and de-motivational. The data included in the Excellent, Good, and Average options have been grouped as a motivational group, whereas the data related to the remaining two options- i.e., Fair and Poor have been grouped as a de-motivational group. The job satisfaction that arises from all motivational factors are also grouped into one dependent variable- i.e, job satisfaction. To test the normality of job satisfaction, the Shapiro Wilk test has been done for each case. Then after, an independent sample t-test was done to test the stated alternative hypothesis. Cronbach's Alpha value (α) has been calculated to measure the internal

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consistency of the questions that were asked to respondents at the time of the survey. George and Mallery (2003) provide the following rules of thumb: "_ > .9 – Excellent,_ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable".

Cronbach's Alpha	No. of Items
0.700	15

The above table signifies that, by considering all the 15 constructs related to independent variables, the Cronbach's Alpha value (α) that the researcher has gotten is 0.7. Here, Cronbach's Alpha value is equal to '0.7'. This means, the internal consistency among the constructs related to independent variables is good, and the data that the researcher has collected to identify the impact of motivational factors to job satisfaction can be statistically trusted and accepted.

This research work has also met the core assumptions of independent sample t-tests which are as follows:

i. As one dependent variable should be measured in ratio scale here, job satisfaction has been measured in ratio scale.
ii. As independent variables should be measured in nominal scale here, each motivational factor has been classified in to two separate groups. One is motivational factor, and another is the de-motivational factor.
iii. To meet the assumption of independence, one respondent of the survey has only responded to one group of independent variables (all 15 motivational factors).
iv. To meet the assumption of normal distribution, the Shapiro Wilk test has been done. The p-value (sign.) of the job satisfaction is greater than the alfa (α) value-i.e., 0.05 in each of the two groups of independent variables.

IV. Result and Discussion

Table 1: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Salary

Salary		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Salary	0.994	191	0.581
	De-motivational Salary	0.901	9	0.260

The above table shows us thep-value of the job satisfaction (*p=0.581)* is greater than the alfa value (α=0.05) in motivational salary. Therefore, job satisfaction is normally distributed within the sample size of human resources receiving motivational salary. Similarly, the p-value of job satisfaction (*p=0.260)* is greater than the alfa value (α=0.05) in de-motivational salary. Therefore, job satisfaction is normally distributed with in the sample size of human resources receiving the de-motivational salary.

Table 2: Group Statistics of Motivational and De-Motivational Salary

Salary		N	Mean	Std. Deviation
Job Satisfaction	Motivational Salary	191	40.4293	6.49404
	De-motivational Salary	9	46.5556	5.15051

The above table shows us that, out of 200 respondents in the field survey, 191 respondents have been receiving a salary that motivates them to do their job, whereas 9 respondents have been receiving a salary that demotivates them to do their job. Here, the mean score of job dis-satisfaction (*M=46.5556)* of human resources which have been receiving a salary at de-motivational level is higher than the mean score of job satisfaction (*M=40.4293)* of human resources which have been receiving salary at the motivational level.

Table 3: Independent Sample T-Test Result for Salary As a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal Variances Assumed	0.986	0.322	-2.787	198	0.006
	Equal Variances not Assumed			-3.442	9.241	0.007

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In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.322(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.006*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in the payment of salary.

Table 4: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Bonus

Bonus		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Bonus	0.992	167	0.435
	De-motivational Bonus	0.971	33	0.501

The above table shows us the p-value of the job satisfaction (*p=0.435)* is greater than the alfa value (α=0.05) in motivational bonuses. Therefore, job satisfaction is normally distributed within the sample size of human resources receiving motivational bonuses. Similarly, the p-value of job satisfaction (*p=0.501)* is greater than the alfa value (α=0.05) in de-motivational bonus. Therefore, the job satisfaction is normally distributed within the sample size of human resources receiving de-motivational bonuses.

Table 5: Group Statistics of Motivational and De-Motivational Bonus

Bonus		N	Mean	Std. Deviation
Job Satisfaction	Motivational Bonus	167	39.9461	6.29138
	De-motivational Bonus	33	44.5455	6.60062

The above table shows us that, out of 200 respondents in the field survey, 167 respondents have been receiving a bonus that motivates them to do their job, whereas 33 respondents have been receiving a bonus that demotivate them to do their job. Here, the mean score of job dis- satisfaction (*M=44.5455)* of human resources which been receiving a bonus at the de-motivational level is higher than the mean score of job satisfaction (*M=39.9461)* of human resources which have been receiving a bonus at the motivational level.

Table 6: Independent Sample T-Test Result for Bonus as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	0.188	0.665	-3.807	198	0.000
	Equal variances not assumed			-3.686	44.246	0.001

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.665 (which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in the payment of bonuses.

Table 7: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Vehicle Facility

Vehicle Facility		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Vehicle Facility	0.984	134	0.110
	De-motivational Vehicle Facility	0.980	66	0.372

The above table shows us the p-value of job satisfaction (*p=0.110)* is greater than the alfa value (α=0.05) in the motivational vehicle facility. Therefore, job satisfaction is normally distributed within the sample size of human resources receiving motivational salaries. Similarly, the p-value of the job satisfaction (*p=0.372)* is greater than the

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alfa value (α=0.05) inde-motivational vehicle facility. Therefore, job satisfaction is normally distributed within the sample size of human resources receiving de-motivational vehicle facilities.

Table 8: Group Statistics of Motivational and De-Motivational Vehicle Facility

Vehicle Facility		N	Mean	Std. Deviation
Job Satisfaction	Motivational Vehicle Facility	134	39.0149	6.16318
	De-motivational Vehicle Facility	66	44.1364	5.99458

The above table shows us that, out of 200 respondents in the field survey, 134 respondents have been receiving vehicle facility that motivates them to do their job, whereas 66 respondents have been receiving vehicle facility that demotivates them to do their job. Here, the mean score of job dis-satisfaction *(M=44.1364)* of human resources which have been receiving vehicle facility at the de-motivational level is higher than the mean score of job satisfaction *(M=39.0149)* of human resources which have been receiving vehicle facility at the motivational level.

Table 9: Independent Sample T-Test Result for Vehicle Facility As a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2- tailed)
Job Satisfaction	Equal variances assumed	0.001	0.978	-5.575	198	0.000
	Equal variances not assumed			-5.629	132.719	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.978(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing vehicle facilities to human resources.

Table 10: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Training

Trainings		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Trainings	0.988	158	0.216
	De-motivational Trainings	0.966	42	0.250

The above table shows us the p-value of the job satisfaction *(p=0.216)* is greater than the alfa value (α=0.05) in motivational training. Therefore, the job satisfaction is normally distributed within the sample size of human resources receiving motivational training. Similarly, the p-value of the job satisfaction *(p=0.250)* is greater than the alfa value (α=0.05) in de-motivational trainings. Therefore, job satisfaction is normally distributed within the sample size of human resources receiving de-motivational training.

Table 11: Group Statistics of Motivational and De-Motivational Training

Trainings		N	Mean	Std. Deviation
Job Satisfaction	Motivational Trainings	158	39.6392	6.15016
	De-motivational Trainings	42	44.7143	6.54174

The above table shows us that, out of 200 respondents in the field survey, 158 respondents have been receiving proper training that motivates them to do their job, whereas 42 respondents have not been receiving appropriate training. As a result, that demotivates them to do their job. Here, the mean score of job dis-satisfaction *(M=44.7143)* of human resources who have not been receiving proper training at the motivational level is higher than the mean score of job satisfaction *(M=39.6392)* of human resources which have been receiving appropriate training at the motivational level.

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Table 12: Independent Sample T-Test Result for Trainings as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	0.920	0.339	-4.690	198	0.000
	Equal variances not assumed			-4.524	61.641	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.339(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing training to the human resources.

Table 13: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Job Promotion

Job Promotion		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Job Promotion	0.993	135	0.725
	De-motivational Job Promotion	0.965	65	0.059

The above table shows us the p-value of job satisfaction (*p=0.725)* is greater than the alfa value (α=0.05) in motivational job promotion. Therefore, job satisfaction is normally distributed within the sample size of human resources receiving motivational job promotions. Similarly, the p-value of the job satisfaction (*p=0.059)* is greater than the alfa value (α=0.05) in de-motivational job promotion. Therefore, the job satisfaction is normally distributed within the sample size of human resources receiving de-motivational job promotion.

Table 14: Group Statistics of Motivational and De-Motivational Job Promotion

Job Promotion		N	Mean	Std. Deviation
Job Satisfaction	Motivational Job Promotion	135	38.8370	6.14527
	De-motivational Job Promotion	65	44.5846	5.64273

The above table shows us that, out of 200 respondents in the field survey, 135 respondents have been receiving job promotion that motivates them to do their job, whereas 65 respondents have not been receiving job promotion. As a result, that demotivates them to do their job. Here, the mean score of job dis-satisfaction (*M=44.5846)* of human resources who have not been receiving job promotion is higher than the mean score of job satisfaction (*M=38.8370)* of human resources who have been receiving job promotion.

Table 15: Independent Sample T-Test Result for Job Promotion as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	*df*	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	0.411	0.522	-6.358	*198*	0.000
	Equal variances not assumed			-6.552	136.679	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.522(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing job promotion to human resources.

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Table 16: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Work Environment

Work Environment		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Work Environment	0.994	172	0.668
	De-motivational Work Environment	0.974	28	0.697

The above table shows us the p-value of the job satisfaction (*p=0.668)* is greater than the alfa value (α=0.05) in the motivational work environment. Therefore, job satisfaction is normally distributed within the sample size of human resources enjoying a motivational work environment. Similarly, the p-value of job satisfaction (*p=0.697)* is greater than the alfa value (α=0.05) in de-motivational work environment. Therefore, job satisfaction is normally distributed within the sample size of human resources getting de-motivational work environment.

Table 17: Group Statistics of Motivational and De-Motivational Work Environment

Work Environment		N	Mean	Std. Deviation
Job Satisfaction	Motivational Work Environment	172	39.8953	6.53560
	De-motivational Work Environment	28	45.6786	4.02817

The above table shows us that, out of 200 respondents in the field survey, 172 respondents have been enjoying the work environment that motivates them to do their job, whereas 28 respondents have been receiving the work environment that demotivates them to do their job. Here, the mean score of job dis-satisfaction (*M=45.6786)* of human resources who have been receiving de-motivational work environment is higher than the mean score of job satisfaction (*M=39.8953)* of human resources who have been enjoying motivational work environment.

Table 18: Independent Sample T-Test Result for Work Environment as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	5.920	0.016	-4.538	198	0.000
	Equal variances not assumed			-6.356	53.55	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.016(which is lesser than 0.05). It indicates that the variances are significantly unequal. Hence, the case of "Equal Variances Not Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the unequal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing a work environment to the human resources.

Table 19: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Relations with Colleagues

Relationship With Colleagues		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Relation with Colleagues	0.994	193	0.587
	De-motivational Relation with Colleagues	0.912	7	0.407

The above table shows us the p-value of the job satisfaction (*p=0.587)* is greater than the alfa value (α=0.05) in motivational relation with colleagues. Therefore, job satisfaction is normally distributed within the sample size of human resources who have motivational relations with their colleagues. Similarly, the p-value of job satisfaction (*p=0.407)* is greater than the alfa value (α=0.05) in de-motivational relation with colleagues. Therefore, job satisfaction is normally distributed with in the sample size of human resources who have de-motivational relationswith their colleagues.

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Table 20: Group Statistics of Motivational and De-Motivational Relations with Colleagues

Relationship With Colleagues		N	Mean	Std. Deviation
Job Satisfaction	Motivational Relation with Colleagues	193	40.6321	6.59580
	De-motivational Relation with Colleagues	7	42.7143	5.25085

The above table shows us out of 200 respondents in the field survey, 193 respondents have been enjoying the relationship with colleagues that motivates them to do their job, whereas 7 respondents have been placed in the relationship with colleagues that demotivates them to do their job. Here, the mean score of job dis-satisfaction (*M=42.7143)* of human resources who have been placed in a relation with colleagues that de-motivates them to do their job is higher than the mean score of job satisfaction (*M=40.6321)* of human resources who have motivational relation with their colleagues.

Table 21: Independent Sample T-Test Result for Relation with Colleagues as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	0.382	0.537	-0.825	198	0.410
	Equal variances not assumed			-1.020	6.706	0.343

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.537(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.410*. Since this p-value is greater than 0.05, it is concluded that there is no statistically significant mean difference in the level of job satisfaction due to the difference in providing relations with colleagues.

Table 22: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Allowances

Allowances		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Allowances	0.989	180	0.153
	De-motivational Allowances	0.917	20	0.088

The above table shows us the p-value of the job satisfaction (*p=0.153)* is greater than the alfa value (α=0.05) in motivational allowances. Therefore, job satisfaction is normally distributed within the sample size of human resources who have been receiving allowances at the motivational level. Similarly, p-value of job satisfaction (*p=0.088)* is greater than the alfa value (α=0.05) in de-motivational allowances. Therefore, the job satisfaction is normally distributed within the sample size of human resources who have been receiving allowances at de-motivational level.

Table 23: Group Statistics of Motivational and De-Motivational Allowances

Allowances		N	Mean	Std. Deviation
Job Satisfaction	Motivational Allowances	180	40.7222	6.49112
	De-motivational Allowances	20	40.5500	7.27270

The above table shows us that, out of 200 respondents in the field survey, 180 respondents have been receiving allowances that motivate them to do their job, whereas 7 respondents do not have been receiving allowances that motivates them to do their job. Here, the mean score of job satisfaction (*M=40.7222)* of human resources who have been receiving allowances that motivates them to do their job is slightly higher than the mean score of job dis-satisfaction (*M=40.5500)* of human resources who do not have been receiving allowances that motivates them to do their job.

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Table 24: Independent Sample T-Test Result for Allowances as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2- tailed)
Job Satisfaction	Equal variances assumed	0.113	0.737	0.111	198	0.912
	Equal variances not assumed			0.102	22.494	0.920

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.737(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is $p=0.912$. Since this p-value is greater than 0.05, it is concluded that there is no statistically significant mean difference in the level of job satisfaction due to the difference in providing allowances to human resources.

Table 25: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Organizational Rules and Regulations

Rules and Regulations		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Rules and Regulations	0.990	170	0.283
	De-motivational Rules and Regulations	0.983	30	0.894

The above table shows us the p-value of the job satisfaction ($p=0.283$) is greater than the alfa value ($\alpha=0.05$) in motivational rules and regulations. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that organizational rules and regulations motivate them to do their job. Similarly, the p-value of the job satisfaction ($p=0.894$) is greater than the alfa value ($\alpha=0.05$) in de-motivational rules and regulations. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that organizational rules and regulations demotivate them to do their job.

Table 26: Group Statistics of Motivational and De-Motivational Organizational Rules and Regulations

Rules and Regulations		N	Mean	Std. Deviation
Job Satisfaction	Motivational Rules and Regulations	170	39.7706	6.25969
	De-motivational Rules and Regulations	30	46.0000	5.68118

The above table shows us that, out of 200 respondents in the field survey, 170 respondents say that organizational rules and regulations have motivated them to do their jobs, whereas 30 respondents say that organizational rules and regulations have demotivated them to do their job. Here, the mean score of job dissatisfaction ($M=46.0000$) of human resources who say that organizational rules and regulations have demotivated them to do their job is higher than the mean score of job satisfaction ($M=39.7706$) of human resources who say that organizational rules and regulations have motivated them to do their job.

Table 27: Independent Sample T-Test Result for Organizational Rules and Regulations as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	0.570	0.451	-5.091	198	0.000
	Equal variances not assumed			-5.450	42.423	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.451(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the

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case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to difference in providing organizational rules and regulations.

Table 28: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Loan Facility

Loan Facility		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Loan Facility	0.989	177	0.205
	De-motivational Loan Facility	0.971	23	0.708

The above table shows us that p-value of the job satisfaction (*p=0.205)* is greater than the alfa value (α=0.05) in the motivational loan facility. Therefore, the job satisfaction is normally distributed within the sample size of human resources who have been receiving loan facility that motivates them to do their job. Similarly, the p-value of the job satisfaction (*p=0.708)* is greater than the alfa value (α=0.05) in the de-motivational loan facility. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that the loan facility they have been receiving demotivates them to do their job.

Table 29: Group Statistics of Motivational and De-Motivational Loan Facility

Loan Facility		N	Mean	Std. Deviation
Job Satisfaction	Motivational Loan Facility	177	39.7345	6.12211
	De-motivational Loan Facility	23	48.1739	4.77353

The above table shows us that, out of 200 respondents in the field survey, 177 respondents say that loan facility has motivated them to do their job, whereas 23 respondents say that loan facility has demotivated them to do their job. Here, the mean score of job dissatisfaction (*M=48.1739)* of human resources who say that available loan facility has demotivated them to do their job is higher than the mean score of job satisfaction (*M=39.7345)* of human resources who say that loan facility has motivated them to do their job.

Table 30: Independent Sample T-Test Result for Loan Facility as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	1.897	0.170	-6.359	198	0.000
	Equal variances not assumed			-7.696	32.225	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.170(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing loan facilities.

Table 31: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Relation with Superior

Relation With Superior		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Relation With Superior	0.991	188	0.329
	De-motivational Relation With Superior	0.919	12	0.279

The above table shows us the p-value of the job satisfaction (*p=0.329)* is greater than the alfa value (α=0.05) in motivational relation with superior. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that their relation with superiors has motivated them to do their job. Similarly, the p-value of the job satisfaction (*p=0.279)* is greater than the alfa value (α=0.05) in de-motivational relation with

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superior. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that their relation with superiors has demotivated them to do their job.

Table 32: Group Statistics of Motivational and De-Motivational Relation with Superior

Relation with Superior		N	Mean	Std. Deviation
Job Satisfaction	Motivational Relation With Superior	188	40.2979	6.44488
	De-motivational Relation With Superior	12	47.0833	4.87029

The above table shows us out of 200 respondents in the field survey, 188 respondents say that their relationship with superior has motivated them to do their job whereas 12 respondents say that relationship with their superior has demotivated them to do their job. Here, the mean score of job dissatisfaction (*M=47.0833)* of human resources who say that relationship with their superior has demotivated them to do their job is higher than the mean score of job satisfaction (*M=40.2979)* of human resources who say that relation with superior has motivated them to do their job.

Table 33: Independent Sample T-Test Result for Relation with Superior as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	1.081	0.300	-3.579	198	0.000
	Equal variances not assumed			-4.577	13.586	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.300(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in maintaining the relation between superior and subordinate.

Table 34: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Awards

Awards		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Awards	0.990	139	0.401
	De-motivational Awards	0.976	61	0.260

The above table shows us the p-value of job satisfaction (*p=0.401)* is greater than the alfa value (α=0.05) in motivational awards. Therefore, the job satisfaction is normally distributed within the sample size of human resources who say that awards have motivated them to do their job. Similarly, the p-value of the job satisfaction (*p=0.260)* is greater than the alfa value (α=0.05) in de-motivational awards. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that awards have demotivated them to do their job.

Table 35: Group Statistics of Motivational and De-Motivational Awards

Awards		N	Mean	Std. Deviation
Job Satisfaction	Motivational Awards	139	38.7986	5.88560
	De-motivational Awards	61	45.0492	5.93135

The above table shows us out of 200 respondents in the field survey, 139 respondents say that awards have motivated them to do their job, whereas 61 respondents believe that awards have demotivated them to do their job. Here, the mean score of job dissatisfaction (*M=45.0492)* of human resources who say that awards have demotivated them to do their job is higher than the mean score of job satisfaction (*M=38.7986)* of human resources who say that awards have motivated them to do their job.

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Table 36: Independent Sample T-Test Result for Awards as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2- tailed)
Job Satisfaction	Equal variances assumed	0.054	0.816	-6.899	198	0.000
	Equal variances not assumed			-6.878	113.816	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.816 (which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing awards to employees as recognition of their work.

Table 37: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Challenging Job

Challenging Job		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Challenging Job	0.993	181	0.531
	De-motivational Challenging Job	0.970	19	0.782

The above table shows us that p-value of the job satisfaction (*p=0.531)* is greater than the alfa value (α=0.05) in motivational challenging jobs. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that delegation of challenging job has motivated them to do their job. Similarly, the p-value of job satisfaction (*p=0.782)* is greater than the alfa value (α=0.05) in a de-motivational challenging job. Therefore, job satisfaction is normally distributed within the sample size of human resources who say that the delegation of challenging job has demotivated them to do their job.

Table 38: Group Statistics of Motivational and De-Motivational Challenging Job

Challenging Job		N	Mean	Std. Deviation
Job Satisfaction	Motivational Challenging Job	181	40.0829	6.46003
	De-motivational Challenging Job	19	46.6316	4.07173

The above table shows us out of 200 respondents in the field survey, 181 respondents say that delegation of challenging job has motivated them to do their job, whereas 19 respondents say that delegation of challenging job has demotivated them to do their job. Here, the mean score of job dissatisfaction (*M=46.6316)* of human resources who say that challenging job has demotivated them to do their job is higher than the mean score of job satisfaction (*M=40.0829)* of human resources who say that challenging job has motivated them to do their job

Table 39: Independent Sample T-Test Result for Challenging Job as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	4.259	0.040	-4.324	198	0.000
	Equal variances not assumed			-6.235	28.570	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.040(which is lesser than 0.05). It indicates that the variances are significantly unequal. Hence, the case of "Equal Variances Not Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the unequal variances t-test is *p=0.000*. Since this p-value is lesser

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than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in the delegation of challenging job to the employees.

Table 40: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Relation with Subordinate

Relation With Subordinate		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Relation With Subordinate	0.987	188	0.074
	De-motivational Relation With Subordinate	0.970	12	0.910

The above table shows us the p-value of job satisfaction (*p=0.074)* is greater than the alfa value (α=0.05) in motivational relation with subordinate. Therefore, the job satisfaction is normally distributed within the sample size of human resources who say that their relation with subordinate has motivated them to do their job. Similarly, the p-value of the job satisfaction (*p=0.910)* is greater than the alfa value (α=0.05) in the de-motivational relation with subordinate. Therefore, the job satisfaction is normally distributed within the sample size of human resources who say that their relation with subordinate has demotivated them to do their job.

Table 41: Group Statistics of Motivational and De-Motivational Relation with Subordinate

Relation With Subordinate		N	Mean	Std. Deviation
Job Satisfaction	Motivational Relation With Subordinate	188	40.2713	6.24592
	De-motivational Relation With Subordinate	12	47.5000	7.76355

The above table shows us out of 200 respondents in the field survey, 188 respondents say that their relation with subordinate has motivated them to do their jobs whereas 12 respondents believe that their relation with subordinate has demotivated them to do their job. Here, the mean score of job dissatisfaction (*M=47.5000)* of human resources who say that their relation with subordinate has demotivated them to do their job is higher than the mean score of job satisfaction (*M=40.2713)* of human resources who say that their relation with subordinate has motivated them to do their jobs.

Table 42: Independent Sample T-Test Result for Relation with Subordinate as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2tailed)
Job Satisfaction	Equal variances assumed	0.933	0.335	-3.830	198	0.000
	Equal variances not assumed			-3.161	11.926	0.008

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.335(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.000*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in relation with subordinate.

Table 43: Test of Normality on Job Satisfaction Due to Motivational and De-Motivational Job Security

Job Security		Shapiro-Wilk		
		Statistic	df	Sig.
Job Satisfaction	Motivational Job Security	0.993	164	0.583
	De-motivational Job Security	0.986	36	0.911

The above table shows us the p-value of the job satisfaction (*p=0.583)* is greater than the alfa value (α=0.05) in motivational job security. Therefore, the job satisfaction is normally distributed with in the sample size of human resources who believe that job security has motivated them to do their job. Similarly, p-value of the job satisfaction (*p=0.911)* is greater than the alfa value (α=0.05) in de-motivational job security. Therefore, the job satisfaction is normally distributed with in the sample size of human resources who believe that job security has demotivated them to do their job.

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Table 44: Group Statistics of Motivational and De-Motivational Job Security

Job Security		N	Mean	Std. Deviation
Job Satisfaction	Motivational Job Security	164	39.9756	6.52221
	De-motivational Job Security	36	44.0278	5.67947

The above table shows us out of 200 respondents of field survey, 164 respondents say that job security has motivated them to do their job, whereas 36 respondents say that job security has demotivated them to do their job. Here, the mean score of job dissatisfaction (*M=44.0278)* of human resources who say that job security has demotivated them to do their job is higher than the mean score of job satisfaction (*M=39.9756)* of human resources who say that job security has motivated them to do their job.

Table 45: Independent Sample T-Test Result for Job Security as a Factor Leading to Job Satisfaction

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Job Satisfaction	Equal variances assumed	0.511	0.476	-3.450	198	0.001
	Equal variances not assumed			-3.770	57.169	0.000

In the above table, F-test (Levene's test) has been done to evaluate the equality of variance. It can be seen that the p-value is 0.476(which is greater than 0.05). It indicates that the variances are significantly equal. Hence, the case of "Equal Variances Assumed" has been considered. The values under the "t-test for Equality of Means" has been examined. So, the p-value for the equal variances t-test is *p=0.001*. Since this p-value is lesser than 0.05, it is concluded that there is a statistically significant mean difference in the level of job satisfaction due to the difference in providing job security to employees.

V. Conclusion

The result of each independent sample t-test concluded that except for the two hygiene factors-i.e, relation with colleagues and allowance, all the motivational factors significantly do affect on job satisfaction of human resource working in bank and insurance companies of Nepal. This meansan increase or decrease in the level of the remaining 13 factors of motivation significantly do change the level of job satisfaction of human resource working in bank and insurance companies of Nepal. Oppositely, an increase or decrease in the level of 2 motivational factors do not significantly change the level of job satisfaction of human resource working in bank and insurance companies of Nepal. The conclusion of the research work partially supports the conclusion of Herzberg's theory of motivation. The result of the independent sample t-test has concluded that there is a significant mean difference in the level of job satisfaction due to changes in the level of 11 hygiene factors-i.e, salary, bonus, vehicle facility, work environment, relation with colleague, allowances, rules & regulations, loan facility, relation with superior, relation with subordinate and job security. This means when all these hygiene factors increase or decrease, then job satisfaction also increase or decrease but according to Herzberg, when these hygiene factors get increase then the level of job satisfaction does not increase. Whereas other conclusions of Herzberg's theory, like; the absence or decrease in the level of hygiene factors creates dissatisfaction among employees, an increase in the level of motivator factors increase the level of job satisfaction, and a decrease the level of motivator factors decrease the level of job satisfaction has been matched with the conclusion of this research work.

The results of the independent sample t-test suggest that there is no significant mean difference in the level of job satisfaction due to changes in the level of allowance and relation with colleagues. This conclusion indicates that the bank and insurance companies of Nepal should not invest their vast amount of finance, time, and effort to increase the amount of allowance and assist in maintaining reasonable and friendlier relations with colleagues of the human resource because at the end that will not play vital role to increase the level of job satisfaction rather than, bank and insurance companies can invest their time, effort and finance in the remaining 13 factors of motivation to increase the level of job satisfaction of human resource.

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Use of the Ahangyol Theory in the Management of Business Entities

By Ahmad Gashamoglu

Summary- The article examines a number of propositions of the Ahangyol theory proposed by the author in the field of management of business entities. The theory is gaining increasing recognition in the scientific world these days. Proposals are made on the main conditions for creating a harmonious situation in a business entity and how to meet these conditions. Using the "4-energy" provision of the Ahangyol theory, the author identifies he key components for the existence and operation of each business entity. The proposed mathematical model can help reveal the latent factors that cause failures of business entities.

Keywords: *"business entity", "management", "ahangyol", "system power", "energy", "latent opportunities".*

GJMBR-A Classification: *LCC code: HD30.23*



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I. Introduction

Each business entity can be characterized by a certain system. Therefore, the use of every new scientific theory and the results obtained that may facilitate the development and enrichment of the system can contribute a lot to management in this field. The Ahangyol theory [1] proposed by the author and supported by renowned American scientist L. Zade [2] can prove very beneficial in this field.

It is known that a business entity exists and operates in the form of interactions of certain elements and subsystems. Obviously, if these interactions are arranged in a harmonious manner, the business entity will function more successfully. According to the science of Ahangyol, these interactions can be harmonious only if the following conditions are met:

1. All the elements and subsystems should work towards a common goal. In other words, they should all serve the same purpose. Therefore, the management of a business entity should keep this issue in the spotlight. This can be done with the help of the state-of-the-art Scientific Center, various sociological, psychological and other studies. If a different position is observed in any element or subsystem, this position should be deeply studied, analyzed, and conclusions should be drawn before tension arises. If there are any benefits in this difference, they should be utilized.
2. The business entity should have sufficient resources to achieve the set goal, and these resources should form a complete and integrated system. The available capabilities and resources of elements and subsystems should complement each other. In order to achieve the overall objective, what one element or subsystem lacks should be available in others. If such an opportunity or resource is not available in the existing structure, the goals should be modified to one for which there are sufficient resources. Alternatively, the business entity itself should be modified by introducing new elements and creating subsystems. It is necessary to bring the business entity to a state in which its resources can achieve that goal by creating a complete system. If the resources are not sufficient to achieve the goal, this should be explained to those who have a different position and they should be required to take a position commensurate with available resources. Those still disagreeing should be removed and replaced with others.
3. Each subsystem and element of the business entity should have the right to require others to undertake activity necessary to achieve the common goal. This right should be exercised in a moderate and tension-free manner. In other words, everyone representing the business entity and all of its teams should be able to request others to perform better to achieve the common goal and, if necessary, help them in this work. This request should comply with high ethical standards, be in accordance with general norms, no-one should take offence and no tension should be created.
4. In order to achieve the common goal, the activity of each person should help and strengthen the activity of others. Everyone and all teams should have the power to raise issues with the governing body to improve the activities of those hindering the overall performance.

In order to organize management more successfully, let's first pay attention to the essence of the concept of "system power", which is used and investigated in the Ahangyol theory. Unfortunately, the concept of "system power" is not investigated sufficiently in scientific literature. Perhaps the main reason for this is the fact that the concept of "power" is not comprehensively studied in philosophy [4]. In the science of Ahangyol, the power of a system refers to a set of its capabilities. It should be noted that this concept should not be confused with the concept of "potential energy" or "kinetic energy" of a system or entity. When talking of the "power of a business entity",

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we means a set of its capabilities. These capabilities can be divided in four parts: g_1– capabilities that can be used quickly; g_2 – capabilities that can be used to solve not very difficult problems; g_3 – capabilities that can be used with some difficulty; g_4 – capabilities that can be used to overcome enormous difficulties. For the time being, the business entity should set a goal that would be within the scope of g_1 and g_2 capabilities. g_3, g_4 capabilities should determine future goals and strategies to achieve them.

Let's now move on to the "4 energy" provision [3] of the science of Ahangyol, which can be of great importance for the successful operation of a business entity. According to this provision, it is important to analyze and take into account four components of "life energy", which is important for the existence and successful operation of any system. These components are:

1) In the hierarchical system of which the business entity is a part, the energy it receives from the upper systems. The word "energy" here means "help", "support", etc. For example, let's say that a business entity is a factory manufacturing some products. This factory is part of other systems in terms of hierarchy. Examples of such upper systems include the ministry, legislative bodies, government, ecological system, market, etc. Part of the energy available for the factory's existence and operation comes from these systems. We will refer to this component e_1.
2) The second component is the energy generated in the course of the interaction of personnel, technical facilities, governance principles, scientific support, etc. within the factory itself. Let's call this component e_2.
3) The third type of energy component in related to the opportunities emerging during experience exchange with others and the results obtained. Let's call this component e_3.
4) This component is formed under the influence of irrational factors that cannot be fully understood. In the Ahangyol theory, there are methods to reveal these factors and take them into account. Let's mark this component as e_4.

Experience shows that an analysis of these components in the management process leads to more successful business management. The role of these components may vary at different times and in different places.

a) Mathematical Model Helping Uncover Latent Factors

Let's assume that we can define the strength of a business entity on a fuzzy scale [5] as follows:

X (x_1– no power, x_2– very low power, x_3– low power, x_4– medium power, x_5– high power, x_6– very high power, x_7– extremely high power).

At the same time, let's review the achievements. Let's define the scale on which these achievements are possible as follows:

Y (y_1– no results, y_2– very few results; y_3– few unsatisfactory results; y_4– average results; y_5–overall good results; y_6–good results; y_7– extremely good results)

It is clear that specific y_i outcomes are expected for each x_i power unit of the business entity. In other words, if the power of a business entity is high (x_6), then its activity is expected to be successful (y_6). In real life, however, x_i may correspond not to y_i, but to another option, for example, y_k. Then it is necessary to examine why such a situation has arisen. This examination can be performed in different ways, of course. The results will help to significantly improve management. In our opinion, the "4 energy" principle of Ahangyol we talked about above will be helpful in carrying out a more comprehensive examination. This will make it possible to reveal valuable latent factors. To do this, the following steps should be taken:

It is necessary to check the condition of e_1, e_2, e_3, e_4 components which form the energy for an x_i business entity. In other words, it should be clarified that:

e_1– In the subsystem this business entity is part of (in the hierarchical system that should ensure the operation of this business entity), what is the status of its support? We can mark the state of this support as follows:

(k_1– very high, k_2– high, k_3– medium, k_4– low, k_5– very low)

e_2– how are the processes going on within this business entity, what is the state of management and productivity? We can mark the quality of internal processes as follows:

(d_1– very high, d_2– high, d_3– medium, d_4– low, d_5– very low)

e_3– what is the situation in the field of studying the experience of others, exchanging experience and benefiting from others?

Let's mark the processes in this field as follows:

(t_1– very high, t_2– high, t_3– medium, t_4– low, t_5– very low)

e_4 – studying the situation with e_4 is of a slightly different nature. It is impossible to find out exactly what the situation is like here because we are already talking about irrational factors. And yet it is possible to determine certain things based on the provisions of the Ahangyol.

(q_1– very high, q_2– high, q_3– medium, q_4– low, q_5– very low)

Let's assume that after careful analysis, we came to the conclusion that the current status of a team is as follows: (k_3, d_2, t_4, q_3).

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Of course, changes should be immediately made to e_1, e_2, e_3. The possibility degree of making such changes will be as follows:

$$\mu_1, \mu_2, \mu_3, \mu_4$$

μ_1 – opportunities that can be quickly modified and brought to a higher level without any difficulty in e_1, e_2, e_3;

μ_2 – opportunities with certain difficulties in e_1, e_2, e_3, which do not require much time and which can be improved from the medium to the high level;

μ_3 – problems in e_1, e_2, e_3 - problems that can be eliminated, although not quickly;

μ_4 – problems in e_1, e_2, e_3 that cannot be resolved;

First of all, the opportunities available in μ_1 should be used with flexibility and problems should be resolved. This will help to improve the mood and psychological state in the business entity and contribute to the solution of problems in μ_2 and μ_3. Solving the problems in μ_2 and μ_3 requires the preparation of scientifically supported Action Programs. These Action Programs should define strategies for solving the problems in μ_2, μ_3 and propose specific technologies. If unsolvable problems in μ_4 exceed 50 percent, this activity direction of the business entity should be stopped.

Let's assume that the following situation may arise in some cases: even if the highest level is achieved in e_1, e_2, e_3, the desired result is not available. Then there is a need to pay more attention to e_4. As these analyzes go deeper, more latent factors will be revealed. We have conducted these assessments on the basis of a business entity. However, it is obvious that these judgments may also prove useful for any other system. Therefore, the proposed model is universal.

II. Conclusion

The conclusion is as follows. There is currently a great need for using new results in the management of business entities. Using the results of the Ahangyol theory can also be quite useful. By using the provisions of this theory, it is possible to identify the more harmonious operating principles of any business entity and the strength of the business. These provisions can also be useful in improving the management of the business entity and revealing the latent factors that are important for management. The proposed mathematical model will be helpful in achieving more successful results to enable a more efficient use of important technologies.

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Research on Artificial Intelligence in Human Resource Management: Trends and Prospects

By Dr. Mandeep Kaur, Dr. Rekha AG, Dr. Resmi AG & Dr. Franco Gandolfi
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Abstract- Applying Artificial Intelligence (AI) technologies in Human Resource Management (HRM) contributes to more capability, diverse insights, and analytical support to enhance people management. This study presents an integrated overview of the research trends through a PRISMA-compliant bibliometric review. We have analysed a dataset of 247 Scopus-indexed publications between the earliest available date (1993) till 2020 to understand the key themes and the related research focus. The study shows that most research has been conducted in recent years, with 70% of relevant papers published since 2010. The key themes subscribed to the development of this literature have been called out. The outcome of term co-occurrence analysis highlights majority research related to AI in HRM focuses on resource allocation, talent acquisition, and training and development. The research spotlights significant areas attributed to AI in HR functions that warrant additional research. Deliberation of research gaps and recommendations on future direction is also provided.

Keywords: *artificial intelligence, AI, HRM, human resource management, bibliometric analysis.*

GJMBR-A Classification: *LCC: HD28-HD70*

RESEARCHONARTIFICIALINTELLIGENCEINHUMANRESOURCEMANAGEMENTTRENDSANDPROSPECTS

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Abstract- Applying Artificial Intelligence (AI) technologies in Human Resource Management (HRM) contributes to more capability, diverse insights, and analytical support to enhance people management. This study presents an integrated overview of the research trends through a PRISMA-compliant bibliometric review. We have analysed a dataset of 247 Scopus-indexed publications between the earliest available date (1993) till 2020 to understand the key themes and the related research focus. The study shows that most research has been conducted in recent years, with 70% of relevant papers published since 2010. The key themes subscribed to the development of this literature have been called out. The outcome of term co-occurrence analysis highlights majority research related to AI in HRM focuses on resource allocation, talent acquisition, and training and development. The research spotlights significant areas attributed to AI in HR functions that warrant additional research. Deliberation of research gaps and recommendations on future direction is also provided.

Keywords: artificial intelligence, AI, HRM, human resource management, bibliometric analysis.

I. Introduction and Background

Rapid increase in digitization and the corresponding trend of leveraging Artificial Intelligence Technologies (AIT) has been reshaping the business landscape.The amalgamation of Information Technologies and Human Resource Management (HRM) has brought forth improved efficiency, impacted service delivery, provided standardization, empowered managers, and transformed HR functions (Parry and Tyson, 2011; Bondarouk and Brewster, 2016). AI and related technologies, be it Machine Learning (ML), Robotic Process Automation (RPA), or Natural Language Processing (NLP), have influenced and revolutionized the very foundation of business models (Heric, 2018). The transformation of HR technologies has also revolutionized HRM practices by introducing functionalities of e-recruitment, e-training, or e-competence management (Stone et al., 2015). AI-enabled digital technologies have impacted HR functioning approaches such as resource planning, candidate sourcing, talent acquisition, attrition prediction, performance evaluation, succession planning, employee engagement, compensation, and learning and development (Kovach & Cathcart, 1999; Falletta, 2013; Rogers, 2018; Fallucchi et al., 2020; Kaur et al., 2021). HR function has transitioned from being considered a support function, to being acknowledged as a strategic partner to the business (Park, 2018; Zehir et al., 2020). Therefore, in the current context of rapid digitalization, the expectation is to adopt contemporary technological advances to build additional digital and cognitive HRM competencies that will enhance business performance. HR is envisaged to be a 'key transformation player' in the adoption of technologies and in reducing resistance to change (Thite, 2018).

Literature indicates the growing importance of AI tools for HRM activities. These technologies have enabled new functionalities in HRM, such as, data mining, cloud computing, application of HRM for mobile technologies, Social Media, Analytics, Clouds (SMAC), and big data (Bondarouk, 2014). A conceptional framework of AI in HRM is proposed in a study by Jia et al. (2018), which consists of aspects of HRM related to talent acquisition, learning, HR strategy, performance management, compensation, and employee engagement along with related AI technology applications. AI strengthens HRM functionality to identify actual performers and future leaders by eliminating bias (Buck and Morrow, 2018). Another key aspect is contribution of AI in enhancing employee experience (Smith, 2019). AI applications em powers HR teams to make better talent decisions in analysing, predicting, and diagnosing, thus providing a strategic advantage (Nicastro, 2020).

Work and the HR function are going through a period of rapid change and are getting transformed by technological advancements (Bondarouk et al., 2017, Connelly et al., 2020). The innovation and related disruptions in business processes require continuous up-skilling of employees. As a function, HR has needed to reimagine how work needs to be done differently with AI and the related technologies (Manuti and Palma, 2018; Maity, 2019). The digitization of HR has been referred to by many terms – online HRM, E- HRM, and digital HRM (Crawshaw et al., 2020). On challenges of AI in HR, Tambe et al. (2019) emphasize the challenges

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related to limitations imposed by small data sets, the intricacy of HR phenomena, aspects of fairness, ethical, legal, and accounting aspects in the adoption of AI in HR. There are various challenges ranging from empirical to conceptual, which can be attributed to the adoption of AI in HRM (Kaur et al., 2021).

Thus, AI has become progressively of great interest to scholars and practitioners.The impact of AI on HRM has necessitated the need for conducting an exhaustive study of the research landscape of this critical domain. It appears from the literature that the research on applications of AI in HRM is receiving a greater focus and many related relevant areas remain unexplored. The current study has attempted to provide insights to the following research questions (RQs):

RQ1: What are the research trends of publications in terms of source types, citations, document types etc. related to AI in HRM?
RQ2: What are the key themes of research in the domain of AI in HRM?
RQ3: Which are the areas/domains that require additional and focused examination in the future related to AI in HRM?

This study was conducted using bibliometrics analysis to provide reference, insights, and inputs for future research and to share in-depth insights into aspects of AI-HRM research trends with the Scopus database as the base.

This paper is arranged into five sections. The following section briefs the methods, data and the search strategy used in this study. Then we present the analysis and findings of the study. After that we provide a detailed discussion on major research themes identified and the future research directions followed by concluding remarks.

II. Methodology

a) Method

Bibliometric analysis has been widely recognized as one of the significant methods to determine and forecast the research trends of specific topics (Zupic and Cater, 2015). Bibliometric analysis-based studies include methods for understanding the global trends in research within a particular field using a database of scholarly literature and presents findings and discussions on the evolution and intellectual structure of knowledge base in that field. In this study, we conducted a bibliometric analysis using citation analysis, co-citation analysis, keyword co-occurrence analysis, and clustering (Ellegaard and Wallin, 2015; Linnenluecke et al., 2020; Donthu et al., 2021). The following section presents the data source and search strategy applied in this study.

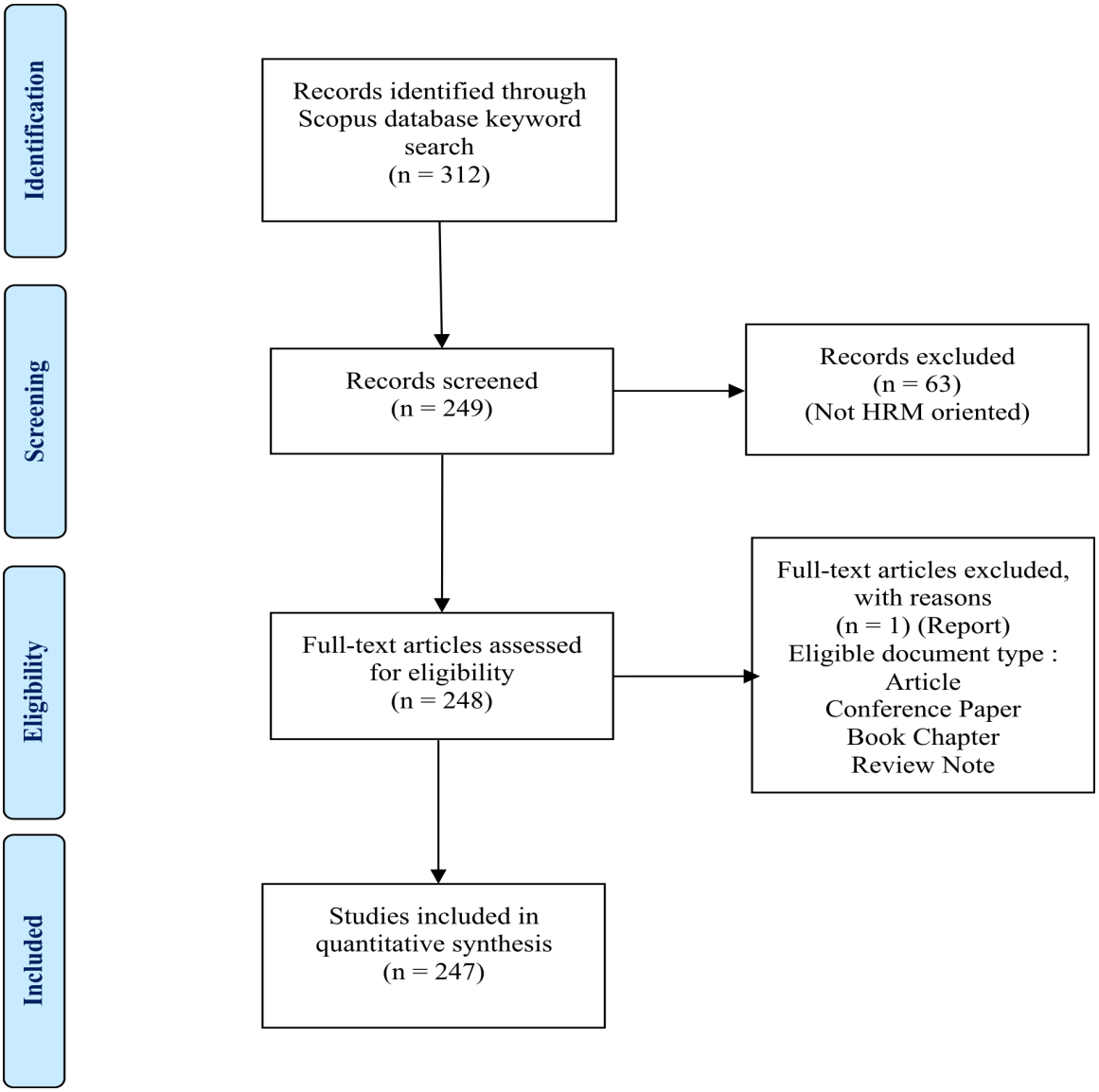
b) Data Source

Scopus is a detailed database with adequate inbuilt search filters (Oliveira et al., 2019). Thus, we have earmarked Scopus as the data repository to pull out relevant results related to the research. All related studies published and indexed in Scopus till the end of the year 2020 has been reviewed to document and analyse key trends since the emergence of research related to AI in HRM.

c) Search Strategy

Systematic methods were deployed in the research by adopting the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines to make the article selection process to be objective and systematic (Priyashantha et al., 2021). As represented in the flow diagram (Figure 1), we have followed a search protocol and inclusion/exclusion criteria through the four steps of identification, screening, eligibility and inclusion for arriving at the list of articles to be analysed as mentioned in Meline (2006) and Pahlevan-Sharif (2019). The study integrated an extensive range of document types, indexed by Scopus, including books, chapters/ sections of books, journal articles, and conference papers published by 2020 on the topic. As there was no specific start date being referenced for the Scopus search in the literature, thus it facilitated the search engine to identify the earliest studies related to this topic. After the initial screening of documents from a relevant perspective, the final database reflected a total of 247 documents, resultant of query results by using keywords "Human Resource" OR "HRM" OR "Talent" OR "Personnel Management" OR "HRD" AND "AI" OR "Artificial Intelligence" OR "Machine Learning" OR "Deep Learning" OR "Neural Network" OR "Fuzzy" OR "ANN" OR "Genetic Algorithm" OR "Predict". Additionally, all available metadata related to the title, abstract, keyword, and related research studies were downloaded and analysed. Additional data editing was conducted for specific fields of the search, which included instances wherein synonyms were merged (e.g., 'Human Resource Management, 'Human Resources Management' and 'HRM'). The quantitative review aimed to examine the present status of literature related to AI in HRM and to recognize, identify, and trace clusters and integrated research.

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Source: Moher et al., (2009)

Figure 1: Prisma Flow Diagram detailing Steps in the Identification and Screening of Sources

III. Analysis and Findings

On the research question (RQ1), we analysed the key attributes of the literature and research trends currently on AI in HRM. A total of 247 Scopus-indexed documents spanning the last 25 years represent a rapidly increasing foundation of knowledge related to AI in HRM. The source type represented in Table 1 reflect that journal papers contributed to 49.80% of the published documents on AI research in the HRM domain, while conference papers contributed 39.68% and book series 9.72%. Table 2 represents citation metrics, and it shows that there is an average of 68 citations per year.

Table 1: Publications by Source Type

Source Type	Total Publications (TP)	Percentage (%)
Journal	123	49.80%
Conference Proceeding	98	39.68%
Book Series	24	9.72%
Book	1	0.40%
Trade Journal	1	0.40%
Total	**247**	**100%**

Source: Scopus Database;1993 to 2020 and Authors Compilation

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Table 2: Citations Metrics

Metrics	Data
Publication years	1993-2020
Citation years	27 (1993-2020)
Papers	247
Citations	1859
Citations/year	68
Citations/paper	7
Citations/author	708
Papers/author	120
h-index	2
g-index	23

Source: Scopus Database; 1993 to 2020 and Authors Compilation

Table 3: Publications Bylanguage

Language	Total Publications (TP)	%
English	239	96.76%
Chinese	5	2.02%
German	1	0.40%
Portuguese	1	0.40%
Spanish	1	0.40%

Source: Scopus Database; 1993 to 2020 and Authors Compilation

Table 4: Countries with Highest Number of Documents Published (Country of Origin)

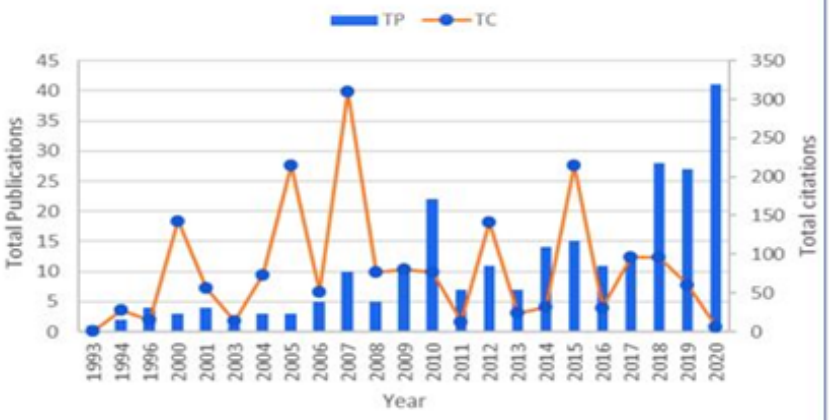
Sl	Country	TP	%
1	China	106	42.74%
2	Taiwan	17	6.85%
3	India	14	5.65%
4	Iran	13	5.24%
5	United States	11	4.44%
6	Turkey	9	3.63%
7	United Kingdom	9	3.63%
8	Germany	7	2.82%
9	Brazil	6	2.42%
10	Malaysia	6	2.42%

Source: Scopus Database; 1993 to 2020 and Authors Compilation

Figure 2 traces the growth trajectory of the number of publications related to the area of AI in HRM till October 2020. During the period from 1993 to 2010, 30% of contributions of the total publications were made, while during the last decade, i.e., during the period 2010 to 2020, 70% of the publications were made. The sharp increase reflected in publications from the year 2018 contributing to 44% of the total publications since 1993, indicates the increasing focus on the application of AI in the HRM function. The analysis of the language of research publication is reflected in Table 3, with English contributing to the majority 96.7%, followed by 2.02% as Chinese, and German, Portuguese and Spanish at 0.40% respectively. Table 4 represents the countrywide distribution of research indicating that 42.74% of the documents are published in China, followed by Taiwan with 6.85% and India with 5.65% of the contribution. The figures suggest that there is an upward swing reflected, with swiftly emerging literature since 2018.

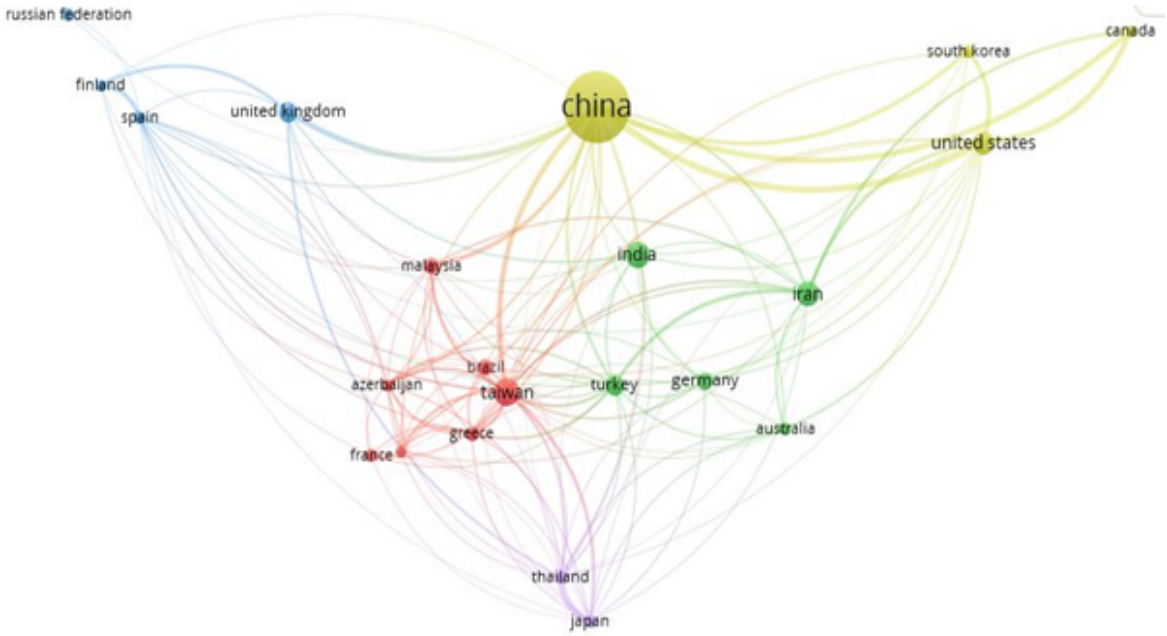
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Year	TP %	Cumm %
1993	0%	0%
1994	1%	1%
1996	2%	3%
2000	1%	4%
2001	2%	6%
2003	0%	6%
2004	1%	7%
2005	1%	9%
2006	2%	11%
2007	4%	15%
2008	2%	17%
2009	4%	21%
2010	9%	30%
2011	3%	33%
2012	4%	37%
2013	3%	40%
2014	6%	46%
2015	6%	52%
2016	4%	56%
2017	5%	61%
2018	11%	72%
2019	11%	83%
2020	17%	100%



Source: Scopus Database;1993 to 2020 and Authors compilation

Figure 2: Total Publications by Year Notes: TP=total publications; TC=total citations. TP %=percentage of publications; Cumm%=cumulative percentage of publications.



Source: Generated by the Authors using VOS Viewer

Figure 3: Country-Based Bibliometric Coupling

Table 5: Top Author Keywords Used in the Literature

Author Keywords	Total Publications (TP)	Percentage (%)
Human Resource	96	38.87%
Artificial Intelligence	47	19.03%
Fuzzy Logic	43	17.41%
Decision Making	42	17.00%
Resource Allocation	37	14.98%
Neural Networks	25	10.12%
Analytic Hierarchy Process	22	8.91%
Artificial Neural Network	16	6.48%

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Optimization	14	5.67%
Personnel Training	14	5.67%
Genetic Algorithms	12	4.86%
Hierarchical Systems	12	4.86%
Performance Evaluation	12	4.86%
Enterprise Human Resource	10	4.05%
Recruitment	10	4.05%
Deep Learning	9	3.64%
Fuzzy Evaluation	9	3.64%
Genetic Algorithm	9	3.64%
Talent Management	8	3.24%
Decision Support Systems	7	2.83%
Decision Theory	7	2.83%
Fuzzy Systems	7	2.83%
Human Resource Allocation	7	2.83%
Innovation	7	2.83%
Machine Learning	7	2.83%
Membership Functions	7	2.83%
Neural Network	7	2.83%
Project Management	7	2.83%
Analytical Hierarchy Process	6	2.43%
Big Data	6	2.43%

Source: Scopus Database; 1993 to 2020 and Authors Compilation

Figure 3 represents country-based bibliometric coupling, indicating that the countries presented therein cite similar literature in their publications. Higher bibliometric coupling indicates that the studies deal with related subject matter (Martyn, 1964). The figure shows that strongest bibliometric coupling exists between China and the United States, indicating that the studies originated from China and the United States have common citations more frequently. Table 5 is representative of the main keywords related to AI in HRM, which indicate the functionalities and technologies associated with AI in the HRM field that is currently being referenced in research. These keywords related to functionalities are – "decision making", "resource allocation", "optimisation", "personnel training", "performance evaluation", "talent management". The corresponding keywords related to AI technologies are – "neural networks", "genetic algorithms", "deep learning", "fuzzy support systems".

Table 6: Literature Related to Cluster 1: AI in Resource Allocation

Research on HRM Functionality/AI Technique	Research Sources
Demand forecasting, Allocation of resources, Prediction tasks, Neural Networks applications, Analytic Hierarchy Process, Fuzzy Mathematics	Aviso et al.(2018);Andalib et al.(2020);Apornak etal.(2021);Coelho et al.(2019);Chang (2010); Ivanov et al. (2020); Kieling et al.(2019); Khanizad & Montazer (2018); Kwak & Jung, (2003); Markevich & Sidorenko (2019); Xu et al.(2019)
Prioritization of resource demands, Resource optimization	Daojin (2010); Guenole & Feinzig (2019); Hsu et al. (2019); Lin & Gen (2008)
Reverse candidate profiling, Ideal Fit for role, Balanced Job descriptions, AI Algorithms	Gikopoulos(2019); Guenole & Feinzig (2019); Rogers (2018); Leem (1996)

a) Term Co-Occurrence Analysis

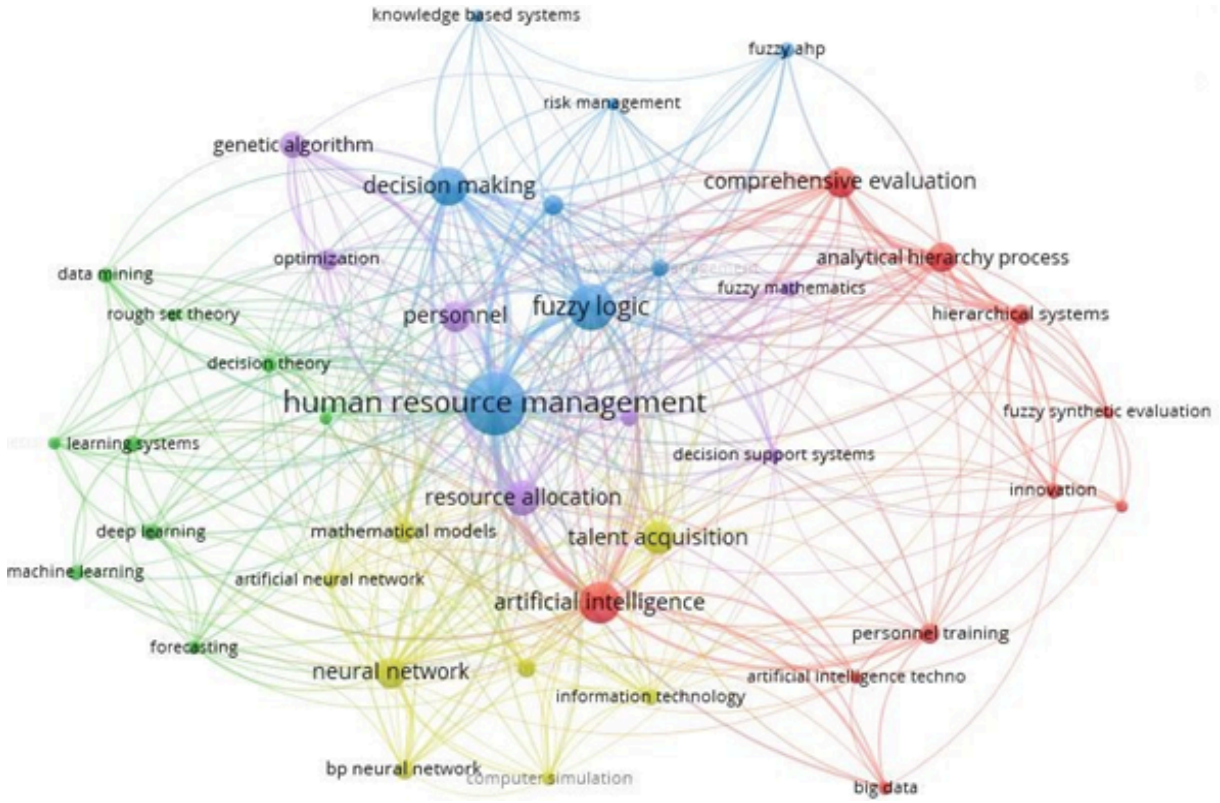
In order to identify the research focus, a co-occurrence analysis was conducted of all keywords, including author keywords and index keywords, using VOS viewer software (Van Eck and Waltman, 2010). As reflected in Figure 5, areas of maximum focus in the research related to AI in HRM literature are talent acquisition for recruitment and selection, resource allocation, and personnel training. The analysis also reflects the related AI technologies that support these functionalities: machine learning, data mining, big data, deep learning, neural network, and fuzzy logic.

Co-occurrence network (Figure 5), based on title and abstract fields, indicates that the significant overlapping areas in AI in HRM research are resource allocation, training & development, talent acquisition,

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and related aspects of efficiency and effectiveness in decision-making. It is also indicative that the methods and techniques focussed include analytic hierarchy process, artificial neural network, fuzzy logic, and evaluation models. Resource allocation function is facilitated by the application of AI in HRM, as it contributes in an optimal, effective, and budgeted manner, the process of assigning and scheduling available resources, including the workforce. The talent evaluation function is objectively developed and driven by neural networks and the analytic hierarchy process, which brings forth a method of organizing and analysing complex decisions related to talent. Training and development are another key area that is reflected in the co-occurrence network.

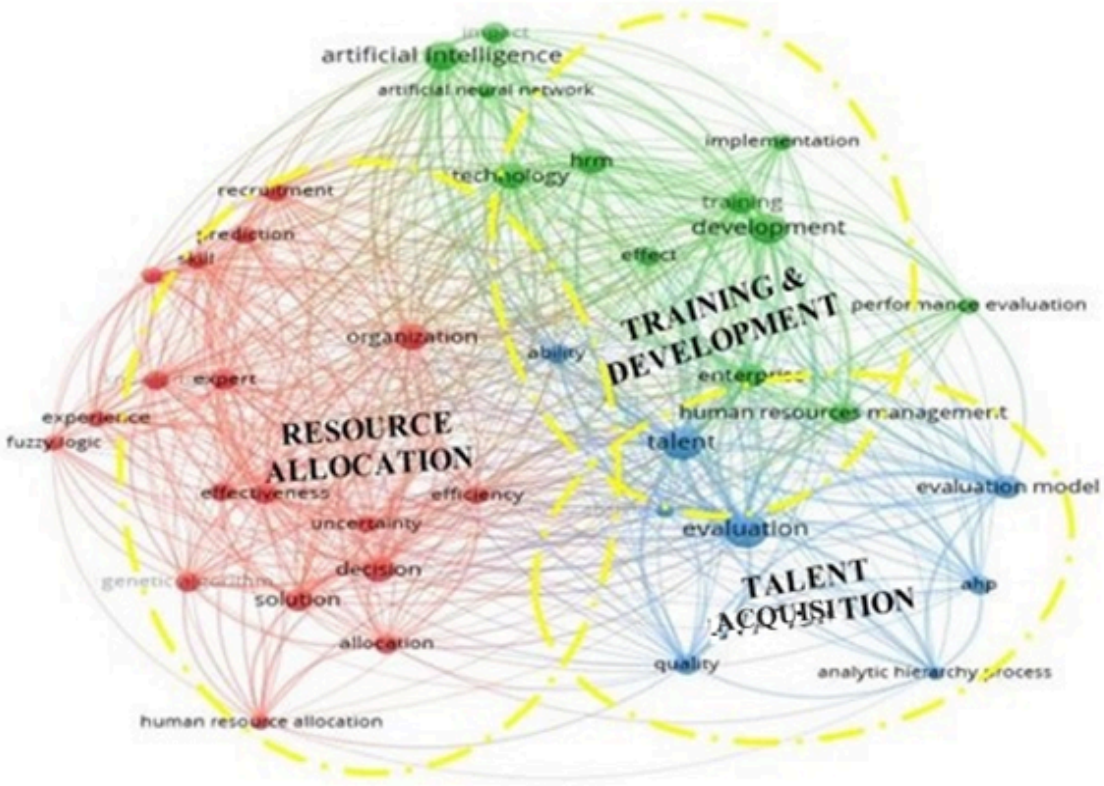
The second research question (RQ2) focussed on the areas of research in the domain of AI in HRM. As indicated in the VOS viewer visualization of term co-occurrence network based on title and abstract (Figure 5) suggests that the research in AI in HRM predominantly focuses on talent acquisition, resource allocation, and training and development. Top keyword analysis, as reflected in Figure 4 shows the prominent keywords used in the publications, bigger a circle, the more frequently the keyword appears in the publication set from Scopus. The top three keywords as per the analysis are Human Resources (38.87%), AI (19.03%), and Fuzzy Logic (17.41%). A brief overview of the literature on the three key areas identified, namely, resource allocation, talent acquisition, and training and development is reflected in Tables 7, 8 and 9.



Source: Created by Authors using VOS Viewer

Figure 4: Network Visualization Map of Keywords

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Source: Created by Authors

Figure 5: VOS Viewer Visualization of Term Co-Occurrence Network based on Title and Abstract (Binary Counting)

Table 6: Literature Related to Cluster 1: All in Resource Allocation

Research on HRM Functionality/AI Technique	Research Sources
Demand forecasting, Allocation of resources, Prediction tasks, Neural Networks applications, Analytic Hierarchy Process, Fuzzy Mathematics	Aviso et al.(2018); Andalib et al.(2020); Apornak etal.(2021); Coelho et al.(2019); Chang (2010); Ivanov et al. (2020); Kieling et al.(2019); Khanizad & Montazer (2018); Kwak & Jung, (2003); Markevich & Sidorenko (2019); Xu et al.(2019)
Prioritization of resource demands, Resource optimization	Daojin (2010); Guenole & Feinzig (2019); Hsu et al. (2019); Lin & Gen (2008)
Reverse candidate profiling, Ideal Fit for role, Balanced Job descriptions, AI Algorithms	Gikopoulos(2019); Guenole & Feinzig (2019); Rogers (2018); Leem (1996)

Table 7: Literature Related to Cluster 2: All in Talent Acquisition

Research on HRM Functionality/AI Technique	Research Sources
Sourcing candidates. Predictive tool algorithms for programmatic recruitment advertising	Esch & Black (2019); Schweyer (2018)
Candidate engagement through chatbots on the web, mobile, socially enabled by natural language processing	Ernst & Young (2018); Meister (2019a); Nunn, (2019); Sheikh et al.(2019); Upadhyay & Khandelwal(2019)
Candidate profiling by applying computational linguistics	Charlier & Kloppenburg (2017); Walford-Wright & Scott-Jackson (2018)

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Profile matching,Automation of resume/job description, Optical character recognition (OCR), Advanced application tracking systems, Inclusive AI algorithms for unbiased screening of profiles	Barboza (2019); Cohen (2019); Esch & Black (2019); Gikopoulos (2019); Guenole & Feinzig (2019); Kaplan & Haenlein (2019); Meister (2018b); Nunn (2019); Rogers (2018); Sivathanu & Pillai (2018); Strohmeier & Piazza (2015)
Talent selection techniques, Neural network, Fuzzy Systems, Data mining techniques,Gaming techniques for selection, AI chatbots – interpretation/validation of candidate response	Bersin (2017); Huang et al.(2001,2004); Ranjan et al. (2008); Sivathanu & Pillai (2018); Ernest & Young (2018); Meister (2018b); Mentzelopoulos & Economou (2020); Johnson et al. (2020); Jimenez et al.(2018); Qin et al. (2020); Ye et al.(2019)
Interview methods with Unconscious bias reduced -AI tools "listen"/prompt question, Robotic Process Automation (RPAs)	Cohen (2019); Gikopoulos (2019); Guenole & Feinzig 2019); HRPA (2017)
Onboarding, Natural language processing, for chatbot-agnostic technology and text-based conversational interface of Chatbots as an online buddy, customization, and automation, and core business functions, AI algorithms to map team fit,learning needs on Day 1	Barboza (2019); Gikopoulos (2019); Upadhyay & Khandelwal (2019)

Table 8: Literature Related to Cluster 3: AI in Training & Development

Research on HRM Functionality	Research Source
AI tagging of learning content through metadata, AI-enabled tutoring systems, intelligent agents embedded	Barboza (2019); Guenole & Feinzig (2019); Meister (2019a); Niehueser & Boak (2020); Schweyer (2018); Qiong et al. (2018)
Individual Development Plan, Succession Planning Smart data matching and AI-enabled Individual profile analysis to identify the right talent for key roles	Barboza (2019); Bersin (2017); Nunn (2019)
Career mobility through digital coaching Virtual assistant-datafor personalized career counselling.	Bersin (2017); Ernest & Young (2018); HRPA (2017); IBM (2019);Kiron & Spindel (2019)
Skill gap analysis, Gaming techniques for Deep Learning, Current analytics, and predictive analytics of skills required	Barboza (2019);Guo & Li (2020); Nunn, (2019a); Mentzelopoulos & Economou (2020);

The effectiveness of HR function is greatly enhanced by the adoption of AI and the associated technologies. The third research question (RQ3) addresses the areas/domains that require additional and focused research in the future related to AI in HRM. There has been a steady pace of development of applications related to AI technologies for the HRM function, which have been covered with adequate research.

IV. Discussion and Future Research Directions

The analysis shows that a significant portion of the research was published during the last decade, with a sharp increase since 2018. In the country-wise publication output, China is leading with more than 42% of documents published in the area of AI in HRM. As pointed out in (Demchak, 2019; Li et al., 2021), China is abundant with the two critical assets needed in the AI era, i.e., data and engineering talent, which could be the reason behind its prominence in this field. The keyword and term co-occurrence analysis were conducted to explore the prevailing themes in the research related to AI in HRM. Three clusters emerged from the term co-occurrence analysis based on title and abstract is represented in Figure 5. A brief discussion on these clusters is presented in the following sub sections.

a) Cluster 1 - Resource Allocation

The logical allocation of human resources plays an important role for the organization's development and

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is considered a challenge by many organizations. The term co-occurrence network showed that workforce planning and resource management are a key research area in AI and HR. Literature suggests that AI technology and applications enable organizations for efficient workforce management and optimization. For example, a variation of unsupervised Competitive Learning neural networks algorithm was proposed by Leem (1996) to overcome the obstacles that conventional analyses face. The deployment of Analytic Hierarchy Process (AHP) and Fuzzy Mathematics systems ensures appropriate management decisions for employees' most suitable role assignments (Subramanian and Ramanathan, 2012; Saaty et al., 2007). A fuzzy input-output optimization method was proposed by Aviso et al. (2018) for HR allocation during a crisis.

AI enables a comprehensive evaluation of human resource allocation and continuous improvement. The ability of AI to analyze a large amount of data and draw inferences and detect patterns assist in resource planning optimally (Lengnick-Hall et al., 2018). It also enables multi-criteria human resource allocation, which involves allocating limited availability human resources among many demands by optimizing current objectives (Lin & Gen, 2008). Data related to employee performance and succession and analysis of it provides insights on employee engagement and related challenges (Smith, C. 2019). Resource efficiency can be enhanced by forecasting, which is critical in decision making, based on which the financial costs of the workforce can be optimized.

b) Cluster 2 - Talent Acquisition

Literature shows that AI enhances recruitment efficiency through balanced job descriptions, job requisition prioritization, profile databases, programmatic recruitment advertising based on machine learning, attracting potentially suitable candidates (Albert, 2019; Upadhyay and Khandelwal, 2018). A human resource selection system constructed using FNN is discussed in Huang et al. (2004). AI assistants support the engagement of candidates through digital platforms (Van and Black, 2019). Specialized chatbots can be used for candidate attraction and to have an insightful conversation to engage candidates in deeper conversation and recommend jobs relevant to their skills and experience (Leong, 2018). The chat topics provide informative answers about aspects related to the organization – compensation, vacation guidelines, culture, locations, dress code, business, and assessment process. It enhances the scope of converting prospective candidates into active job seekers. Thus, creating a positive recruiting experience and facilitates accepting a job offer by the right candidate. Selection efficiency is improved by proper candidate identification with data analysis (Bongard, 2019). Predictive analysis helps forecast the future performance of a prospective candidate, basis the profile and information collated and analysed during the automated aspects of the job application process.

Profile matching, Optical Character Recognition (OCR), CV Parsing are key applications enabled by AI (Singh and Finn, 2003; Bizer et al., 2005). Initial screening can be automated by neural networks, data mining techniques, and AI chatbots by conducting interpretation/validation of candidate responses. Intelligent interviews are conducted with reduced unconscious bias, assisted by AI tools to "listen"/prompt questions and Robotic Process Automation (RPAs) (Madakam, 2019; Nawaz, 2019). Background checks are automated, based on different reviews required, basis the profile of the candidate. From the literature it can be seen that the digitally enabled on boarding process focuses on two aspects. One is to automate, and the second is to personalize. Functionalities like Chatbots support new hires in knowing relevant details about their new role, team hierarchy, and overall organizational landscape (Ernst & Young, 2018; Nunn, 2019). The efficiency of the on boarding process improves by the collection of employee information, joining forms completion, and assistance in online registration. Another key aspect is that through digitally enabled on boarding, the new hires have access to tools facilitating them to connect and socialize in their new organization, which positively impacts their learning, productivity, and engagement, as they settle in their new roles (Sheikh et al., 2019;Upadhyay & Khandelwal, 2019).

c) Cluster 3 - Training and Development

Cluster 3 focuses on training and development applications of AI. Literature suggests that AI-based tools provide more personalized and enhanced digital learning experience (Ong and Ramachandran, 2003; Maity, 2019). An employee can access their skill profiles, to build their skill journey helping to have ownership in building their skills path and their career path and thereby supporting the acceleration of skill development (Wang and Lin, 2020). The search engine capabilities in the Learning tools architecture helps in making intelligent recommendations, for the learning road map, for an employee. Through metadata, AI tagging of all content in the learning modules supports user-friendly interfaces through content channels (Guenole and Feinzig, 2019). Intelligent data matching and AI-enabled individual profile analysis provide insights that help identify the right talent for key roles and succession planning (Barboza, 2019; Bersin, 2017; Nunn, 2019). Interactions with employees for growth and future opportunities are enabled by AI tools, which can act as a personalized digital career advisor, allowing employees to advance their careers within the

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organization. This allows in creating meaningful work experiences for employees, better growth assistance, and building more robust pipelines for critical businesses. The interactive user interface uses natural language processing to engage in active discussion with the employees (Litman, 2016). This is integrated with precisely the employee's historical information about various aspects. Literature also suggests that AI-enabled job-opportunity match functionality will be of use in suggesting suitable roles for employees, based on their profiles (Tambe, 2019; Nocker and Sena, 2019). Employee queries can be resolved by the AI tools. Provision of built-in alerts on job opportunities help employees to know about internal opening matching to their current profiles and tailored to their aspirational roles.

We can see that majority of research related to AI in HRM focuses on talent acquisition, resource allocation, and training and development. Very few studies have explored the adoption of AI in other HR functions such as employee retention, compensation and seperation. Additional research is needed on different aspects of AI in HRM, including adoption challenges, impact studies, new skill requirements etc. In the following section, we discuss the future research directions based on the findings.

d) Implications and Future Research Directions

As indicated by the findings, despite continual research progress is being made related to AI technologies for the HRM function, there are areas which need further attention and in-depth understanding.

The study findings indicate possible follow-on ideas and future studies. For example, research is required on how AI and related technologies in the HRM function have impacted vital aspects of employee engagement, retention, growth, compensation, reward, and recognition. There have been very few studies conducted related to these aspects. How this phase of HR transformation and the strategic development of HR has impacted business performance is a key area that has not been investigated.

The transformation of HR function by the adoption of AI technologies is an emergent field of focus. Despite the benefits of AI adoption, there is a huge variance in terms of adoption of AI. Research needs to be conducted on what are the influencing factors that impact adoption. Though AI adoption is key aspect of technology adoption in organizations, there is lack of technology adoption model-based research, related to adoption of AI across all domains of HR. Further, detailed research work is recommended to be conducted on the design and implementation of change management in adoption. Another good avenue for future research would be industry-specific and cross-industry comparisons to support further research.

Many areas merit additional investigation, even though a significant work on AI in HRM has been conducted, especially in the last decade. AI in HR has enabled the HRM function to be transformed and acknowledged as a strategic partner of the business. For example, technological advancements have created opportunities in the talent acquisition domain that links strategic HR management with business strategy (Walford and Scott, 2018). By enabling digital engagement, HR provides a competitive advantage to the organizations (Jesuthasan, 2017). There is a lack of research, as to what is the impact of HR's transformation by leveraging AI and how does this contribute to enabling organizations to achieve business success and leverage strategic advantage for hiring and retaining key talent. Further, in the domain of strategic HRM, cognitive enabled insights can facilitate drawing optimal outcomes. While humans contribute to a more thorough and intuitive approach to managing uncertainty and complexity in organizations (Jarrahi, 2018), AI can enhance humans' cognition when handling complex problems. There is a dearth of research and detailed studies on this aspect.

The use of AI tools/applications has led to questions related to the authenticity of people/talent decisions made basis AI algorithms and logic. Especially in the talent acquisition domain, the fairness and objectivity of hiring decisions based on the logic of an AI based algorithm or an AI based decision rule is questioned, as to whether these decisions are objective (Bogen, 2019). Aspects regarding the authenticity of employee data – both current and potential, are a cause of concern, as its validity is questionable. The authenticity of algorithms designed based on the data could be imperfect, as it could reflect society's ingrained prejudices and biases. Also, the aspect of inherent or unconscious bias which could be part of the logic of the algorithm or seeded in the decision rule and driving biased decision related to hiring needs further exploration. Data sets could be structured in advance to be aligned with historical precedents and patterns, which could even be part of an organization's culture and can be hardwired into code (Gulliford and Dixon, 2019). Questions regarding talent decisions made basis this data, whether it further strengthens exclusions and existing biases, is imperative to be researched, as these are sensitive topics to be addressed. Also, interlinked to this, there is a requirement for more comprehensive insights and counsel in the form of additional research to help address ethical concerns and acceptance of talent decisions based on applications of AI in the human resources functions.

Concerns related to the security and privacy of employee sensitive information also needs deeper exploration. Capelli (2019) has highlighted some of the drawbacks of data science being applied in HR, including concerns related to infringing on privacy, usage of social media posts as a determinant factor for

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hiring, which may lead to discriminative impacts on minorities/diversity. Democratizing data, transparency, and providing data and insights to employees is another aspect that needs further exploration (Hirsch, 2019).

Practical implication of the findings is related to the skill development of HR practitioners. There is lack of research regarding a key aspect, which is related to the expectations of new skills and competencies that HR professionals need to be proficient in, to adopt and apply AI and leverage its benefits. The skills of present and future HR practitioners will need to be developed to manage today's AI applications and future advancements. HR practitioners need to learn how to use AI-enabled analytical tools. They also need to be able to interpret and take action basis the analysis, thus developing numerical analysis and reasoning skills will also be required (Davenport, 2019). HR professionals need to have the competence to utilize technology to provide insights that support business, which necessitates the skill development of HR professionals (Wang and Lin, 2020). There are hardly any studies conducted on this key aspect of AI in HRM, which is the new skills and competencies that HR professionals need to be proficient in adopting and applying AI applications in HRM and leveraging all the benefits. Recent studies indicate that COVID-19 may accelerate the adoption of AI in HRM (Hamouche, 2021; Vahdat, 2021; Khalifa, 2022). There is also research gap related to actual impact studies providing insights on the adoption of AI and related technologies on the transformation of HR, which can be potentially leveraged for future growth and advancement of the HR function.

V. Conclusion

The adoption of AI in HRM has resulted in the effectiveness of HR processes, service delivery, and enhanced employee experience. It is imperative to study and interpret the further trends and opportunities of AI as applied to HRM. This work provides an exhaustive study of the emergence and accelerated growth of research on AI in HRM. We have evaluated the current status of research in the domain of AI in HRM and demonstrated the research gaps. In general, studies directly addressing AI in HRM in the abstract, title, or keywords has been continuously growing since 2010. The growth trajectory of literature indicates that it has more than doubled in size over the past decade. Analysis related to various aspects of research, be it types of documents and volume of documents, conceptual coherence, and citation impact, reveals that the most prevalent research areas are talent acquisition, resource allocation, and training and development in applying AI in HRM. Other predominant areas of research highlighted are neural networks, fuzzy logic, and evaluation models. Various future research implications are also discussed. Though this study has limitations in that it has considered only the publications indexed by Scopus, the comparatively small amount of research articles directly addressing the field suggest that further research is needed, focusing on areas of systematic theory development as well as conceptual and empirical studies. AI in HRM, being a rapidly developing area, there is substantial literature and research in the form of white papers and industry reports, which may lead to a lack of requisite bibliographic control.

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Breaking Through the Recruitment Barrier: Key Challenges and Proven Strategies for Hiring Managers

By Aditya Sharma

Abstract- In today's competitive job market, having the right strategy is crucial for hiring and on boarding top talent. A recent survey conducted with 200 participants revealed that there are several important pillars of the hiring process, including compelling outreach messaging, the use of scheduling tools, training and up skilling opportunities, employee growth, employer branding, and clear communication. By focusing on these pillars, recruiters can achieve better and more efficient results during the recruitment process. This paper aims to address the challenges faced by job seekers, and leverages the insights of corporate professionals, recruiters, and hiring managers across diverse industries to identify six strategies that can simplify the hiring process for recruiters.

Keywords: hiring, recruitment, job search, talent, human resource, on boarding, talent sourcing, jobs, recruiter, hiring manager.

GJMBR-A Classification: JEL codes: J23, M12



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Breaking Through the Recruitment Barrier: Key Challenges and Proven Strategies for Hiring Managers

Aditya Sharma

Abstract- In today's competitive job market, having the right strategy is crucial for hiring and on boarding top talent. A recent survey conducted with 200 participants revealed that there are several important pillars of the hiring process, including compelling outreach messaging, the use of scheduling tools, training and up skilling opportunities, employee growth, employer branding, and clear communication. By focusing on these pillars, recruiters can achieve better and more efficient results during the recruitment process. This paper aims to address the challenges faced by job seekers, and leverages the insights of corporate professionals, recruiters, and hiring managers across diverse industries to identify six strategies that can simplify the hiring process for recruiters.

Keywords: hiring, recruitment, job search, talent, human resource, on boarding, talent sourcing, jobs, recruiter, hiring manager.

I. Body

The recruitment market has been significantly impacted by the COVID-19 pandemic in the last two years. The pandemic has led to an increase in unemployment rates and a decrease in job opportunities, which has resulted in a highly competitive job market for both job seekers and employers. In addition, remote work has become more prevalent, making it easier for companies to hire candidates from anywhere in the world.

There are different category of candidates in the market that recruiters have to target:

1. Active and Passive Candidates: Active candidates are actively looking for job opportunities and are typically more responsive to recruitment efforts. On the other hand, passive candidates are not actively looking for new job opportunities but may be open to considering new roles if the right opportunity presents itself. Passive candidates may require more effort and a different approach to recruitment, such as building relationships over time.
2. Gen Z Candidates: Gen Z candidates are individuals born between 1997 and 2012 and are just starting to enter the workforce. They have grown up with technology and have different expectations and preferences for the workplace compared to previous generations. For example, Gen Z candidates may prioritize flexibility, work-life balance, and opportunities for career growth.
3. Older Candidates: Older candidates are individuals who are approaching retirement age or have already retired but are still interested in working. They may bring valuable experience and expertise to the workplace but may also have different expectations and preferences, such as a desire for part-time or flexible work arrangements.

It's important for recruiters to understand the different categories of candidates and tailor their recruitment strategies accordingly. For example, strategies for attracting Gen Z candidates may differ from strategies for attracting older candidates, and strategies for engaging with passive candidates may differ from strategies for engaging with active candidates.

Some of the usual challenges faced by recruiters:

1. Attracting and retaining top talent: With the highly competitive job market, recruiters are struggling to attract and retain the best talent for their companies.
2. Managing large volumes of applications: Recruiters are often inundated with large volumes of applications, which can be time-consuming and challenging to manage effectively.
3. Ensuring diversity and inclusion: Diversity and inclusion have become increasingly important in the workplace, and recruiters need to ensure that their hiring processes are inclusive and bias-free.
4. Adapting to new technologies: The recruitment industry is constantly evolving, and recruiters need to stay up-to-date with new technologies and tools to remain competitive.

Here are some of key strategies used by recruiters:

1. Employer branding: Building a strong employer brand can help attract and retain top talent by highlighting the company's unique values, culture, and benefits.
2. Candidate relationship management: Establishing and maintaining relationships with potential candidates can help recruiters build a talent pool and fill positions quickly when they become available.
3. Data-driven recruitment: Using data to inform recruitment strategies can help recruiters identify

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trends, optimize their processes, and make more informed hiring decisions.

4. Collaborating with hiring managers: Collaboration between recruiters and hiring managers can help ensure that the recruitment process is aligned with the company's needs and goals.
5. Inclusive hiring practices: Adopting inclusive hiring practices can help recruiters attract a diverse range of candidates and ensure that their hiring processes are fair and bias-free.

Overall, the recruitment market in the last two years has been impacted by the COVID-19 pandemic, and recruiters are facing challenges related to attracting and retaining top talent, managing large volumes of applications, ensuring diversity and inclusion, and adapting to new technologies. To overcome these challenges, recruiters are using strategies such as employer branding, candidate relationship management, data-driven recruitment, collaboration with hiring managers, and inclusive hiring practices.

II. Review of Literature

Recruitment is the process of finding and attracting qualified candidates for job openings. It typically involves various stages, such as job posting, sourcing, screening, interviewing, and selecting candidates. Recruitment may be done in-house by a company's HR team or outsourced to external recruiters or staffing agencies. The goal of recruitment is to find the best fit for the position and the organization, taking into account factors such as skills, experience, qualifications, culture fit, and diversity. Effective recruitment strategies involve understanding the needs of the organization and the job, as well as the preferences and motivations of different categories of candidates.

- According to a study published in the Journal of Business and Psychology, one of the biggest challenges facing recruiters is identifying and selecting the best candidates from a large pool of applicants. This challenge is exacerbated by the fact that many candidates may not fully represent themselves in their application materials, making it difficult to assess their true qualifications and fit for the position (Johnson & Sackett, 2019).
- In a study published in the Journal of Applied Psychology, researchers found that recruiters often struggle with identifying and overcoming unconscious biases in their hiring processes. These biases can result in discrimination against certain groups of candidates and may also limit the pool of potential candidates (Dovidio et al., 2019).
- A study published in the Journal of Occupational and Organizational Psychology found that recruiters often face challenges related to managing the recruitment process effectively, such as coordinating with hiring managers and scheduling interviews. These challenges can lead to delays in the recruitment process and may result in losing top candidates to competing job offers (Lievens et al., 2019).
- According to a study published in the Journal of Business and Psychology, another challenge facing recruiters is keeping up with the changing landscape of recruitment technology. With the proliferation of new tools and platforms, recruiters may struggle to identify which ones are most effective for their needs and how to integrate them into their existing processes (Schmit et al., 2018).

A study published in the Journal of Business and Psychology found that job seekers place a high value on job characteristics such as pay, benefits, and job security. They also place a high value on job characteristics related to work-life balance, such as flexible work arrangements and supportive management (Sturman et al., 2019).

According to a study published in the Journal of Vocational Behavior, job seekers are increasingly interested in organizational culture and values, and they seek out organizations that align with their own values and beliefs. This is especially true for younger job seekers, who tend to prioritize social responsibility and environmental sustainability (Briscoe et al., 2019).

In a study published in the Journal of Applied Psychology, researchers found that job seekers place a high value on the reputation of the organization they are applying to, as well as the perceived fit between themselves and the organization. Job seekers are more likely to accept a job offer from an organization with a positive reputation and that aligns with their values and preferences (Cable et al., 2019).

A study published in the Journal of Organizational Behavior found that job seekers place a high value on opportunities for career development and growth. They seek out organizations that offer training, mentoring, and career advancement opportunities (Hmieleski & Ensley, 2019).

It is also important to understand the future of recruitment. Here are some of the important highlights found so far.

- According to Schramm and Wischniewski (2020), emerging trends such as artificial intelligence, virtual reality, and the gig economy are expected to significantly impact recruitment in the near future.
- De Cuyper et al. (2019) argue that recruitment and selection practices will need to become more flexible and adaptable to keep pace with changing labor market trends and technological developments.
- Kiran et al. (2021) discuss the growing role of social media in recruitment and suggest that social media

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platforms offer a valuable opportunity for employers to reach a wider pool of potential candidates.

- Shah and Jain (2021) highlight the increasing importance of diversity and inclusion in recruitment, as organizations strive to create more diverse and inclusive workforces that reflect the changing demographics of the global workforce.

III. Research Design and Methodology

To gain a better understanding of the recruitment process, we conducted two surveys. The first survey consisted of 10 questions (see Appendix) and was completed by 200 participants who are primarily involved in recruiting and interviewing candidates. The objective of this survey was to identify the top three challenges faced in the recruitment process.

The survey questions were designed to cover various steps in the recruitment process, including candidate sourcing, outreach, candidate review, scheduling interviews, sharing results, and offering compensation.

To identify effective strategies for recruitment, we conducted a second survey with questions related to personal branding, employer branding, inclusive hiring practices, and data-driven recruitment. Participants were asked to draw on their professional knowledge and experience to respond to the survey."

IV. Participants

A survey comprising 10 questions was sent to 200 participants. The participants are recruiters, hiring managers, and corporate professionals actively involved in recruiting, interviewing, and helping job seekers land their dream jobs. They are based in companies in the United States.

V. Analysis, Discussion and Findings

We asked 200 participants involved in the recruiting and interviewing of candidates about the primary obstacle they face when it comes to attracting high-quality candidates. From the responses, it can be concluded that a significant percentage of recruiters face the challenge of limited outreach channels and networks. This indicates that there is a need to explore and expand outreach channels and networks to attract high-quality candidates. The second biggest obstacle reported was competition with other employers, followed by limited candidate pool and limited budget for recruitment. Therefore, employers should focus on differentiating themselves from their competitors and expanding their candidate pool to attract high-quality candidates.

We asked respondents to identify the biggest challenge they face when creating outreach messages to potential candidates. The most common response was ensuring messages are compelling and engaging at 37%, followed by identifying the best channels for outreach at 27%, personalizing messages to each candidate at 24%, and ensuring messages are reaching the right candidates at 12%.

We asked participants about the most challenging aspect of evaluating candidates' skills and experience. The options provided were assessing fit with company culture, managing a high volume of resumes, evaluating candidate qualifications and experience, and conducting effective reference checks. Based on the responses, 35% found assessing fit with company culture to be the most challenging aspect, followed by 30% who found evaluating candidate qualifications and experience to be the most difficult.

Evaluating candidates' skills and experience can be a daunting task, but assessing fit with company culture and evaluating qualifications and experience were the two most challenging aspects for the participants. This suggests that companies should focus on developing effective strategies for evaluating these factors in the recruitment process.

We asked participants what their primary challenge is when scheduling interviews with candidates. Out of the four options, 37% of participants chose "Finding mutually convenient time slots", 22% chose "Managing scheduling conflicts", 28% chose "Communicating interview details effectively to candidates", and 13% chose "Ensuring interviewers are available at the scheduled time". Based on the responses, it appears that finding mutually convenient time slots is the biggest challenge for scheduling interviews.

We asked participants what the most challenging aspect of communicating interview results to hiring managers is. Out of the four options, 27% of participants chose "Providing a balanced evaluation of candidates", 33% chose "Communicating feedback effectively", 18% chose "Managing hiring managers' expectations", and 22% chose "Ensuring accuracy of the interview results". Based on the responses, it appears that the biggest challenge is communicating feedback effectively to hiring managers.

We asked participants what the most difficult aspect of making an offer to a candidate is. Out of the four options, 23% of participants chose "Negotiating compensation and benefits", 28% chose "Ensuring that the candidate accepts the offer", 36% chose "Creating an attractive offer package", and 13% chose "Managing expectations of the hiring manager and candidate". Based on the responses, it appears that creating an attractive offer package is the biggest challenge.

Employers may want to focus on creating comprehensive and appealing offer packages that include not only salary and benefits but also opportunities for growth and development, work-life

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balance, and other non-monetary benefits. This can help to attract top talent and ensure that offers are accepted.

When asked about the most crucial factor in retaining top talent. Survey participants identified "Opportunities for growth and development" as the most crucial factor in retaining top talent, with 36% of respondents choosing this option. "Strong company culture and values" was the second most popular response, chosen by 28% of participants. "Competitive salary and benefits" and "Supportive leadership and management" were chosen by 21% and 15% of respondents, respectively.

One of the survey questions was about the primary challenge you face when creating a diverse and inclusive workforce.

Survey participants identified "Ensuring that hiring processes are unbiased and inclusive" as the primary challenge in creating a diverse and inclusive workforce, with 42% of respondents choosing this option. "Creating a culture that supports diversity and inclusion" was the second most popular response, chosen by 27% of participants. "Finding diverse candidates to fill open positions" and "Measuring the effectiveness of diversity and inclusion efforts" were chosen by 19% and 12% of respondents, respectively.

When asked about the most challenging aspect of using data to inform recruitment decisions. Survey participants identified "Interpreting data accurately" as the most challenging aspect of using data to inform recruitment decisions, with 38% of respondents choosing this option. "Collecting and analyzing relevant data" was the second most popular response, chosen by 32% of participants. "Overcoming resistance to data-driven approaches" and "Ensuring data privacy and security" were chosen by 19% and 11% of respondents, respectively.

These results suggest that accurately interpreting data is a key challenge when using data to inform recruitment decisions. Companies may want to invest in training programs to help their recruiters and hiring managers improve their data analysis skills.

In response to the most difficult aspect of providing a positive candidate experience, survey participants identified "Providing clear communication throughout the recruitment process" as the most difficult aspect of providing a positive candidate experience, with 39% of respondents choosing this option. "Managing candidate expectations" was the second most popular response, chosen by 28% of participants. "Offering an engaging and positive candidate experience" and "Ensuring that candidates have a fair and unbiased experience" were chosen by 20% and 13% of respondents, respectively.

VI. Conclusion

There are certain challenges in recruiting quality talent; however, there are strategies that can help a recruiters, and hiring managers get better results in hiring talent. Based on this study, the following are four strategies for navigating the hiring process.

1. Creating compelling and engaging outreach messages was the biggest challenge they face when reaching out to potential candidates.
2. Employers should consider implementing scheduling software or tools to streamline the interview scheduling process and make it easier to find mutually convenient time slots for both the interviewer and candidate.
3. Employers should invest in training or resources to help recruiters effectively communicate feedback to hiring managers and ensure that interview results are accurately and clearly conveyed.
4. Providing opportunities for growth and development is the most important factor in retaining top talent. Companies may want to focus on developing clear career paths and providing training and development opportunities to help employees grow and advance within the organization.
5. Companies should focus on ensuring that their hiring processes are unbiased and inclusive in order to create a diverse and inclusive workforce. This may involve reviewing job descriptions and interview questions to remove bias, as well as implementing training programs to promote diversity and inclusion.
6. Providing clear communication throughout the recruitment process is the most important factor in providing a positive candidate experience. Companies may want to focus on improving their communication processes, such as sending regular updates and providing feedback to candidates.

VII. Scope of Further Research

The aim of this research was to gain insights from hiring managers, recruiters, and corporate professionals from various industries in the United States, to identify the main reasons behind the failure of the recruitment process. The study focused on gathering data from industry experts and recruiters in sectors such as insurance, technology, finance, product, and design.

However, there is still an opportunity to expand this research to include other industries like consulting, accounting, banking, and the automotive industry. Additionally, it would be beneficial to explore other challenges and obstacles faced by recruiters during the hiring process. Conducting further studies could help to identify both internal and external factors that impact recruiters' ability to successfully hire talented individuals.

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VIII. Limitations of the Study

While our study provides valuable insights into the recruitment process, we acknowledge its limitations. The survey participants comprised full-time managerial and professional employees, and as such, our findings may not be generalizable to part-time jobs or job seekers in industries beyond insurance, technology, finance, product, and design.

Furthermore, it is important to note that our survey and interview participants were exclusively professionals based in the United States, and therefore, the results cannot be generalized to professionals in other countries. Nonetheless, this study can serve as a foundation for future research in other industries and countries to provide a more comprehensive understanding of the recruitment process and its challenges.

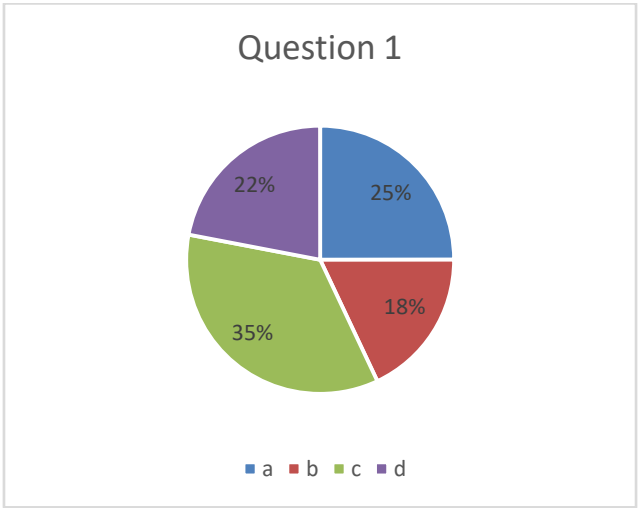
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Appendix – Survey Questions

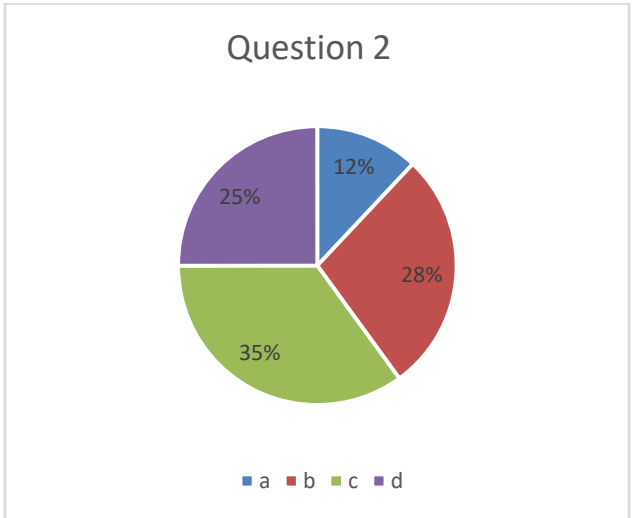
1. What is the primary obstacle you face when it comes to attracting high-quality candidates?

a. Limited outreach channels and networks - 25%
b. Competition with other employers - 18%
c. Limited candidate pool - 35%
d. Limited budget for recruitment - 22%



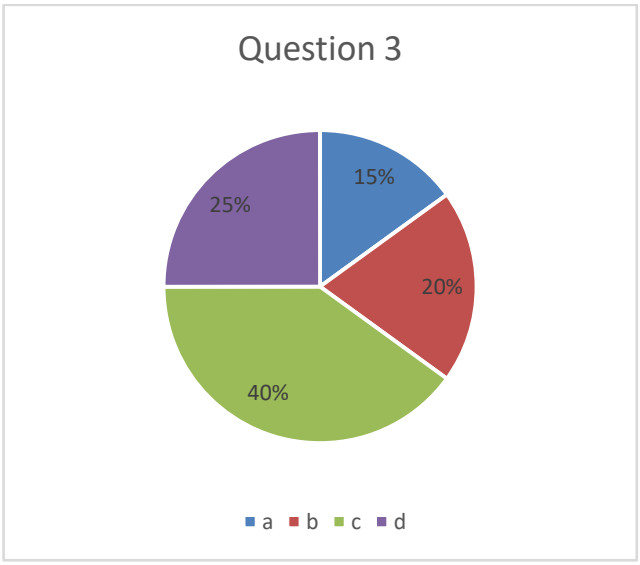
2. What is the biggest challenge you face when creating outreach messages to potential candidates?

a. Personalizing messages to each candidate - 12%
b. Ensuring messages are compelling and engaging - 28%
c. Identifying the best channels for outreach - 35%
d. Ensuring messages are reaching the right candidates - 25%

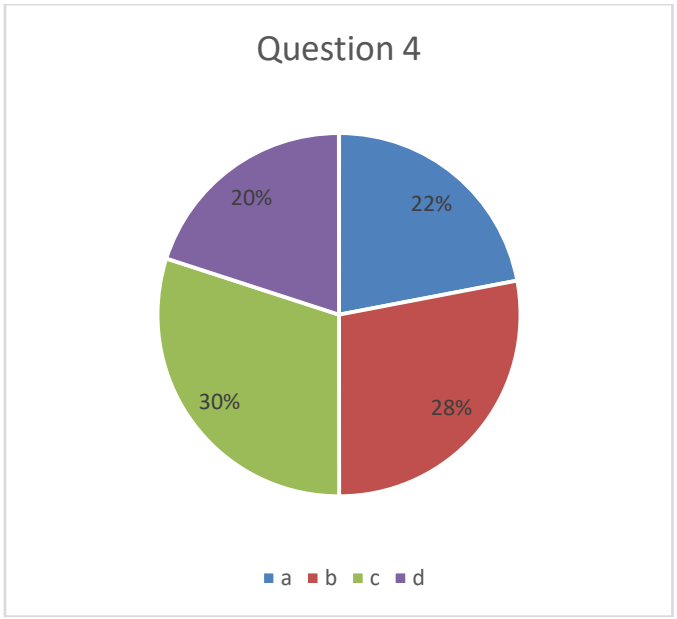


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3. What is the most difficult aspect of evaluating candidates' skills and experience?
   a. Assessing fit with company culture - 15%
   b. Managing a high volume of resumes - 20%
   c. Evaluating candidate qualifications and experience - 40%
   d. Conducting effective reference checks - 25%

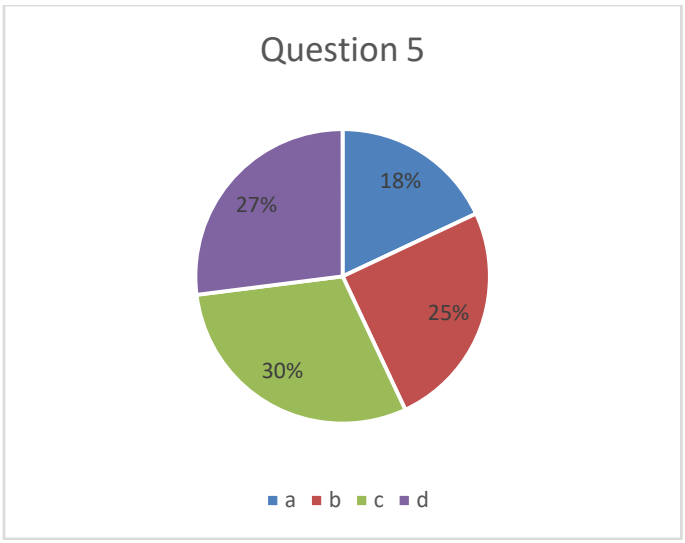


4. What is the primary challenge you face when scheduling interviews with candidates?
   a. Finding mutually convenient time slots - 22%
   b. Managing scheduling conflicts - 28%
   c. Communicating interview details effectively to candidates - 30%
   d. Ensuring interviewers are available at the scheduled time - 20%



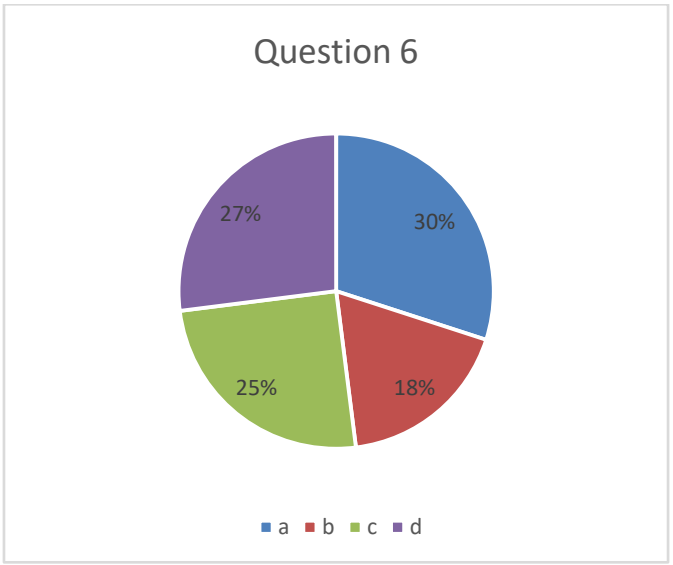
5. What is the most challenging aspect of communicating interview results to hiring managers?
   a. Providing a balanced evaluation of candidates - 18%
   b. Communicating feedback effectively - 25%
   c. Managing hiring managers' expectations - 30%
   d. Ensuring accuracy of the interview results - 27%

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6. What is the most difficult aspect of making an offer to a candidate?

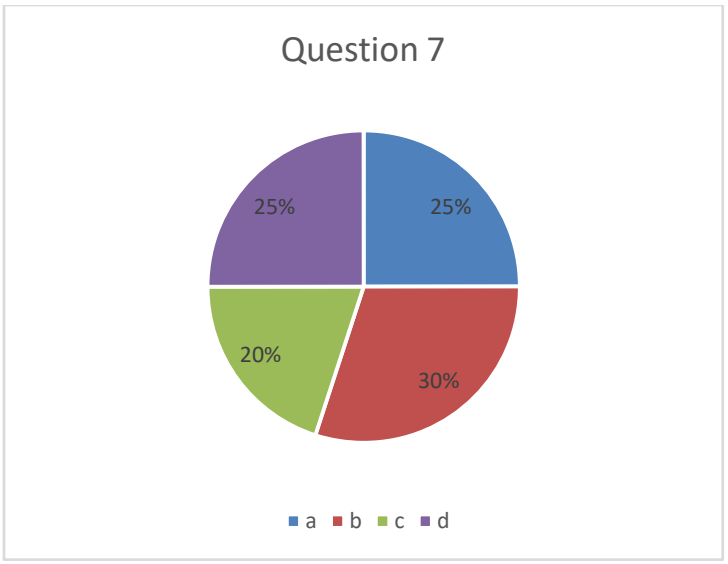
a. Negotiating compensation and benefits - 30%
b. Ensuring that the candidate accepts the offer - 18%
c. Creating an attractive offer package - 25%
d. Managing expectations of the hiring manager and candidate - 27%



7. What do you believe is the most crucial factor in retaining top talent?

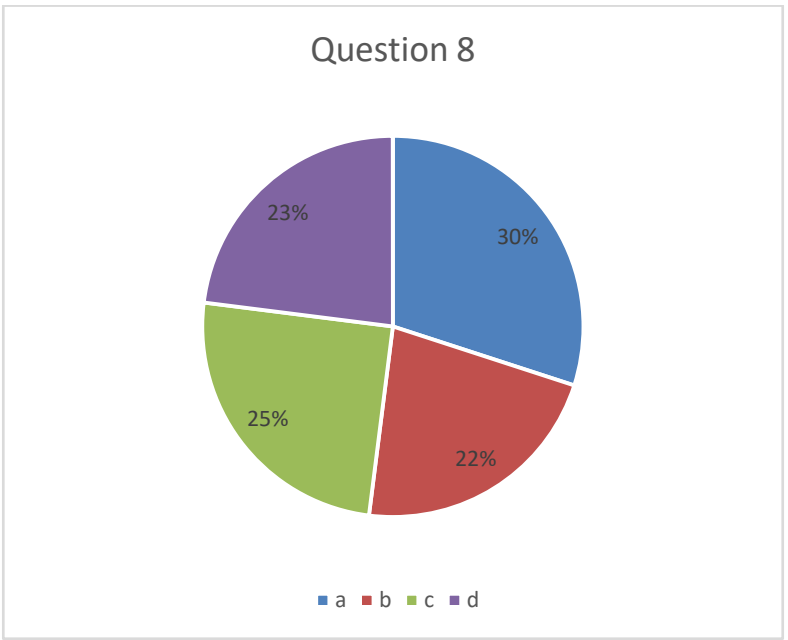
a. Opportunities for growth and development - 25%
b. Strong company culture and values - 30%
c. Supportive leadership and management - 20%
d. Competitive salary and benefits - 25%

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8. What is the primary challenge you face when creating a diverse and inclusive workforce?

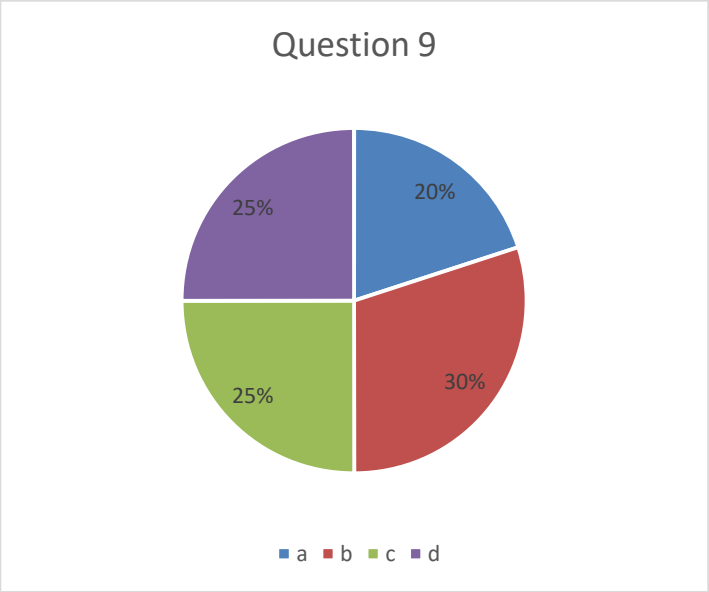
a. Ensuring that hiring processes are unbiased and inclusive - 30%
b. Finding diverse candidates to fill open positions - 22%
c. Creating a culture that supports diversity and inclusion - 25%
d. Measuring the effectiveness of diversity and inclusion efforts - 23%



9. What is the most challenging aspect of using data to inform recruitment decisions?

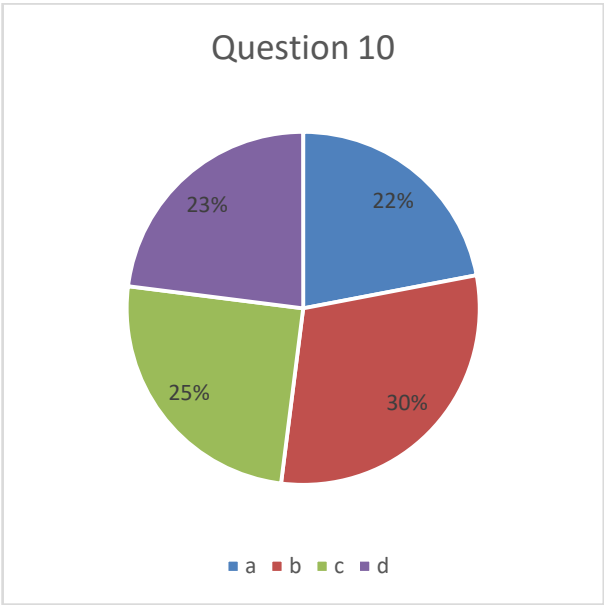
a. Collecting and analyzing relevant data - 20%
b. Interpreting data accurately - 30%
c. Ensuring data privacy and security - 25%
d. Overcoming resistance to data-driven approaches - 25%

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10. What is the most difficult aspect of providing a positive candidate experience?

a. Providing clear communication throughout the recruitment process - 22%
b. Offering an engaging and positive candidate experience - 30%
c. Managing candidate expectations - 25%
d. Ensuring that candidates have a fair and unbiased experience - 23%



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Modelo Para Medir as Relações Interinstitucionais Estratégicas Para O Desenvolvimento Organizacional: Aplicação Na Piscicultura Brasileira

By Ijean Gomes Riedo

Abstract- Study question: Do inter-institutional relations favor/do not favor organizational development? For this purpose, the following theories were used as a theoretical framework: Triple Helix and Planned Behavior. The cross-section was carried out in three moments of the International Fish Congress Event, in 2021, in the city of Foz do Iguaçu/PR. The surveyed population consisted of 328 participants from industry, university and government. The data collection instrument was a questionnaire with 18 questions with Likert scale. The contribution is the proposition of statistical modeling between the theory of the Triple Helix and the Theory of Planned Behavior. The final construct of the model used six statistical analyses. The results made it possible to suggest a plan of interinstitutional strategies for Brazilian fish farming. Furthermore, the plan made it possible to guide technology transfer policies, the elaboration of effective normative and incentive policies, and instigated the resolution of the market's sustainability needs.

Keywords: *triple helix. planned behavior. strategic planning. synergies model. behavior cross model.*

GJMBR-A Classification: *LCC: HD28-HD70*



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I. Introdução

O mundo está tecendo novos paradigmas para aquilo que a sociedade considerava arquipélagos de certezas. Morin (2001, p. 17) afirma que "é preciso aprender a navegar em um oceano de incertezas". Essa metáfora torna-se mais atual, em uma importante reflexão, em meio aos tempos de reorganizações institucionais, causados pela Pandemia COVID-19 (FAO, 2020a).

Diante dessa crise, o cenário atual de desenvolvimento econômico mundial mostrou-se colapsado. Muitos esforços da sociedade mundial foram e têm sido empregados para o controle da situação caótica na saúde humana, como o distanciamento social e o uso de equipamentos de biossegurança (OMS, 2020).

Para o rural, a partir deste cenário pandêmico global, surgem lacunas, como pano de fundo dos setores produtivos, em relação as estratégias de mercados. Na conferência *on-line* (série 2030), sobre inovações e tecnologias agrícolas para o desenvolvimento sustentável, oferecida pela *Food and Agriculture Organization* (FAO, 2020a), foram apresentadas percepções futurísticas de mercados, fundamentado nos preceitos mais justos e solidarizados, por meio da integração de cadeias produtivas.

No entanto, para o atual momento, destaca-se a necessidade de efetivar/consolidar estruturas democráticas e sinérgicas (conectividade dos elos) dentro de cada cadeia produtiva brasileira (FAO, 2018a).

De acordo com Slack, Chambers e Johnston (2002), o dinamismo de uma cadeia de produção, depende de vários sistemas e subsistemas. Essa organização sistêmica acontece por várias relações nas tomadas de decisão, essencialmente, daqueles que planejam e representam o setor.

As decisões galgam, não apenas em plantar e colher, mas no conjunto de regras e ações que permeiam, direta e indiretamente, a atividade, como políticas, pesquisas, inovações tecnológicas, boas práticas de manejos, melhoramento genético, entre outras (FEIDEN *et al.*, 2018).

As tratativas para o desenvolvimento sistêmico pautam-se em parâmetros de responsabilidades e são balizados em representatividades institucionais (BOFF, 2000). Porém, em uma concepção epistemológica de responsabilidade, Bazzo, Pereira e Bazzo (2016) fazem refletir sobre os valores que estão enraizados na população, prioritariamente, naquelas representadas pelas sociedades institucionais (GRANOVETTER, 2007).

As relações interinstitucionais permitem medidas dinâmicas de intervenção ou de construção nos comportamentos das sociedades organizacionais (RODRIGUES *et al.*, 2021). Essas relações interinstitucionais são explicadas pela teoria Tríplice Hélice (TH) (ETZKOWITZ & LEYDESDORFF, 1995; RIEDO *et al.*, 2022).

Enfatiza-se, que os recursos intelectuais são aspectos endógenos da Tríplice Hélice (TH) e são vitais para a inovação sustentável (ETZKOWITZ & KLOFSTEN, 2005). A TH consiste em um paradigma produtivo inovativo, que deixa de se apoiar apenas na indústria, e passa a se inter-relacionar, de forma dinâmica, entre a

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indústria, a universidade e o governo. Para Champenois e Etzkowitz (2018), a inovação será sustentável, quando houver preocupações com o desempenho econômico, social e ambiental.

No entanto, quando se pensa na aplicação da TH em cadeias produtivas brasileiras da piscicultura, admite-se valores em suas estruturas organizacionais e nas relações de transferências de tecnologias, buscando estratégias nacionais para o desenvolvimento rural (RIEDO *et al.*, 2022).

Sintetizando, os relacionamentos interinstitucionais permitem relações sinérgicas, especialmente, para elaboração de estratégias organizacionais conjuntas (RIEDO & FEIDEN, 2021).

A tentativa é de prover estratégias nacionais (BRESSER-PEREIRA, 2009), baseado em comportamentos (AZJEN, 1991; EAST, 1993), nas organizações da piscicultura brasileira (RIEDO, 2017; FEIDEN *et al.*, 2018). Para esse entrelaçamento, se integraram as dimensões da Teoria do Comportamento Planejado (TCP) (EAST, 1993), teoria que permite entender os fatores que levam os indivíduos a tomarem suas decisões vinculadas às dimensões TH (ETZKOWITZ, 2012; LEYDESDORFF, 2003).

Para corroborar com essa relação problema, a FAO (2018b) aponta os aspectos da tomada de decisão, compreendidos como ampla participação das partes, tanto no planejamento como na implementação, conciliando os focos ambientais e conservação com a gestão social e econômica.

Destaca-se que, apesar de não ser tema central deste estudo, os 17 objetivos do desenvolvimento sustentável ODS sempre estarão implícitos nas ações das organizações que buscam sustentabilidade ambiental e humana de forma democrática.

Essas interinstituições (North, 1991) são articuladas, considerando suas normas e regras, que contribuem, direta e indiretamente, para o desenvolvi mento das atividades rurais, próprias de suas características organizacionais (RIEDO *et al.*, 2022).

O sustentável, aqui defendido, significa, que além de garantir o desenvolvimento econômico, também é imprescindível a preocupação com os aspectos sociais e a preservação do meio ambiente, para a presente e futuras gerações (BOFF, 2015; FAO, 2018b).

Nesse contexto, este estudo se apropriou da cadeia produtiva da piscicultura brasileira para análise, de forma focal seus planos de ações e seu desenvolvimento sistêmico organizacional. Enfatiza-se, que os planos sistêmicos devem ser explorados em articulações comportamentais, face às organizações institucionais, e considerando fator indissociável à preocupação sustentável das organizações.

Quanto à originalidade do estudo está em, após testar as hipóteses, sugerir um modelo e um plano de desenvolvimento interinstitucional para a piscicultura brasileira, articulado pela Teoria Tríplice Hélice e a Teoria do Comportamento Planejado.

Nesse entendimento, justifica-se que, para o desenvolvimento das cadeias produtivas, entre outros aspectos de outras áreas de estudo, são necessárias estratégias (BRESSER-PEREIRA, 2009), relações institucionais (ETZKOWITZ, 2008), comportamentos planejados (AJZEN, 1991), tomadas de decisões (SLACK; CHAMBERS & JOHNSTON, 2002) das partes que integram/compõem o setor.

Portanto, o estudo buscou responder a seguinte questão: O quanto as relações interinstitucionais favorecem ou não favorecem o desenvolvimento organizacional da piscicultura brasileira? Por isso, destrinchou-se o estudo em duas propostas.

1. Propor, determinar e estruturar um modelo estatístico capaz de medir relações e comportamentos em múltiplas dimensões TH;
2. Propor, determinar e sistematizar analiticamente um plano de estratégias decisórias para a piscicultura brasileira.

Posto isso, com intuito de responder à pergunta do estudo, estabeleceu-se duas hipóteses: H_0 As relações interinstitucionais favorecem o desenvolvimento organizacional da piscicultura brasileira; e H_1 As relações interinstitucionais não favorecem o desenvolvimento organizacional da piscicultura brasileira.

II. Revisão

a) *Desenvolvimento E A Piscicultura Brasileira*

A ideia de desenvolvimento remonta desde a origem do ser humano, quando analisado sob a perspectiva social. Para Bottomore (1975, p. 138) "a palavra desenvolvimento necessita de evolução em sua aplicação aos fenômenos sociais". No uso comum, desenvolvimento significa um "desdobramento gradual"; uma elaboração mais dos detalhes de qualquer coisa; o crescimento do que está no germe (BOTTOMORE, 1975).

Na linha do crescimento, como meta ao desenvolvimento, Rostow (1961), em sua obra *The Stages of Economic Growth: A Non-Communist,* publicada em 1960, estabeleceu que a sociedade deveria passar por cinco etapas para chegar ao desenvolvimento, sendo elas: a sociedade tradicional, as preconizações para o arranco, o arranco, a marcha para maturidade, e a era do consumo em massa.

Entendia-se que, seguindo tais etapas, o desenvolvimento aconteceria de forma natural. Diante disso, percebe-se que o termo desenvolvimento, por muitas vezes, confundia-se com crescimento (ROSTOW, 1961).

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Entretanto, no âmbito da conjuntura social, Amartya Sen, em sua obra ganhadora do prêmio Nobel "Desenvolvimento como liberdade", analisou o fator social como vetor do desenvolvimento, no qual apontava que "o desenvolvimento requer" que se removam as principais fontes de privações de liberdade: a pobreza e a tirania, carência de oportunidade econômica e destituição social sistemática, negligência dos serviços públicos e a intolerância ou a interferência excessiva de Estados repressivos (SEN, 2017, p. 18).

Já no âmbito das contribuições da sociologia econômica, retoma-se a obra de Karl Polanyi (1977, *apud* SCHNEIDER; SCHER, 2011), a qual destacava que o "capitalismo liberal foi com efeito a resposta inicial do homem ao desafio da Revolução industrial", e dele vieram as grandes dificuldades e novos enfrentamentos, entre as esferas política e econômica.

Por esta razão, Schneider e Scher (2011) asseveram que a contemporaneidade das visões de Polanyi são oportunas e pertinentes à discussão acerca do desenvolvimento. Pois, ressalta a importância central da regulação social, sobre a economia, e do papel das instituições, enquanto instâncias mediadoras, entre as estruturas socioeconômicas e os indivíduos, como atores sociais.

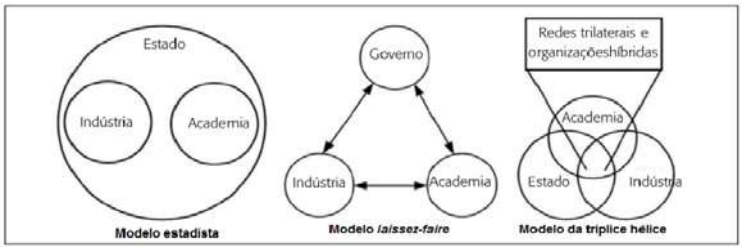
Na década de 1970, o termo desenvolvimento afastou-se um pouco da visão de crescimento, tecnologia e produção, e passou a ser analisado de forma, a incluir a preocupação com os recursos não-renováveis, tendo como ponto a obra, o "mito" de Furtado (1981), o qual afirmava que em se concebendo a ideia originária de desenvolvimento, os "recursos não-renováveis da terra se esgotariam, culminando em um colapso social e ambiental" (FURTADO, 1981, p. 17).

Percebe-se que as definições ou percepções acerca do desenvolvimento, foram influenciadas pelo contexto institucional de suas respectivas épocas, em constante inter-relação com as políticas públicas de cada época. O Quadro 1 e a Figura 1 ilustram este argumento.

Quadro 1: Desenvolvimento Institucional No Contexto Histórico Brasileiro

Anos de 1950 a 1960	Anos de 1960 a 1970	Anos de 1980 a 1990
A aliança nacional Combinação das Teorias Econômicas Puras baseadas no mercado com as Teorias de Economia Política Atribuição ao Estado e as instituições como coordenador auxiliar da economia	Modelo de subdesenvolvimento industrial A proteção da indústria nacional, o foco no mercado e a redução do coeficiente de abertura da economia Economias de escala	A dependência de nações ricas A grande crise da dívida externa O acordo de Washington: A decadência da economia Brasileira

Fonte: Riedo (2022).



Fonte: Etzkowitz e Leydesdorff (1995).

Figura 1: Evolução Das Estratégias Interinstitucionais De Desenvolvimento

Ressalta-se aquilo que North (1991) já dizia, e ainda válido, que as instituições representam a manutenção da ordem e a redução das incertezas nas sociedades, pois definem o conjunto de alternativas e de oportunidades a que os agentes econômicos se sujeitam, favorecendo, ou não, a elevação dos custos de transação, a transformação e a lucratividade existente no sistema econômico. São elas que desenvolvem as regras do jogo e orientam as direções a serem tomadas para que os problemas relacionados às interações entre os agentes sejam resolvidos, e os acordos de troca sejam estabelecidos e cumpridos.

Para a piscicultura, Ostrensky (2007, p. 28) relata que é difícil propor "soluções realmente transformadoras da realidade", mas ressalta que para a piscicultura continuar crescendo, depende tanto da capacidade dos produtores, quanto do poder público e dos outros atores da cadeia produtiva interagirem, valorizando as oportunidades oferecidas pelos ambientes físicos, econômicos e institucionais da atividade (SCHULTER & VIEIRA FILHO, 2017).

Na economia mundial, o crescimento da piscicultura é destacado como um fator social, pois é o setor de produção de alimentos proteicos que mais

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cresce no mundo. O setor apresentou um crescimento médio anual de 4,9% entre 2018 e 2019 (FAO, 2020b).

No Anuário da Peixe-BR (2019), nota-se que a produção brasileira da piscicultura em 2014, foi superior a 578 mil de toneladas, representadas, principalmente, pela produção da espécie de peixe tilápia.

Já no ano de 2019, a produção foi superior a 722 mil toneladas (PEIXE-BR, 2020). Ainda, a Peixe-BR (2020) explanou que o Brasil também tomou como preferência e intensidade a produção do peixe tilápia. Essa escolha se dá ao fato da espécie ter alta adaptabilidade às características climáticas locais brasileiras. Existem outras espécies de peixes produzidas no Brasil e no mundo (peixes redondos e peixes de couro), mas a tilápia, no Brasil, apresenta-se como carro-chefe de produção. Em tempo, revela-se que em 2020, o continente responsável por mais de 4 milhões de toneladas da produção mundial de tilápias foi o Asiático.

No ano de 2019, novamente destacaram-se os países Asiáticos na produção de tilápias, como China, Indonésia e Egito, com 1,93 milhão de toneladas, 1,35 milhão/toneladas e 900 mil/toneladas, respectivamente. Entretanto, o Brasil está nesse *ranking* de produção de tilápia, na quarta colocação, com mais de 432 mil toneladas em 2019 (PEIXE-BR, 2020).

Considera-se que o Brasil tem diversas potencialidades de desenvolvimento sustentável para o setor (OSTRENSKY, 2007; FAO, 2018a). Nos cenários regionais brasileiros, a Peixe BR (2019) divulgou que, dentre as produções dos estados brasileiros de 2018, o Paraná teve 129,9 mil toneladas e São Paulo teve 73,2 mil toneladas, e foram líderes no *ranking* de produção de peixes no Brasil.

Evidencia-se que entre esses números, muitas produções brasileiras concentram-se em pequenas propriedades rurais (BARROSO *et al.*, 2018) como o caso do Paraná e da Paraíba (PEIXE-BR, 2020, p. 90).

Destarte, as relações sociais e econômicas dessa cadeia produtiva sofrem impactos diretos, por conta dos comportamentos nos processos decisórios, representados pelos agentes de desenvolvimento institucionais (RIEDO *et al.*, 2021). Isto posto, apresenta-se duas problemáticas: a primeira, da *Food and Agriculture Organization* (FAO) que condiciona a piscicultura ao cumprimento dos objetivos do desenvolvimento sustentável (ODS). Este desenvolvimento está diretamente associado ao cumprimento das metas para o Desenvolvimento Sustentável polarizadas pela ONU (2020). Portanto, nesta tese, circula-se pelos objetivos n. 09 (indústria, inovação e infraestrutura) e 17 (parcerias em prol das metas).

Além disso, existem *hot topics* que estão no bojo de discussão deste artigo, como: Ampla participação das partes interessadas em todos os níveis de planejamento e implementação; Análise abrangente e explícita de todos os componentes-chave do sistema de pesca ou aquicultura (ecológico, social, econômico e governança), bem como de fatores externos (por exemplo, mudanças climáticas); Tomada de decisão com base no melhor conhecimento disponível, incluindo conhecimento científico e tradicional, com a promoção de avaliações de risco e gestão de risco e o reconhecimento de que ainda há decisões a serem tomadas mesmo na ausência de conhecimento científico detalhado; Um interesse especial em questões de sustentabilidade que requerem atenção, determinado e priorizado por meio de um processo participativo formal; Um processo de gestão flexível que inclui mecanismos para ciclos de *feedback* em diferentes escalas de tempo, permitindo que o plano de gestão seja ajustado com base em observações e experiências passadas e atuais; O uso de instituições e práticas de gestão existentes (FAO, 2018b, p. 137, tradução nossa).

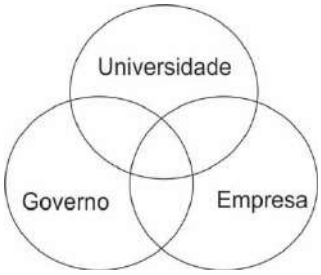
E, ainda, as inquietações de vários pesquisadores brasileiros (OSTRENSKY, 2007; LOPERA-BARRERO *et al.*, 2011; SIQUEIRA NETO, 2016; RIEDO, 2017; FEIDEN *et al.*, 2018; QUIEZI, 2021), permitem questionar sobre as representações institucionais da piscicultura, quanto aos papéis na implementação de políticas e os comportamentos que direcionam o desenvolvimento rural e a preocupação com a sustentabilidade.

Então, a teoria da tríplice hélice – TH, vem ao encontro de relacionamentos, com intuito de demonstrar e/ou estabelecer formas de integração fundamentais, e uma alternativa de provocar mudanças comportamentais significativas na piscicultura brasileira.

b) A teoria Tríplice Hélice (TH)

Em estudos sobre a TH, as relações institucionais têm sido adotadas para entender parte do processo do desenvolvimento regional de um setor (SMITH & BAGCHI-SEM, 2010; GARCÍA; VELÁSQUEZ, 2013; RIEDO & FEIDEN, 2021). Para entender melhor, conceitua-se TH como a descrição de relações interativas e sinérgicas entre universidades, indústrias e governos (Figura 2), para fins de promoção de estratégias de desenvolvimento (ETZKOWITZ, 2008).

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Fonte: Etzkowitz e Leydesdorff (1995).

Figura 2: Teoria Tríplice Hélice

A TH é composta por estratégias de relações interinstitucionais (Universidade-Governo-Empresa). A hélice governo contempla a instrumentalização de políticas de apoios e incentivo nas atividades produtivas. A hélice empresa (ou indústria, ou setor produtivo) corresponde ao agente aplicador na prática de processos produtivos, de processamento e estratégias mercadológicas.

Quanto ao papel da universidade na TH, a hélice universidade (ou Instituições de Ensino, Ciência, Tecnologia e Inovação) operam como ambientes de construções de conhecimentos e de transferências de tecnologias (ETZKOWITZ & ZHOU, 2017). Na concepção de Terra *et al.* (2013), a universidade é caracterizada como formadora de capital intelectual e também pode funcionar como universidade empreendedora.

Assim, é nesse contexto que Programas de Pós-graduação (Profissionalizante/Mestrado Profissional, Mestrado e Doutorado) brasileiros vêm debruçando esforços para pesquisas estratégicas e na formação de capital intelectual sinérgico. Os resultados de Riedo e Feiden (2021) mostraram que a partir de 2010 houve um crescimento significativo de trabalhos científicos sobre a teoria TH, para propiciar alternativas de interações institucionais ao desenvolvimento da sociedade nacional.

Entre as pesquisas sobre a TH, destacam-se duas teses de doutorado: a de Silva (2015) que pesquisou sobre o emprego da TH nos processos adotados pelo Ministério da Defesa do Brasil e a de Brustolin (2014) que comparou os mesmos processos entre os países Brasil e Estados Unidos. A pesquisa de mestrado de Dalmarco (2012), por sua vez, analisou a horticultura nos países Holanda e Brasil. As conclusões dos autores, foram sobre a incidência de recursos financeiros e intelectuais para a promoção da Ciência e Tecnologia nos países Estados Unidos e Holanda. No entanto, na visão dos autores, o Brasil pouco forma ambientes de estratégias e de inovação social e tecnológica para o desenvolvimento interinstitucional.

Nesse contexto, Riedo e Feiden (2021) dissertaram, ainda, que há interesse de pesquisadores em analisar os fatores de conhecimento, à luz da TH, que influenciam o desenvolvimento institucional, despertado pelo interesse da sociedade.

No Brasil, a teoria TH, como proposta de desenvolvimento da inovação para a sociedade, ainda está na fase de desenvolvimento (ETZKOWITZ & ZHOU, 2017). A inovação aparece como mola propulsora da TH, que pode ser entendida como estratégia para o desenvolvimento sustentável, ancoradas na proposta de forças de cada segmento/organização (GARCÍA & VELÁSQUEZ, 2013; RIEDO *et al.*, 2022).

O desenvolvimento sustentável obedece ao duplo imperativo ético da solidariedade, com as gerações presentes e futuras, e exige a explicitação de critérios de desempenho social e ambiental e de viabilidade econômica (NAVARRO, 2001).

O modelo padrão de desenvolvimento sustentável, descrito no tripé chamado *Triple Botton Line* (três pilares da sustentabilidade), deve garantir o desempenho positivo econômico, social e ambiental. Além, de que "para ser sustentável, o desenvolvimento deve ser economicamente viável, socialmente justo e ambientalmente correto" (BOFF, 2015, p. 43).

Enfatiza-se que a TH, nos países desenvolvidos, atua como motor de desenvolvimento econômico para a inovação; e nos países periféricos, como o caso do Brasil, a TH pode ser o dispositivo para construção de relações para o desenvolvimento organizacional (RIEDO *et al.*, 2022).

O enfoque da Tríplice Hélice nos vínculos institucionais, desempenha um papel-chave no acesso ao conhecimento e à tecnologia, melhorando a inovação e a aprendizagem organizacional (ETZKOWITZ & LEYDESDORFF, 1995; CHAMPENOIS & ETZKOWITZ, 2018). Ainda, na análise da obra de Dutrénit e Sutz (2014), cujo enfoque estava nos Sistemas e Políticas de Ciência, Tecnologia e Inovação nos países Latino-Americanos, os autores dissertaram acerca dos benefícios de uma estrutura consolidada de atores e vínculos para a inovação, quanto às estratégias sinérgicas e estruturadas.

Para isso, a TH deve interagir. Estas interações podem determinar como a sustentabilidade, sinergias, mudanças significativas ocorrerão, por isso a necessidade de demonstrar a importância de uma

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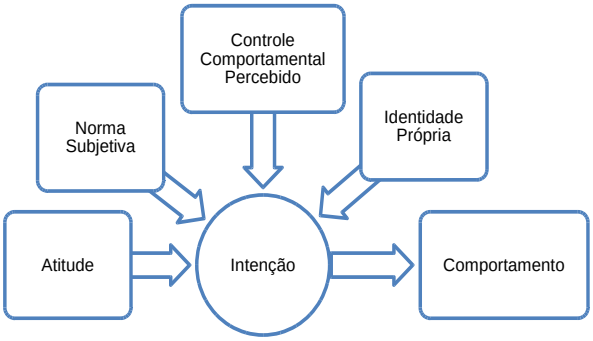
sinergia articulada de forma sustentável, tanto para as pessoas como para o meio ambiente. E é nesse contexto que a teoria do comportamento planejado (TCP), já que são pessoas que se articulam nesses ambientes, e faz-se presente.

c) A Teoria Do Comportamento Planejado (TCP)

A Teoria do Comportamento Planejado (TCP) foi concebida a partir do campo da psicologia, para prever o comportamento específico do indivíduo, em relação as suas intenções (EAST, 1993). Ela assume que o comportamento real de uma pessoa é subjetivo ao ambiente inserido, ou seja, quanto mais forte for a intenção do indivíduo em realizar um comportamento, mais provável será que a instituição esteja engajada (AJZEN, 1991).

Segundo o autor Ajzen (1991), a TCP se fundamenta sobre o pressuposto de que os indivíduos tomam suas decisões de forma eminentemente racional e utilizam as informações de forma sistemática, com os fatos disponíveis, analisando as implicações e impactos de suas ações de maneira antecipada, para decidir como se comportar frente a cada contexto.

São três as dimensões de intenções comportamentais (Figura 3), a saber: atitude (AT), normas subjetivas (NS), controle percebido (CP) e identidade própria (IP). Essas intenções são responsáveis pela variação do comportamento real dos indivíduos (AJZEN, 1991).



Fonte: Adaptado de East (1993).

Figura 3: Teoria do Comportamento Planejado

Segundo Ajzen (1991) a variável atitude representa o quanto a pessoa dá importância, admite a necessidade e tem o desejo de realizar um comportamento específico; a variável norma subjetiva compreende a significância e o valor do indivíduo, ou seja, o quanto é visto pelos outros e como suas decisões são socialmente aceitáveis na sociedade; o controle percebido compreende o valor representativo normativo e profissional, ou seja, o quanto é conveniente realizar aquele comportamento. East (1993) complementou o modelo, com a inclusão da variável identidade própria, que trata sobre o envolvimento do indivíduo no comportamento.

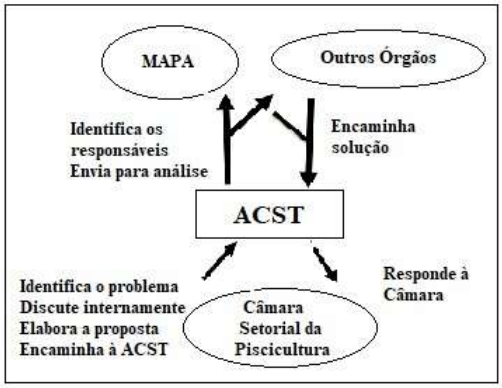
East (1993) compreende que juntas as variáveis formam a intenção, o que explicita a disposição do agente institucional em se engajar na tomada de decisão. Por sua vez, a variável intenção representa o comportamento planejado dos indivíduos.

d) Um Sistema De Análise Entre A TH E A TCP Para A Piscicultura Brasileira

Em 2016, houve uma implementação de sistema de decisão para desenvolver a área da piscicultura, através da criação da Câmara Setorial da Cadeira Produtiva da Aquicultura Brasileira (CGAC) pelo Ministério da Agricultura, Pecuária e Abastecimento (MAPA), com grupos orientados ao inter-relacionamento entre governo e a indústria. O objetivo dessa câmara (Figura 4), na sua concepção, foi diagnosticar as oportunidades, as ameaças e os gargalos, bem como, obter estratégias necessárias para desenvolver a cadeia produtiva (CGAC/MAPA, 2016).

Esta foi composta por uma equipe de múltiplas *expertises*, com foco em cooperar para o desenvolvimento da piscicultura brasileira. Na visão do MAPA, a câmara objetiva a determinação de pautas estratégicas de aproximação dos agentes, estabelecendo prioridades para políticas públicas e privadas do setor, "desde a produção até a entrega do produto" (CGAC/MAPA, 2016, p. 4).

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Fonte: CGAC/MAPA (2016).

Figura 4: Fluxograma da Assessoria de Apoio às Câmaras Setoriais (ACST).

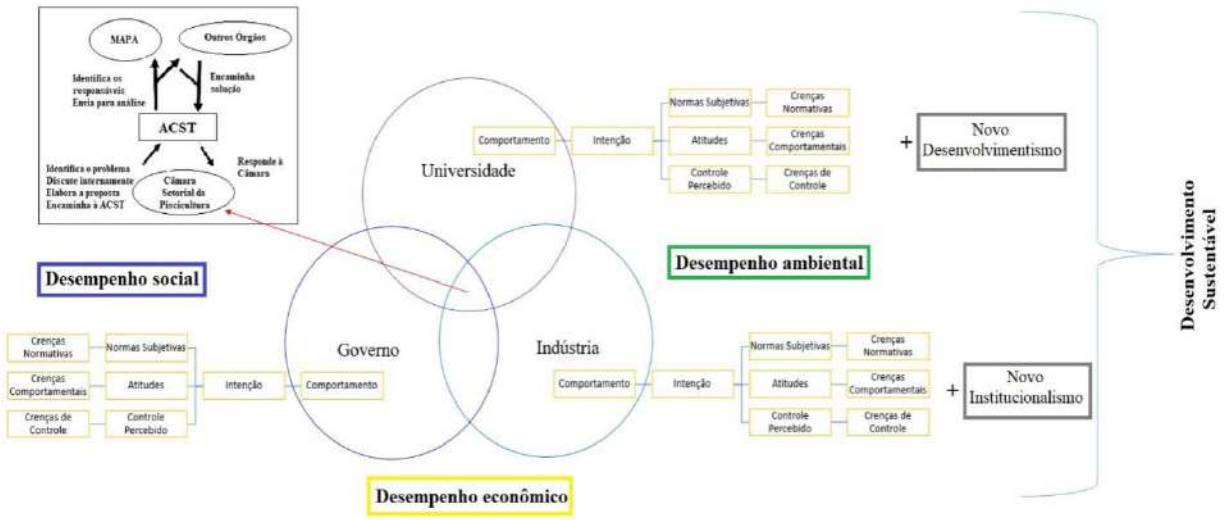
A proposta dessa câmara deveria passar pelo desenvolvimento sustentável e democrático. Ainda, a atuação deveria atuar como foro consultivo, na identificação de oportunidades e ameaças às cadeias produtivas, e deliberativo, por meio da articulação entre Governo, Universidade e Indústria. As ações devem ter a atuação dinâmica, sistêmica e integrada de todos os segmentos produtivos.

A composição das câmaras normalmente é estruturada pelos mais diversos setores, como: indústria, consumidores, comércio, atacadista, órgãos do governo, instituições financeiras, entidades tecnológicas, órgãos de pesquisa e desenvolvimento, mas o importante é reunir num único espaço todos os representantes da cadeia produtiva (CGAC/MAPA, 2016, p. 5).

Entretanto, empreende-se preocupação neste estudo, pois, na prática, percebe-se que as instituições formadoras de capital intelectual não se somam às tomadas de decisões desta câmara. Nesse contexto, as câmaras setoriais precisam ser reestruturadas, criando debates sinérgicos, contínuos e democráticos entre vários elos das cadeias produtivas.

Os cientistas Etzkowitz e Zhou (2017) afirmam que para o desenvolvimento inovador e econômico são necessários diálogos e sinergias contínuos, para amparar a sociedade em suas atividades e fortalecer sua capacidade técnica.

Assim, propõe-se a análise aditiva das teorias TH e da TCP, com foco em resultados e na formulação de estratégias sinérgicas comportamentais ao desenvolvimento interinstitucional da piscicultura brasileira (Figura 5).



Fonte: Elaborado a partir de Etzkowitz (2008); East (1993); North (1991) e Bresser-Pereira (2020).

Figura 5: Sistematização Das Teorias TH E CP Para Análise Na Piscicultura Brasileira.

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O comportamento governamental tem o papel de fomentar, assistir e regular a atividade (SILVA *et al.*, 2020). É um órgão central que formula políticas e regras normativas para estabelecer planejamentos estratégicos públicos (ETZKOWITZ, 2012). Além disso, o papel do governo é crucial na oferta de incentivos assistenciais técnicos e financeiros (ETZKOWITZ & KLOFSTEN, 2005).

A contribuição da indústria nas relações institucionais, com seus ambientes formais e informais de comportamento (RIEDO, 2017), é a responsabilidade por aplicar e transformar ideias, tecnologias e conhecimentos científicos em produtos e/ou serviços para o mercado (ETZKOWITZ & ZHOU, 2017).

O comportamento das universidades encontra-se na busca de soluções inovadoras para o mercado, na capacitação os produtores/transformadores e na formação de capitais intelectuais, promovendo as transferências de tecnologias (BRASIL, 2016a; ETZKOWITZ, 2012; ETZKOWITZ & ZHOU, 2017).

Assim sendo, este estudo demonstra importância dessa integração às variáveis TCP (AZJEN, 1991; EAST, 1993) e às dimensões TH (ETZKOWITZ, 2008), na tentativa de prover estratégias nacionais (BRESSER-PEREIRA, 2009) aos comportamentos interinstitucionais na piscicultura brasileira (LOPERA-BARRERO *et al.*, 2011; RIEDO, 2017; FEIDEN *et al.*, 2018). Ressalta-se que a TCP é investigada por vários pesquisadores no mundo (SILVA *et al.*, 2020). Observando o ano de 2012, havia mais de 1.200 bibliografias de pesquisa sobre TCP, em bancos de dados acadêmicos (AL-LOZI & PAPAZAFEIRO-POULOU, 2012). Os estudos demonstram a capacidade da teoria em prever a intenção e comportamento, realizar intervenções de forma a demonstrar as mudanças provocadas pelas crenças de controle, normativas e atitudes, frente a intenção, de como será o seu comportamento. Diante disso, relacionar a TH e a TCP às estratégias da piscicultura brasileira, é ampliar o conhecimento e o entendimento sobre como as decisões no âmbito da indústria, universidade e governo se articulam.

Enfatiza-se que, o estudo não pretende esgotar pesquisas ou concluir análises investigativas, mas compreender e elaborar fatos, a partir de uma visão de instituições, por North (1991), e do desenvolvimento, por Bresser-Pereira (2020).

III. Metodologia

O estudo foi descritivo, método que, segundo Richardson (2012), objetiva estabelecer relações entre variáveis, para buscar a sua influência sobre o fenômeno, com o objetivo de articular ações mais efetivas. O corte da pesquisa foi transversal, em três momentos: antes (nas inscrições), entre os dias 1º julho e 23 de novembro de 2021; durante evento III *International Fish Congress*, realizado entre os dias 24 e 26 de novembro de 2021, no município de Foz do Iguaçu/PR; e pós-evento, realizado entre os dias 27 de novembro e 14 de dezembro de 2021.

O critério de escolha foi por convite. Aceitaram participar da pesquisa 328 participantes, dos quais: 135 representantes do segmento Indústria, 82 representantes do segmento Governo e 111 representantes da Universidade. Esse resultado representa 21% do total de 1.561 participantes presentes no evento. Os participantes do evento abrangeram as regiões do oeste do Paraná, a região Norte do Paraná, regiões do interior do Estado de São Paulo, regiões Centro-Oeste e Nordeste brasileiro.

O questionário foi aplicado por meio do *GoogleForms®*, utilizando-se da escala de concordância de *Likert* de 1 a 5, com 18 questões, apresentados no quadro 2, a seguir.

Quadro 2: Número De Questões Para as Variáveis Condicionantes

Número De Questões Do Conjunto	Variáveis Condicionantes	Tipos De Variáveis
01	Identidade institucional	Dependente
03	Intenção	Independente
05	Atitude	Independente
04	Norma subjetiva	Independente
03	Controle comportamental percebido	Independente
02	Identidade própria	Independente

O Quadro 3 caracteriza os representantes por meio das dimensões TH.

Quadro 3: Classificação Institucional TH

Dimensão	Abrangência Do Segmento
Indústria	Compreende: Indústrias de beneficiamento; Indústrias de transformação; Indústrias de processamento; Indústrias de insumos; Indústrias de artefatos de manejo na piscicultura; Entrepostos de peixes; Agroindústrias de peixes; Produtores rurais de pisciculturas; Associações e Cooperativas de classe das pisciculturas brasileiras; Comércios de varejo da piscicultura; Comércios com produtos transformados da piscicultura; Restaurantes e bares com produtos da piscicultura; Outras formas de mercados do peixe.
Governo	Compreende: Parlamentares públicos; Órgãos de fomentos públicos e privados; Órgãos de assistência técnica

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	públicos; Órgãos de extensão rural público; Órgãos públicos de controle ambiental; Órgãos públicos de fiscalização; Órgãos de legislação públicos; Órgãos públicos de licenciamento de atividade; Outras formas de ações públicas na piscicultura.
Universidade	Compreende: Universidades públicas de graduação e pós-graduação; Universidades privadas de graduação e pós-graduação; Professores e pesquisadores de instituições de ciência; Empresas brasileiras públicas de ciência, tecnologia e inovação; Empresas brasileiras privadas de ciência, tecnologia e inovação; Empresas brasileiras de economia mista de ciência, tecnologia e inovação; Pesquisadores independentes; Instituições públicas de Pesquisa, Desenvolvimento e Inovação; Outras formas de ciência da piscicultura.

Foi realizado um pré-teste do questionário, enviado para 14 pessoas para sistematização, dos quais 85% foram pesquisadores e extensionistas e 15% produtores rurais, o que validou a escrita dos questionamentos da pesquisa.

Os dados foram tratados por estatística complexa, para testar as hipóteses do estudo e foram analisados descritivamente. Para clarear, o Quadro 4 mostra as palavras-chave que representam o objetivo de cada questionamento.

Quadro 4: Palavras-Chaves Dos Questionamentos

Conjunto de variáveis	Palavras-chave
Intenção 1	Definição de estratégias de trabalho conjunto
Intenção 2	Forças para estratégias de trabalho conjunto
Intenção 3	Probabilidade para estratégias de trabalho conjunto
Atitude 1	Qualidade no desenvolvimento de estratégias
Atitude 2	Importância no desenvolvimento de estratégias
Atitude 3	Vantagens no desenvolvimento de estratégias
Atitude 4	Necessidade de desenvolvimento de estratégias
Atitude 5	Aceitabilidade de desenvolvimento de estratégias
Normasubjetiva 1	Influência de pessoas importantes para decisões
Normasubjetiva 2	Influência de opiniões de pessoas para decisões
Normasubjetiva 3	Influência de organizações para decisões
Normasubjetiva 4	Influência de pessoas externas para decisões
Controlecomportamentalpercebido 1	Detentor do poder de decisão na organização
Controlecomportamentalpercebido 2	Administrador dos recursos para tomada de decisão
Controlecomportamentalpercebido 3	Facilidade na implementação das decisões conjuntas
Identidadeprópria 1	Percepção a longo prazo de estratégias conjuntas
Identidadeprópria 2	Envolvimento no processo de estratégias conjuntas

Ressalta-se que os resultados foram triangulados através da aplicação de questionários, pesquisas documentais (leis e decretos) e pesquisas bibliográficas.

Na análise estatística foram realizadas análises sequenciadas (uma impactando a outra), em seis etapas: A etapa 1 foi realizada para estimar a confiabilidade do questionário; as etapas 2 e 3 foram realizadas para operacionalização das variáveis; as etapas 4 a 6 foram realizadas para aferir e compreender as relações dos comportamentos interinstitucionais na piscicultura.

Clareando os métodos de análise, a etapa 1 - baseou-se no modelo de Sok *et al.* (2016) e Bruijnis *et al.* (2013); a etapa 2 - baseou-se em Hair *et al.* (2009); a etapa 3 - baseou-se em Bauer (2007) e Callegari-Jacques (2007); a etapa 4 - baseou-se em Reis e Reis (2002) e Hair Jr. *et al.* (2009); a etapa 5 - baseou-se em Stoline (1981) e Jiexun e Alan Wang (2013); e a etapa 6 - baseou-se em Alejandro e Norman (2005) e Silva, Fialho e Saragoça (2013).

Para discutir os resultados, aplicou-se os seguintes conceitos de decisões nos dados.

1. Decisão baseada em evidências (ABNT, 2015): As informações e dados são usados como base para as escolhas. Assim, é possível fazer uma análise lógica e ordenada para definir qual é o melhor caminho;
2. Decisão baseada em comportamentos planejados (AZJEN, 1991; EAST, 1993): Esse método toma como base os princípios e as crenças pessoais. Nesse caso, deve-se selecionar e comunicar os princípios e aplicá-los para a situação atual.

Em tempo, destaca-se que o estudo foi submetido à avaliação do Comitê de Ética em Pesquisa (CEP), da Universidade Estadual do Oeste do Paraná

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(UNIOESTE), pela Plataforma Brasil, no dia 10 de junho de 2021. O estudo foi aprovado pelo registro CAAE 48105621.1.0000.0107 e número do parecer 4.802.951, em 24 de junho de 2021. Ressalta-se que, este estudo garantiu o anonimato dos respondentes, direito acordado no termo de consentimento do estudo.

Etapa 1: Análisse Estatística De *Alfa* De *Cronbach*

Para essa análise estatística foi utilizado o *software* SPSS® (*Statistical Package for the Social Sciences*). Pretendeu-se nesta etapa inicial, realizar uma aplicação analítica para aferir a confiabilidade do questionário elaborado e aplicado (SOK *et al.*, 2016).

Para tanto, foi utilizado o coeficiente **α** (alfa) de *Cronbach*, em cada variável da análise (Tabela 2). Destaca-se que os valores **α** variam de 0 a 1; quanto mais próximo de 1, maior será a confiabilidade entre as declarações. A confiabilidade se expressa no grau em que um conjunto de indicadores de uma determinada variável latente é consistente em suas mensurações (SOK *et al.*, 2016).

Enfatiza-se que o coeficiente **α** de *Cronbach* pode ser considerado alto ou elevado se os resultados forem acima de 0,6 (BRUIJNIS *et al.*, 2013). Observa-se que um alto índice de confiabilidade significa ser mais provável a descoberta de relacionamentos entre as variáveis realmente relacionadas, enquanto a baixa confiabilidade (menor de 0,6) leva a um grau de incerteza nas conclusões. Quando as diferenças são pequenas, não é possível identificar se a diferença é real ou foi devido a algum erro existente na formulação da questão (BRUIJNIS *et al.*, 2013).

Etapa 2: Análise Fatorial Exploratória

Nesta análise utilizou-se o *software* JAMOVI®, para realizar a Análise Fatorial Exploratória (AFE). O objetivo foi enxugar e agrupar as variáveis para tornar ágil o construto (HAIR JR. *et al.*, 2009).

No *software* escolhido, foram seguidas as etapas para rodar o método estatístico multivariado de AFE: Passo 1- Importar os dados (*xls*) da pesquisa para o JAMOVI®; Passo 2- Escolher a opção *Factor*, em seguida *Exploratory Factor Analisis*; Passo 3- Escolher as variáveis para análise: Intenção1, Intenção2, Intenção3, Atitude1, Atitude2, Atitude3, Atitude4, Atitude5, NormaSubjetiva1, NormaSubjetiva2, NormaSubjetiva3, NormaSubjetiva4, Controle Comportamental Percebido1, ControleComportamental Percebido2, ControleComportamentalPercebido3, IdentidadePrópria1, IdentidadePrópria2; Passo 4- Escolher o método de extração: *Principal axis* (eixo principal); Passo 5- Escolher o método de rotação. No início, a rotação *None*, depois, rotação *Oblimin*; Passo 6- Assinalar as duas verificações de suposição (*Assumption Checks*): *Bartlett's test of sphericity* e KMO *measure of sampling adequacy;* Passo 7- Assinalar na opção número de fatores: *Based on eigenvalue*, em seguida *Eigenvalues greater than* em 1; Passo 8- Assinalar a opção de taxa mínima de carregamento: carga fatorial mínima de 0.3 (esse valor foi ajustado, conforme necessidade); Passo 9- Assinalar na saída adicional (*Additional Output*) a opção: *Scree plot*.

Para a interpretação dos fatores gerados na AFE, será utilizado o método de rotação não-ortogonal – *Oblimin*. As rotações oblíquas (*Oblimin*) são semelhantes às ortogonais, porém as oblíquas permitem fatores correlacionados em vez de manterem independência entre os fatores rotacionados (HAIR JR. *et al.*, 2009).

Ademais, os exames somente podem ser realizados se os critérios de *Bartlett's* e KMO estiverem aceitáveis. O teste de esfericidade de *Bartlett* estatisticamente significante (sign. < 0,05) testa a hipótese de que as variáveis não sejam correlacionadas na população. Já o KMO considera os valores aceitáveis entre 0,5 a 1,0, portanto abaixo de 0,5 indica que a análise fatorial é inaceitável (HAIR JR. *et al.*, 2009).

Nesse cenário, caso os critérios forem aceitáveis, observa-se a importância das cargas fatoriais, conforme Hair Jr. *et al.* (2009):

1. Cargas fatoriais na faixa de ± 0,30 a ± 0,40 são consideradas como atendendo o nível mínimo para interpretação de estrutura;
2. Cargas de ± 0,50 ou maiores são tidas como praticamente significantes;
3. Cargas excedendo + 0,70 são consideradas indicativas de estrutura bem definida e são a meta de qualquer análise fatorial.

Neste contexto, o valor da taxa de carregamento (*Hide loadings below*) será reajustado, caso os resultados forem possíveis, para a formação de agrupamentos das variáveis em fatores. Os fatores permitem decisões mais rápidas sobre os fenômenos observados.

Para finalizar esta etapa, o teste *scree plot* será usado para visualizar graficamente o número de fatores que podem ser extraídos, antes que a quantia de variância única comece a dominar a estrutura de variância comum (HAIR JR. *et al.*, 2009).

Etapa 3: Teste De Correlação De Spearman

Nesta análise utilizou-se o *software* JAMOVI®, para o teste de correlação. O objetivo foi analisar a proporcionalidade dos respondentes, identificando convergências e divergências das declarações.

O coeficiente de correlação *Spearman* exige que as variáveis tenham sido medidas pelo menos em escala ordinal, para que os valores possam ser ordenados (CALLEGARI-JACQUES, 2007).

O coeficiente de *Spearman* varia entre -1 (correlação perfeita negativa) e +1 (correlação perfeita positiva), passando pelo valor 0 (ausência de correlação). "As estimativas [...] de cada estrato"

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propostos para essa análise está nos valores acima de 0,6 (BAUER, 2007, p. 48).

Para calcular, deve-se cruzar as variáveis (BAUER, 2007). Nota-se que cada indivíduo da amostra deve ter um valor para x e um para y, em separado. Se as características estiverem correlacionadas positivamente, postos baixos em uma delas serão, em geral, acompanhados de postos também baixos na outra, e postos altos em x corresponderão a postos altos em y. Nas correlações negativas, os postos altos em uma variável estarão ao lado de postos baixos na outra e vice-versa. Se, por outro lado, não houver correlação entre x e y, os postos altos atribuídos a valores de x podem corresponder a postos baixos, médios ou altos de y, indiferentemente. Portanto, a comparação entre os postos de x e y, observados em cada indivíduo, indica o tipo de correlação existente. O cálculo baseia-se nas diferenças entre os postos de x e y.

Etapa 4: Análise Descritiva Boxplot

Nesta etapa também foi utilizado o *software* JAMOVI®. A Análise Descritiva foi a fase inicial do processo de estudo dos comportamentos institucionais. O objetivo desta etapa é organizar, resumir e descrever os aspectos importantes de um conjunto de características observadas ou comparar tais características entre as dimensões TH.

O *Boxplot* é um gráfico proposto para a detecção de valores discrepantes (*outliers*), que são aqueles valores muito diferentes do restante do conjunto de dados (REIS & REIS, 2002). Para construção do *Boxplot*, serão utilizados alguns percentis (mediana, primeiro e terceiro quartis), que são pouco influenciados por valores extremos. Além disso, precisa-se conhecer os valores mínimo e máximo do conjunto de dados (HAIR JR. *et al.*, 2009).

O *Boxplot* é constituído por uma caixa atravessada por uma linha, construído usando um eixo com uma escala de valores. O fundo da caixa é marcado na escala de valores na altura do primeiro quartil (Q1). O topo da caixa é marcado na altura do terceiro quartil (Q3). Uma linha é traçada dentro da caixa na altura da mediana, que não precisa estar necessariamente no meio da caixa. Entre o primeiro e o terceiro quartis, estão 50% dos dados. Esta caixa contém metade dos dados do conjunto. A altura da caixa é dada por (Q3-Q1), que é denominada distância interquartílica (DQ) (REIS; REIS, 2002).

Como o gráfico tem que representar todos os valores do conjunto de dados, pois os outros 50%, sendo 25% abaixo do Q1 e 25% acima do Q3, esses valores serão representados pelas duas linhas que saem das extremidades da caixa (HAIR JR. *et al.*, 2009).

Etapa 5: Análise De Comparação Por Pares

Ainda no *software* JAMOVI® foi realizado o teste de variação *Kruskal-Wallis*. Conhecido como o método de disponibilidade total, o *pairwise comparisons* é usado, principalmente, para medir relações e maximizar a informação dos pares disponíveis da amostra. O teste de *Kruskal-Wallis* é feito para testar a homogeneidade entre três ou mais amostras.

A característica peculiar dessa técnica é o perfil de uma variável (p. ex., mediana) ou a correlação para um par de variáveis, que se baseia em um conjunto de observações potencialmente único. Espera-se que o número de observações usadas nos cálculos varie para cada relação (JIEXUN & ALAN WANG, 2013).

Para determinar se alguma das diferenças entre as medianas é estatisticamente significativa, compara-se o valor-p com o seu nível de significância, a fim de avaliar a hipótese nula. A hipótese nula afirma que as medianas são todas iguais. Geralmente, um nível de significância de 0,5 funciona bem (STOLINE, 1981).

Etapa 6: Análise Das Relações Sociais

Em meio a todas as análises estatísticas, o estudo propôs uma análise descritiva das relações sociais. A análise foi realizada a partir das variáveis resultados, com a inserção dos resultados do questionário no *software Ucinet*/*NetDraw*® de Johnson (1987). O objetivo desta análise foi apresentar graficamente as relações existentes dos resultados nas dimensões TH.

A análise realizada foi baseada em dois estudos: O primeiro de Alejandro e Norman (2005), os quais oferecem um manual de instruções para uso do *software;* e o segundo Silva, Fialho e Saragoça (2013), que apresentam a utilização de relações sociais para tomada de decisões.

O *Ucinet*/*NetDraw* requer que os valores sejam binários (0 e 1). Por isso, utilizou-se de Silva, Fialho e Saragoça (2013) em suas interpretações dos valores dos dados, como: 1- quando os valores forem abaixo do valor da mediana, foram considerados como 0 (não existência de relação); 2- quando os valores foram acima do valor da mediana, foram considerados como 1 (existência de relação). Enfatiza-se que o valor da mediana deste estudo foi 4.

IV. Resultados E Discussões

Após a aplicação dos 328 questionários, o estudo foi dimensionado em duas partes, para as análises estatísticas sequenciadas (uma impactando a outra). A primeira parte foi relativa ao questionário, quanto à confiabilidade, as reestruturações de variáveis e as proporcionalidades dos valores. Enfatiza-se que a confiabilidade foi testada no construto geral; as reestruturações foram para identificar as variáveis que mais representam o construto; e as proporcionalidades para validar o construto reestruturado.

A segunda parte, apropriando-se do construto final realizado, consistiu na análise *boxplot*, que mediu o impacto das variáveis do construto; a análise de

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comparação por pares, que cruzou os dados entre as dimensões TH; e a análise das relações sociais, que identificou e cruzou as variáveis, no contexto da TCP e da TH.

a) Resultados Da Análise Estatística Cronbach

O coeficiente α de *Cronbach* para o construto total foi de 0,881. Em linhas gerais, a análise apresentou um construto positivo para análise dos comportamentos na piscicultura (Tabela 1).

Tabela 1: Análise De *Cronbach* Do Construto Por Variáveis Da TCP

Variáveis	Alfa de *Cronbach*	Conjunto de variáveis
Intenção	0,474	Intenção1, Intenção2 e Intenção3
Atitude	0,764	Atitude1, Atitude2, Atitude3, Atitude4 e Atitude5
Norma Subjetiva	0,629	NormaSubjetiva1, NormaSubjetiva2, NormaSubjetiva3 e NormaSubjetiva4
Controle Comportamental Percebido	0,667	ControleComportamentalPercebido1, ControleComportamentalPercebido2 e ControleComportamentalPercebido3
Identidade Própria	0,624	IdentidadePrópria1 e IdentidadePrópria2

Fonte: Resultados da pesquisa (2022).

Nas variáveis Atitude, Norma Subjetiva, Controle Comportamental Percebido e Identidade Própria, os valores ficaram superiores ao mínimo proposto pela análise de *Cronbach*, que é 0,6. Isso indica que para análise dos conjuntos de variáveis, o questionário aplicado garante confiabilidade.

No entanto, a dimensão Intenção necessitava de ajustes no construto. Por isso, foram reanalisados os valores de cada declaração da variável intenção, e a Intenção 2, que estava abaixo do determinado, foi excluída.

Após a exclusão, apresenta-se a Tabela 2, para verificação dos resultados. Percebe-se, então, que os valores ficaram acima do considerado suficiente.

Tabela 2: Reanálise De *Cronbach* Do Construto Da Dimensão Intenção, Sem A Variável Intenção2.

Variável	Alfa de Cronbach	Conjuntos de variáveis
Intenção	0,618	Intenção1 e Intenção3

Os resultados gerais dos conjuntos de variáveis para os coeficientes α de *Cronbach*, após o ajuste na variável Intenção, foi de 0,885, perfazendo um resultado positivo e significativo do construto. Com esse resultado, o questionário permite resultados confiáveis e realísticos, por unidade ou geral, dos comportamentos na piscicultura brasileira.

b) Resultados da Análise Fatorial Exploratória

A Análise Fatorial Exploratória (AFE) possui o objetivo de criar fatores que expliquem melhor as dimensões na piscicultura brasileira. Sendo assim, o fato de existirem variáveis que possuem pouco (ou não possuem) conexão com as demais variáveis, estas podem ser excluídas. Por fim, a AFE permite apresentar as variáveis satisfatórias, para compreensão dos cenários.

Passo 1 e 2: Executar a matriz de cargas fatoriais e identificar as cargas significantes. Dado o tamanho da amostra de 328 respondentes e 17 variáveis iniciais independentes, considerou-se inicialmente as cargas fatoriais de 0,3 ou mais, como significantes para fins de interpretação (Tabela 3).

Para examinar as cargas fatoriais, parte-se de uma carga fatorial e da análise da matriz não-rotacionada (*Rotation None*). Na Tabela 3, cinco (Intenção3, Atitude2, Atitude4, Controle Com portamentalPercebido1 e IdentidadePrópria2) das 17 variáveis tiveram cargas cruzadas. Nessa situação, utiliza-se a rotação *oblimin*, para melhorar a compreensão entre as variáveis e obter melhor apreensão dos dados.

Passo 3: Avaliando e comparando as cargas fatoriais (Tabela 4). Foi assinalada a rotação *Oblimin*, a qual permite que as cargas sejam alinhadas ao objetivo do construto, com elevada carga sobre o fator. No caso deste estudo, o método formou e agrupou as variáveis em dois fatores, significando que os cenários devem ser reavaliados.

Para entender melhor, tem-se o caso da variável Atitude5, que teve carga fatorial baixa e precisou ser eliminada. O motivo de sua eliminação é que na rotação *None* o valor da variável Atitude5 era de 0,3; e quando realizado a rotação *Oblimin* o valor caiu para 0,153, não enquadrando no mínimo aceitável da AFE.

Enfatiza-se que os resultados que não aparecem na tabela, pois seu valor está menor que o valor de corte, então precisa ser excluída.

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Passo 4: Readequação da taxa fatorial. Para eliminar as cargas cruzadas e tornar mais significativo o construto, aumentou-se a taxa de fatorial para 0,55 (ALBA, 2021). Novamente, rearranjou-se as variáveis de acordo com suas cargas, exibido os valores na Tabela 5.

Assim, aumentando a taxa fatorial para 0,55, percebe-se que as variáveis Intenção1, NormaSubjetiva3, NormaSubjetiva4, Controle Com portamental3, tiveram cargas abaixo da taxa aplicada e foram excluídas.

Tabela 3: Análise Fatorial Exploratória Com Rotação *None* E Taxa De 0,3

	Factor		
	1	2	Uniqueness
Intenção1	0.654		0.566
Intenção3	0.648	0.547	0.281
Atitude1	0.809		0.316
Atitude2	0.667	−0.402	0.394
Atitude3	0.652		0.508
Atitude4	0.544	−0.645	0.288
Atitude 5			0.914
NormaSubjetiva1	0.633		0.528
NormaSubjetiva2	0.577		0.603
NormaSubjetiva3	0.621		0.611
NormaSubjetiva4		0.371	0.788
ControleComportamentalPercebido1	0.497	0.483	0.519
ControleComportamentalPercebido2	0.585		0.599
ControleComportamentalPercebido3	0.590		0.634
IdentidadePróprial	0.661		0.522
IdentidadePróprial2	0.592	−0.461	0.438

Note. 'Principal axis factoring' extraction method was used in combination with a 'none' rotation

Tabela 4: Análise Fatorial Exploratória Com *Oblimin* E Taxa De 0,3 - Primeira Análise

	Factor		
	1	2	Uniqueness
Intenção1	0.358	0.444	0.566
Intenção3	0.882		0.281
Atitude1	0.667	0.311	0.316
Atitude2		0.742	0.394
Atitude3		0.605	0.508
Atitude4		0.891	0.288
Atitude 5			0.914
NormaSubjetiva1	0.634		0.528
NormaSubjetiva2	0.587		0.603
NormaSubjetiva3	0.455		0.611
NormaSubjetiva4	0.490		0.788
ControleComportamentalPercebido1	0.730		0.519
ControleComportamentalPercebido2	0.583		0.599
ControleComportamentalPercebido3		0.459	0.634
IdentidadePróprial		0.560	0.522
IdentidadePróprial2		0.752	0.438

Note. 'Principal axis factoring' extraction method was used in combination with a 'oblimin' rotation

Nesse contexto, rearranjou-se o modelo fatorial, para a carga fatorial estipulada. Para esse construto, observa-se na Tabela 6, que as variáveis Atitude1, Atitude3, NormaSubjetiva1, NormaSubjetiva2, Controle ComportamentalPercebido2 e IdentidadePróprial, tiveram que ser excluídas, pois suas cargas fatoriais ficaram baixas.

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Tabela 5: Análise Fatorial Exploratória com *Oblimin* e taxa de 0,55 - Segunda análise

	Factor		
	1	2	Uniqueness
Intenção1			0.547
Intenção3	0.882		0.279
Atitude1	0.662		0.321
Atitude2		0.745	0.393
Atitude3		0.608	0.507
Atitude4		0.881	0.304
NormaSubjetiva1	0.629		0.535
NormaSubjetiva2	0.583		0.606
NormaSubjetiva3			0.598
NormaSubjetiva4			0.792
ControleComportamentalPercebido1	0.731		0.517
ControleComportamentalPercebido2	0.581		0.601
ControleComportamentalPercebido3			0.637
IdentidadePrópria1		0.564	0.519
IdentidadePrópria2		0.751	0.442

Note. 'Principal axis factoring' extraction method was used in combination with a 'oblimin' rotation

Tabela 6: Análise Fatorial Exploratória Com *Oblimin* E Taxa De 0,7 - Terceira Análise

	Factor		
	1	2	Uniqueness
Intenção3	0.859		0.307
Atitude1			0.324
Atitude2		0.707	0.428
Atitude3			0.505
Atitude4		0.882	0.289
NormaSubjetiva1			0.480
NormaSubjetiva2			0.634
ControleComportamentalPercebido1	0.740		0.500
ControleComportamentalPercebido2			0.638
IdentidadePrópria1			0.490
IdentidadePrópria2		0.753	0.430

Note. 'Principal axis factoring' extraction method was used in combination with a 'oblimin' rotation

A partir da exclusão das variáveis com cargas baixas, percebe-se que o estudo que começou com 17 variáveis independentes, agora, restam cinco variáveis remanescentes (Tabela 7).

Tabela 7: Análise Fatorial Exploratória, Com *Oblimin*: Taxa De 0,7

	Factor	
	1	Uniqueness
Intenção3		0.955
Atitude2	0.768	0.410
Atitude4	0.755	0.430
ControleComportamentalPercebido1		0.977
IdentidadePrópria2	0.790	0.377

Note. 'Principal axis factoring' extraction method was used in combination with a 'oblimin' rotation

Ainda, o método propõe elevar a carga fatorial para 0, 7, pois as cargas excedendo +0, 70, são consideradas mais indicadas de uma estrutura consolidada e expressa o valor máximo de uma análise fatorial (BUTA; GOMES & LIMA, 2020).

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Entretanto, quando foi realizada a exclusão da variável, do passo anterior, percebeu-se que a estrutura foi redefinida, pois as cargas das variáveis Intenção3 e ControleComportamentalPercebido1, tiveram cargas baixas. Por isso, também tiveram que ser excluídas.

Passo 5: O produto final (Tabela 8). Agora, constata-se que o construto já está bem definido e consolidado.

O método permitiu uma reorganização das variáveis, para tomadas de decisão na piscicultura, tornando-as ágeis. Nesse sentido, as variáveis Atitude 2, Atitude 4 e IdentidadePrópria 2, podem propiciar direcionamentos para compreensão dos resultados, sob a ótica da Tríplice Hélice.

Tabela 8: Resultado Final Da Análise Fatorial Exploratória Com *Oblimin*: Taxa De 0, 7

	Factor	
	1	Uniqueness
Atitude4	0.824	0.322
IdentidadePrópria2	0.788	0.379
Atitude2	0.724	0.476

Note. 'Principal axis factoring' extraction method was used in combination with a 'oblimin' rotation

Ademais, apresenta-se o *screeplot*, um gráfico de declividade que demonstra uma análise visual da variância dos componentes principais (Figura 6).

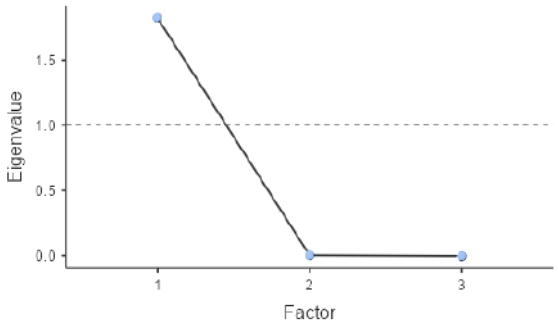


Figura 6: Gráfico Scree Plot Das Variáveis Resultantes

Essa é uma maneira útil de visualizar o número de variáveis resultantes, a serem mantidas nas tomadas de decisão. Esse resultado, dá aos tomadores de decisão, respostas rápidas para ações assertivas e a possibilidade de construção de um planejamento estruturado para os fenômenos observados.

Enfim, para confirmar o construto final, foram necessários os resultados da KMO (*Kaiser-Meyer-Olkin – Measure of Sampling Adequacy* – MSA) que foi 0,853 no início das análises e ao final representou 0,714 (Tabela 9), considerando positivo para os construtos. Isso porque, segundo Hair *et al.* (2009), os valores inferiores a 0,5 são considerados inaceitáveis. Portanto, diante das análises, não foram encontrados valores abaixo do esperado.

Outro teste importante é o teste de *Bartlett – Test of Sphericity* –, que indica existência ou não de relação suficiente entre as variáveis, para a aplicação da AFE, apontou um teste de esfericidade de $p<0,001$ de significância, indicando a possibilidade de aplicação da AFE (Tabela 9).

Então, dentre as cinco grandes variáveis (Intenção, Atitude, Norma Subjetiva, Controle Comportamental Percebido e Identidade Própria) da TCP, empreende-se construir um planejamento, a partir das três variáveis resultantes, na perspectiva das relações interinstitucionais (Tríplice Hélice), pois o construto foi reduzido, tornando-se mais sintético, respeitado seu caráter analítico.

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Tabela 9: Teste *Bartlett* E KMO, Antes E Depois Da Análise Fatorial Exploratória.

Bartlett's Test of Sphericity

χ^2	df	p
2631	120	< .001

KMO Measure of Sampling Adequacy

	MSA
Overall	0.853
Intenção1	0.845
Intenção3	0.849
Atitude1	0.866
Atitude2	0.878
Atitude3	0.913
Atitude4	0.797
Atitude 5	0.657
NormaSubjetiva1	0.883
NormaSubjetiva2	0.847
NormaSubjetiva3	0.866
NormaSubjetiva4	0.707
ControleComportamentalPercebido1	0.882
ControleComportamentalPercebido2	0.812
ControleComportamentalPercebido3	0.818
IdentidadePróprial	0.924
IdentidadePróprial2	0.888

Bartlett's Test of Sphericity

χ^2	df	p
352	3	< .001

KMO Measure of Sampling Adequacy

	MSA
Overall	0.714
Atitude2	0.756
Atitude4	0.688
IdentidadePróprial2	0.707

c) Resultados Do Teste De Corrrelação Spearman

O teste de correlação de *Spearman* foi realizado para confirmar, se as variáveis estão diretamente proporcionais, dentro do limite, para o construto alterado, após a análise fatorial exploratória (etapa anterior). Esta etapa foi útil, pois é necessária a verificação da relação-proporção do construto final (Tabela 10).

Tabela 10: Matriz De Correlação *Spearman*

	Atitude4	Atitude2	IdentidadePróprial2
Atitude4	—		
Atitude2	0.676 ***	—	
IdentidadePróprial2	0.697 ***	0.646 ***	—

Note. * p < .05, ** p < .01, *** p < .001

Os resultados da matriz mostraram que os respondentes não tiveram muitas divergências em suas respostas (CALLEGARI-JACQUES, 2007) e estão diretamente relacionados, pois os valores de p foram superiores ao estabelecido como requisito mínimo na correlação de *Spearman* (BAUER, 2007). Isso significa dizer que as três variáveis analisadas serão utilizadas, a seguir, na análise descritiva dos fatos.

d) Resultados Da Análise Descritiva Boxplot

As representações ficaram para os gráficos *boxplot*. Inicialmente, foram observados se a linha inferior atendeu à primeira condição, encontrando o valor mínimo dos dados, antes de atingir o comprimento máximo permitido. Assim, o limite inferior do *boxplot* coincide com o valor mínimo.

Clareando as ideias, os valores que não se constituíram representativos, foram devidamente marcados por um asterisco (*), em suas respectivas posições na escala de valores. Foi o que ocorreu com os valores na Figura 7, que não conseguiram ser incluídos na linha superior do gráfico. Esses valores são considerados *outliers* pelo critério do *boxplot*. Na lógica, o limite superior do *boxplot* não coincide com o valor máximo dos conjuntos de dados, indicando os valores discrepantes (*outlier*).

Pode-se perceber, a partir da Figura 7, que para a variável Atitude 2, todos os respondentes estiveram diretamente proporcionais. Entretanto, houve maior incidência de divergências nos dados da indústria. Isso mostra que uma pequena parcela dos

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respondentes, não consideram ser importante a elaboração de estratégias conjuntas.

No mais, a variável Atitude 2, que explicita a importância das relações interinstitucionais, aparece como significativa, quando avaliado a totalidade da dimensão Identidadeinstitucional1. Isso denota o entendimento que o apoio percebido nas dimensões TH estão positivamente relacionados à piscicultura.

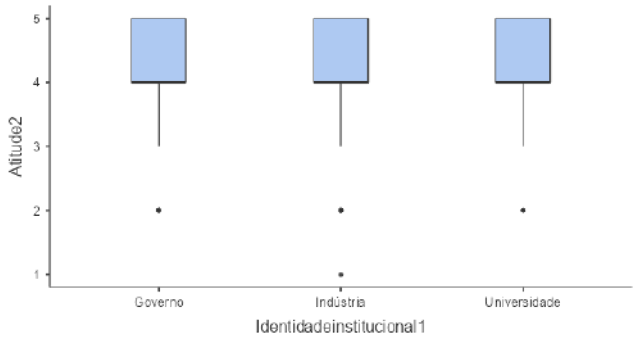


Figura 7: Importância Da Tríplice Hélice Aos Respondentes Na Piscicultura Brasileira

Avaliando a variável Atitude 4 (Figura 8), nota-se o questionamento sobre a necessidade ou a desnecessidade da interação para o desenvolvimento de estratégicas consensualizadas. Ainda, houve uma variância entre as dimensões Governo e Indústria (respostas entre 3-5), o que representa uma proporcionalidade positiva de necessidade.

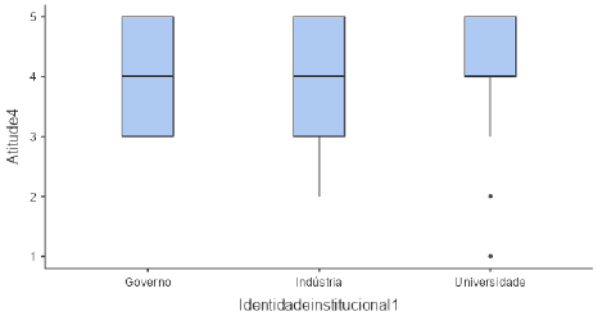


Figura 8: Necessidade de estratégias comuns entre as dimensões da Tríplice Hélice na piscicultura brasileira.

No entanto, houve *outliers* somente na dimensão universidade, ou seja, ainda há necessidade de compreender os aspectos subjacentes de seu papel no modelo interinstitucional.

Ainda a Figura 8 apresenta que há necessidade da TH, ou seja, a ânsia da indústria quanto à interação para o desenvolvimento de estratégias comuns. Foi percebido que os valores ficaram nivelados e isso significa que os tomadores de decisão institucionais, podem aprisionar essa variável para o construto das dimensões TH, pois está relacionado positivamente à piscicultura.

E, por fim, a Figura 9 (variável Identidadeprópria 2) que representa o envolvimento dos indivíduos nas relações interinstitucionais. Observa-se que as dimensões TH tiveram a mesma proporcionalidade. Pode-se compreender, então, o envolvimento dos agentes para o movimento sinérgico.

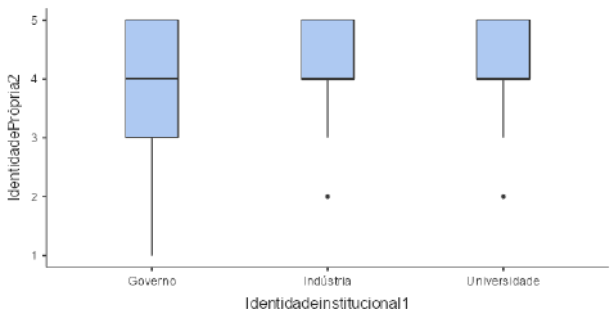


Figura 9: Envolvimento Dos Indivíduos Em Tríplice Hélice Na Piscicultura Brasileira.

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Portanto, as três variáveis TCP estão relacionadas positivamente à piscicultura, mas as representatividades não devem mascarar a finalidade do construto, ou seja, é importante assegurar a relação interinstitucional (TH) conjunta e democrática.

e) Resultados Das Comparações Por Pares

Nesta etapa, o estudo se apropriou da técnica *Dwass-Steel-Critchlow-Fligner* (DSCF) da *pairwise comparisons,* sendo realizadas as comparações múltiplas de traços de personalidade. Essa técnica, aliada ao teste de *Kruskal-Wallis*, propiciou a medição dos comportamentos interinstitucionais, que levou em conta tanto a identidade pessoal quanto os atributos de identidade social de forma coletiva (JIEXUN & ALAN WANG, 2013).

A comparação entre pares foi uma estratégia básica e simples para compreender os comportamentos nas dimensões TH (Tabela 11). Para cada par de variáveis calculou-se o valor p e admitiu-se o valor mínimo de carga de 0,5 (STOLINE, 1981). O elemento W, permitiu aferir as margens de erro da tabela; assim, revelou-se que não houve margens significativas na análise (STOLINE, 1981).

Tabela 11: Comparações Pareadas Das Variáveis

Pairwise comparisons - Atitude2

		W	p
Governo	Indústria	0.384	0.960
Governo	Universidade	−0.121	0.996
Indústria	Universidade	−0.577	0.912

Pairwise comparisons - Atitude4

		W	p
Governo	Indústria	0.998	0.760
Governo	Universidade	2.323	0.228
Indústria	Universidade	1.668	0.466

Pairwise comparisons - IdentidadePrópria2

		W	p
Governo	Indústria	1.559	0.513
Governo	Universidade	2.140	0.285
Indústria	Universidade	0.844	0.822

Na variável que trata sobre a importância da interação (Atitude2), o valor de p foi considerado suficiente (0,9). Os comportamentos dos respondentes engendram para o favorecimento de relações. Contudo, as representatividades precisam ser clareadas para o estímulo de sinergias.

Já na variável que trata sobre a necessidade de interação (Atitude4), o valor p foi baixo, em se tratando da comparação entre Governo-Universidade e Indústria-Universidade, 0,228 e 0,466, respectivamente. Isso leva a considerar que carece de diálogos entre essas dimensões. O trabalho conjunto pode viabilizar soluções científicas e inovadoras e a construção de relações contínuas no setor.

Quando observado a variável que trata sobre o envolvimento para o desenvolvimento de estratégias (IdentidadePróprias 2), percebe-se que os valores de p foram baixos (0,285) para Governo-Indústria. Por isso, para que o envolvimento e o interesse dos indivíduos sejam suficientes na etapa anterior, suas organizações precisam formar instituições eficientes para promover soluções específicas e setorizadas.

Os resultados pareados mostraram que tanto o comportamento social quanto os atributos de relacionamento, podem melhorar o desempenho da identidade institucional, em comparação com o uso de atributos de identidade pessoais sozinhos.

V. Resultados Da Análise De Relações Sociais

A inferência sob as Análises de Relações Sociais (ARS) podem resultar em várias interpretações, como a análise dos laços, análise do ambiente, entre outras (RIEDO *et al.*, 2021). O conceito de densidade traduz-se pelo quociente das interações/ligações efetivamente existentes entre os atores, pelo total de ligações potenciais ou possíveis (ALEJANDRO & NORMAN, 2005; SILVA; FIALHO & SARAGOÇA, 2013).

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Nesse contexto, nas figuras 10, 11 e 12, o estudo pode quantificar e ilustrar os comportamentos das variáveis resultantes TCP nas dimensões TH.

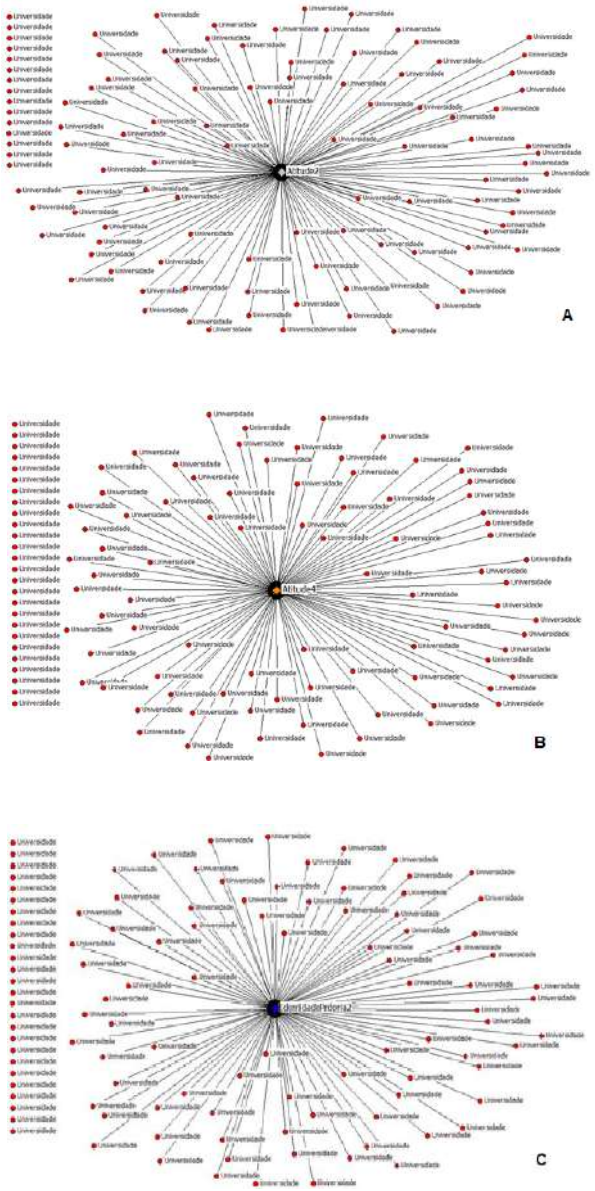
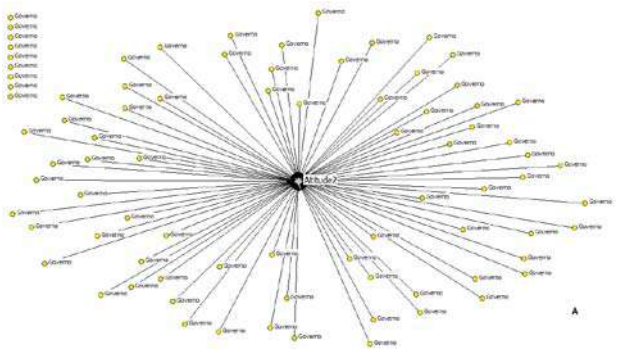


Figura 10: Relações Da Dimensão Universidade Com as Variáveis Resultantes TCP.



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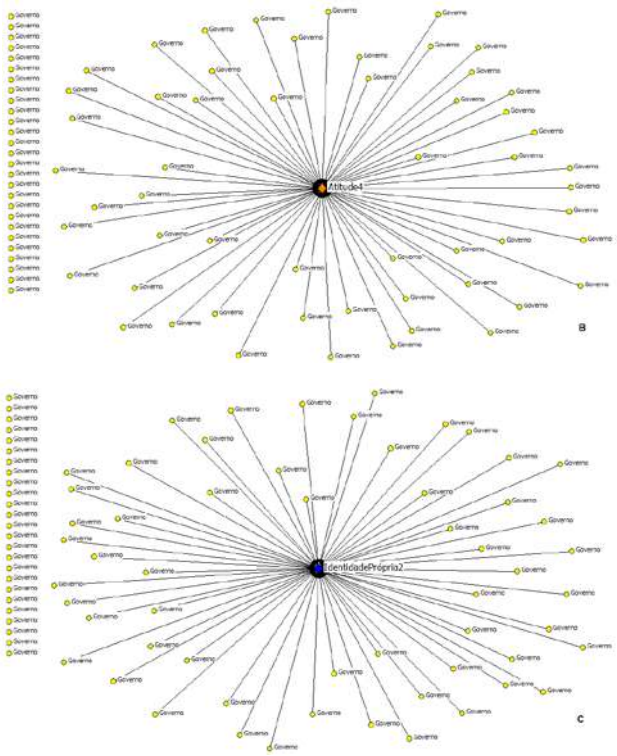
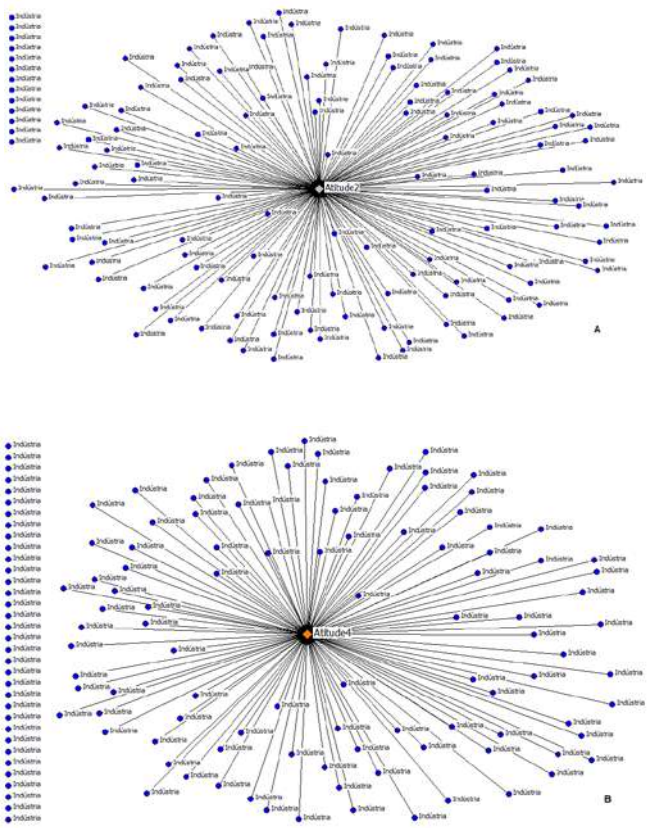


Figura 11: Relações Da Dimensão Governo Com as Variáveis Resultantes TCP.



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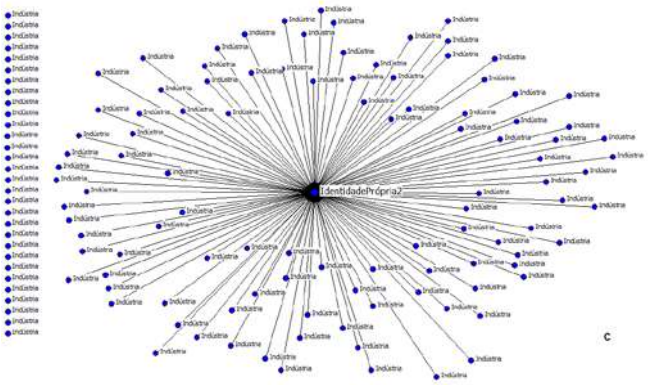


Figura 12: Relações Da Dimensão Indústria Com as Variáveis Resultantes TCP.

Assim, cruzam-se as variáveis TCP nas dimensões TH, tornando-se possível a quantificação das interações entre os participantes (Figuras 13 e 14).

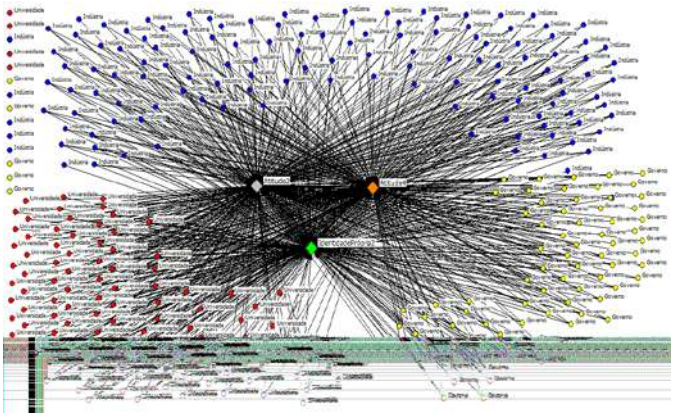


Figura 13: Relações Das Dimensões Tríplice Hélice Nas Variáveis Resultantes TCP.

Legenda: Círculos azuis representam os respondentes que se identificaram como Indústria; Círculos vermelhos como Universidade; Círculos amelos como Governo.

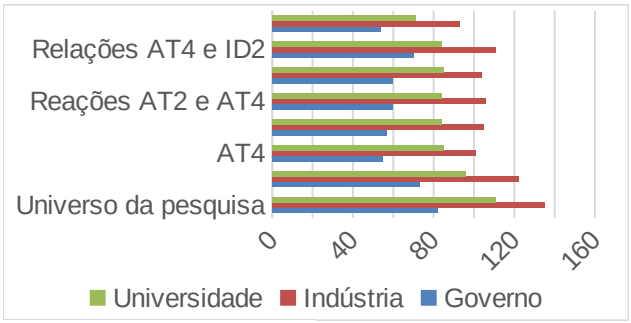


Figura 14: Número De Interações TH Nas Variáveis Resultantes TCP.

Legenda: AT2 – variável Atitude2; AT4 – variável Atitude4; ID2 – variável IdentidadePróprio2; Universo da pesquisa – Número total de participantes em cada dimensão.

Na Figura 10, pode-se perceber que 75,5% da dimensão universidade querem envolver-se em relações para tomadas de decisões conjuntas (Figura 10c). Essa compreensão pode ser percebida pelas dificuldades de entendimento do papel e limitação de acesso nas demandas do mercado. Entretanto, percebe-se que os respondentes, nas Figuras 10a e 10b, consideraram importantes (86,5%) e necessárias (76,5%) essas relações para o desenvolvimento de estratégias comuns na piscicultura brasileira.

Na Figura 11 percebe-se que 89% do governo julgam importante as relações mútuas (Figura 11a), mas 67% consideraram desnecessárias as interações (Figura 11b). Essa questão, traz reflexões sobre a efetividade das normativas e políticas para o setor. Ademais, o 69,5% consideraram o envolvimento nas relações conjuntas (Figura 11c). No entanto, entende-se, que o Governo deve ser parceiro nas estratégias

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conjuntas, fomentando pesquisas, incentivando novos mercados e inovações e, no que for possível, reduzindo os tributos para as organizações, ressalvado o progresso e o desenvolvimento nacional sustentável.

Na Figura 12, identifica-se que 90% da dimensão Indústria consideraram importante (Figura 12a) e 75% consideraram necessário (Figura12b) as relações conjuntas. Os resultados ainda apontaram que 78% das indústrias da piscicultura brasileira (Figura 12c) querem se envolver no desenvolvimento de estratégias conjuntas, especialmente, que carecem de incentivo para produção e adoção de novos produtos para novos e já existentes mercados.

Já as Figuras 13 e 14, apresentam o entrelaçamento das análises, ou seja, as relações totais das variáveis resultantes TCP nas dimensões TH. Percebe-se que a dimensão Universidade representou maior desconexão relacional (63,9%), quando comparado entre suas variáveis TCP. Os valores para a dimensão Governo ficou 65,8% e a dimensão Indústria ficou com 69%. Pode-se pressupor o favorecimento de possibilidade de interação interinstitucional, pois o resultado foi de maioria absoluta positiva para resolver problemas conjuntamente.

Ainda, os resultados da pesquisa permitem a acepção de que os indivíduos não estão isolados, mas inter-relacionados entre si em uma sociedade. Empresários, industriários, pesquisadores, governistas e cidadãos precisam entender que as estratégias e as sinergias impactam no fortalecimento organizacional dos setores produtivos.

Adotar estratégias, requer, além de um olhar para dentro, um pensamento fora do ambiente, pois as respostas para a cadeia produtiva dificilmente surgirão dentro de estruturas não-dinâmicas. É preciso pensar em soluções integradas, que cruzem as fronteiras internas para as externas na piscicultura brasileira.

Portanto, o estudo ressalta que a hipótese geral – H_0: As relações interinstitucionais (Tríplice Hélice) favorecem o desenvolvimento organizacional da piscicultura brasileira – foi comprovada. Para clarear essa constatação, necessitou-se três indicações para cada dimensão TH.

1. Quanto à hélice Universidade, tem a responsabilidade no desenvolvimento de produtos/serviços e capitais intelectuais para a sociedade, promovendo transferências de tecnologias;
2. Quanto à hélice Governo, deve compreender que suas atividades precisam ser atuantes em um processo dinâmico, com investimentos públicos, regulações e proposições de novos mercados;
3. Quanto à hélice Indústria, deve estar aberta para propor situações reais, receber e aplicar tecnologias, e atuar na transformação de ideias, tecnologias e conhecimentos em produtos e/ou serviços.

Essa proposição metodológica estrutural dos cenários na piscicultura brasileira torna-se ainda mais importante o favorecimento do desenvolvimento econômico, pois permite a aplicação de estratégias nos fenômenos observados. Entende-se que, ainda que as representações institucionais sejam independentes, por organização, todas têm ou precisam ter o mesmo objetivo (Figura 15).



Figura 15: União De Propósitos De Instituições Para Estratégias Conjuntas.

Diante dos fatos apresentados, as variáveis analisadas permitem ascender o uso de fatores condizentes com o ambiente da piscicultura, o que favorece a construção do planejamento estratégico do setor.

No estudo de Ayroza *et al.* (2021), as organizações da piscicultura devem tomar decisões, de acordo com a importância estrutural, considerando os envolvimentos dos atores e na necessidade de intervenções institucionais. Ressalta-se, que no universo da pesquisa, as variáveis resultantes provocam a intervenção estrutural, por meio da elaboração de diretrizes para o desenvolvimento da piscicultura brasileira (Figura 16).

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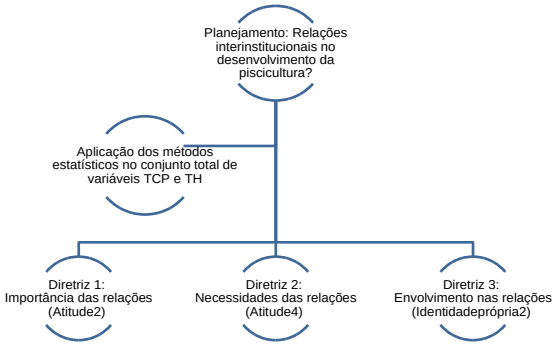


Figura 16: Fluxograma Dos Processos Da Pesquisa E Os Resultados.

Para esse momento, foi necessário voltar e observar à proposição de modelo, pois a redução das variáveis nas análises estatísticas, deu às organizações a possibilidade de decisões rápidas sobre o contexto global em que estão inseridas (Figura 17).

O resultado final do modelo possibilitou o cruzamento das teorias, contribuiu para a identificação da importância do construto, enfatizou as necessidades de estratégias conjuntas e ressaltou os interesses de envolvimentos em soluções sinérgicas de dificuldades na piscicultura brasileira.



Figura 17: Variáveis Coletadas Sob a Perspectiva De Tipologias De Decisões.

Legenda: Decisão baseada em comportamentos – relações informais (crenças e instituições); Decisão baseada em evidências – Observações concretas de cenários (fatos e relações legais); Atitude 2– Importância; Atitude 4– Necessidade; Identidadeprópria 2 – Envolvimento.

Quando testado o modelo proposto sobre outra lente de pesquisa, como é o caso da teoria das decisões baseadas em evidências e comportamentos, percebe-se que juntas, as variáveis resultantes do modelo, explicitam que as dimensões podem construir planejamentos estratégicos de interesse comum. Essa afirmação é corroborada pelos estudos de Pedroza Filho e Castilho (2021) e Ribeiro e Pedroza Filho (2022), nos quais, a decisão do melhor caminho a seguir, abrange todos os processos de uma organização desde a extração de matéria-prima até a distribuição do produto, diferenciando-se da cadeia produtiva pelo conceito de valor atribuído por etapa, envolvendo incertezas e riscos mercadológicos.

Ademais, o modelo propositivo pode ser aplicado em outros setores produtivos brasileiros, pois como Bresser-Pereira (2020) dizia, o desenvolvimento vai além dos pressupostos de curto prazo, afirmando que a estratégia de médio e longo prazo são imprescindíveis para o desenvolvimento nacional, já que é dessa forma que todos os problemas ficam alinhados e fazem com que as organizações do setor sofram menos ameaças.

E é por isso que as análises foram realizadas, para compreender o quanto as relações favorecem o desenvolvimento da piscicultura brasileira. O estudo se permitiu sugestionar um planejamento estratégico. Enfatiza-se que os planejamentos estratégicos são utilizados como fio condutor para tomadas de decisões dos agentes interinstitucionais da piscicultura brasileira. Em analogia com a anatomia humana, o desenvolvimento do plano estratégico é produto do cérebro dos indivíduos.

Então, para construção deste modelo/plano, foram sugeridas diretrizes para o ambiente da piscicultura brasileira (Figura 18).

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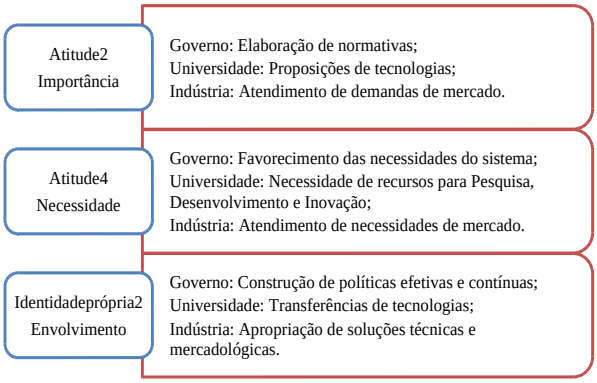


Figura 18: Diretrizes Propositivas Para Elaboração Do Planejamento Estratégico Sinérgico Da Piscicultura.

Ressalta-se que as ações estratégicas são estruturadas por meio de normas, e são entendidas por North (1991), como as regras do jogo. Isso porque a decisão por tomar uma ação específica exige que as informações do plano sejam revisitadas, para, então, definir quais mudanças na estratégia deveram ser adotadas.

Nessa perspectiva, para estruturação do plano estratégico interinstitucional da piscicultura brasileira, tem-se a necessidade de voltar às normas e políticas do desenvolvimento rural brasileiro, tratadas no Artigo 187 da Constituição Federal Brasileira (BRASIL, 1988). Em seu texto, trata-se das políticas de produção rural, que devem planejadas e executadas com a participação efetiva dos atores – envolvendo produtores e trabalhadores rurais, bem como dos setores de comercialização, de armazenamento e de transportes. Além disso, manifesta-se que as políticas de Estado precisam atuar:

1. Na instrumentalização de créditos e fiscalizações;
2. Na concepção de preços compatíveis com os custos de produção e a garantia de comercialização;
3. No incentivo à pesquisa e à tecnologia;
4. Na promoção de assistência técnica e extensão rural;
5. Na construção de seguros, contra perdas, da produção rural;
6. No cooperativismo como forma de organização de gestão de mercado;

Para o atendimento aos dispostos da Constituição Federal no que tange à piscicultura, foi criado, em julho de 2008, um Plano de Desenvolvimento Sustentável, denominado Mais Pesca e Aquicultura, e, posteriormente, publicado pela Lei Federal nº 11.959, em 2009 (BRASIL, 2009), que prevê, entre outros aspectos, a viabilização das cadeias produtivas da pesca e aquicultura brasileiras.

Entre as Diretrizes Intrínsecas Da Lei, Destacam-Se:

1. A concepção de gestão que articula toda a atividade, desde a produção, passando pela transformação até a comercialização;
2. A articulação sinérgica e o envolvimento dos atores da cadeia produtiva, no processo de produção e na implantação de políticas de fomento e de desenvolvimento.

Porém, Barroso *et al.* (2018) expressaram, entre outros aspectos, dificuldades para o alcance da efetividade do dito desenvolvimento da piscicultura brasileira:

1. A falta de organização do sistema de transferência de tecnologia e a carência de pesquisa aplicada no desenvolvimento do setor;
2. A dificuldade de industrialização pelo ciclo de vida do produto e a falta de padrões de qualidade e controles sanitários, permitindo a exploração de mercados mais acentuados.

Nesse contexto, quando analisadas as diretrizes e as dificuldades, são percebidos os direcionamentos à piscicultura brasileira. Entretanto, a piscicultura requer práticas relacionadas às políticas e legislações, ao melhoramento da infraestrutura e comercialização, à preservação ambiental com responsabilidade social, a extensão rural e participação da comunidade científica e com a promoção de vantagens competitivas, valor agregado e distribuição dos produtos ofertados, que realmente contribuam para o fortalecimento da cadeia produtiva.

Essas dificuldades são corroboradas nas estratégias declaradas pela Confederação da Agricultura e Pecuária do Brasil (CNA, 2021) e nas manifestadas pelos pesquisadores, Feiden *et al.* (2018), Lopera-Barrero *et al.* (2011), Ostrenky (2007), Schulter e Vieira Filho (2017), Pedroza Filho e Castilho (2021), Ribeiro e Pedroza Filho (2022) e Rodrigues *et al.* (2021).

1. Definir políticas públicas que permitam melhorar o setor aquícola, priorizando os investimentos e recursos sociais e produtivos, com medidas de licenciamento eficientes e fiscalização eficazes

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(CNA, 2021; FEIDEN *et al.,* 2018; OSTRENKY, 2007; PEDROZA FILHO *et al.,* 2020; RODRIGUES *et al.*, 2021; SCHULTER & VIEIRA FILHO, 2017);
2. Criar acordos de cooperação técnica, que promovam parcerias para o desenvolvimento sustentável do setor (OSTRENKY, 2007; PEDROZA FILHO *et al.,* 2020; SCHULTER & VIEIRA FILHO, 2017);
3. Criar condições para o desenvolvimento de uma produção rentável e inovadora, baseada nos pilares da sustentabilidade social, econômica e ambiental (CNA, 2021; PEDROZA FILHO *et al.,* 2020; RODRIGUES *et al.*, 2021);
4. Criar e fortalecer associações entre os pescadores, aquicultores, produtores rurais, pesquisadores, integrantes de órgãos públicos e privados com interesse do setor e que permitam um canal de comunicação constante (LOPERA-BARRERO *et al.*, 2011; SCHULTER & VIEIRA FILHO, 2017);
5. Fortalecer e fomentar câmaras democráticas setoriais nos âmbitos locais, regionais e nacionais, para estruturação de planos estratégicos do setor (CNA, 2021; LOPERA-BARRERO *et al.*, 2011);
6. Definir estratégias de fomento que permitam viabilizar pesquisas, artigos e boletins científicos, manuais, tecnologias, trabalhos de campo e assistências técnicas por organizações do setor (FEIDEN *et al.*, 2017; PEDROZA FILHO *et al.,* 2020);
7. Criar diferenciais competitivos para o setor, os quais ofereçam novas condições de crescimento sustentável e o máximo de garantias de avaliação da qualidade, como certificação e rastreabilidade do produto ao consumidor (PEDROZA FILHO & CASTILHO, 2021; RIBEIRO & PEDROZA FILHO, 2022).
8. Diante dos fatos narrados, o estudo promoveu a sugestão estrutural para pensar na piscicultura brasileira, apresentados no Quadro 5.

Destacam-se também outros dispositivos, que podem ser subsídios para o desenvolvimento interinstitucional da piscicultura brasileira, tais como:

1. Para a relação Governo e Indústria: A formação em cooperativismo (BRASIL, 1971), o acesso e proteção da propriedade industrial (BRASIL, 1996), os incentivos fiscais para organizações, a liberação e licenciamento de práticas da aquicultura em águas da união (BRASIL, 2020) e a legalização e estímulo para o uso de terras produtivas (BRASIL, 2007);
2. Para a relação Universidade e Governo: O fomento e condições para formação em cooperativismo (BRASIL, 1971), o estímulo à produção intelectual e a propriedade industrial (BRASIL, 1996), o fomento ao desenvolvimento científico, à pesquisa, à capacitação científica e tecnológica à inovação (BRASIL, 2016a) e o estímulo para a inserção de acadêmicos e empresas juniores no mercado (BRASIL, 2016b);
3. Para a relação Universidade e Indústria: Capacitação profissional em cooperativismo para a sociedade (BRASIL, 1971), a produção intelectual inovadora de bens e serviços (BRASIL, 1996), o desenvolvimento de tecnologias de gestão e de capacidades industriais (BRASIL, 2016a) e a inserção de acadêmicos e empresas juniores no ambiente de mercados (BRASIL, 2016b);
4. Para a conexão relacional entre Universidade, Governo e Indústria: O estímulo a parcerias e contratos de integração público-privada aquícolas (BRASIL, 2016c).

Portanto, manifesta-se que os comportamentos planejados nas relações interinstitucionais permitem evitar que as decisões sejam tomadas de forma unilateral. Isso porque, a formulação de planejamentos estratégicos sinérgicos precisa ser o meio para reciprocidades no desenvolvimento da piscicultura brasileira.

É nesse contexto, que as contribuições deste estudo emergiram. A importância e a necessidade de múltiplos cenários e visões dos fatos, podem promover o envolvimento dos agentes da cadeia produtiva da piscicultura em diálogos e decisões ágeis, plurais e consensualizadas.

Quadro 5: Proposição De Um Plano Para Piscicultura Brasileira

Dispositivos	Variáveis TCP	Dimensões TH		
		Universidade	Governo	Indústria
Artigo 187 da Constituição Federal de 1988	Importância; Necessidade; Envolvimento	A - Créditos; C - Pesquisa e tecnologia; D - Assistência e extensão; F – cooperative-ismo	A - Créditos; B - Preços, custos e mercado; C - Pesquisa e tecnologia; D - Assistência e extensão; E - Seguro; F - cooperativismo	A - Créditos; B - Preços, custos e mercado; C - Pesquisa e tecnologia; D - Assistência e extensão; E - Seguro; F - cooperativismo

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Plano da Pesca e Aquicultura (Regulamentado pela Lei Federal nº 11.959, de 29 de junho de 2009)	Importância; Necessidade	A - Gestão articulada B - Sinergias		
Dificuldades da piscicultura (Barroso *et al.*, 2018)	Envolvimento	A - Transferência de tecnologias	B - Padrões de qualidade	A - Transferência de tecnologias; B - Padrões de qualidade
Estratégias de Feiden *et al.* (2018), Lopera-Barrero *et al.* (2011), Ostrenky (2007), Pedroza Filho *et al.* (2017), Schulter e Vieira Filho (2017), Pedroza Filho e Castilho (2021), Ribeiro e Pedroza Filho (2022) e Rodrigues *et al.* (2021)	Importância; Necessidade; Envolvimento	A - Políticas públicas; B - Cooperações técnicas; C - Sustentabilida-de e inovação; D - Parcerias e comunicações; E - Gestões democráticas; F - Pesquisas e extensões	A - Políticas públicas; B - Cooperações técnicas; C - Sustentabilida-de e inovação; D - Parcerias e comunicações; E - Gestões democráticas	A - Políticas públicas; B - Cooperações técnicas; C - Sustentabilida-de e inovação; D - Parcerias e comunicações; F - Pesquisas e extensões; G - Diferencias competitivos

Fonte: Resultados Da Pesquisa (2022).

VI. Conclusões

O desenvolvimento do setor da piscicultura como cadeia produtiva, com elos bem definidos e dimensionados, carece de organização institucional. Para essa organização acontecer, faz-se necessário haver sinergia entre as ações públicas e as atividades do setor privado, o que o estudo indicou, em atingimento dos seus objetivos.

Portanto, as contribuições deste estudo foram duas: A primeira foi a proposição de um modelo estatístico para mensurar comportamentos organizacionais em três dimensões institucionais. No estudo, aplicou-se o modelo na cadeia produtiva da piscicultura, entretanto o modelo pode ser aplicado em outras cadeias produtivas rurais brasileiras.

A segunda, para a validação do modelo estatístico foi necessário testar as hipóteses e testar outras teorias, assim, foi possível propor um plano interinstitucional para a piscicultura brasileira. Esse plano poderá auxiliar e viabilizar compreensões de cenários relacionais e comportamentais, já que a TH e a TCP estão imbricados nas ações estratégicas de setores produtivos brasileiros.

Qual foi a resposta da pergunta inicial do estudo? No caso da piscicultura brasileira, as relações sinérgicas e democráticas ainda não propiciaram os efeitos positivos esperados, mas o foco na construção solidarizada de técnicas e padrões entre os agentes institucionais, podem propiciar mudanças nos modos de produção, transformação e geração de renda do setor.

Admite-se ainda que não há estratégias preparadas para resolver as necessidades de cada região da piscicultura brasileira. Por isso, a formação de relações interinstitucionais podem favorecer a solução de questões mais promissoras, como uma oportunidade de diferenciação.

E quanto a TCP na TH? O Governo deve chamar para si a responsabilidade, com a presença massiva de todos os envolvidos no setor, direta e indiretamente, para discutir e debater, desde o ambiente externo, com o estabelecimento e implantação de políticas eficazes, a proteção eficientes dos recursos naturais, a formação de capital intelectual competentes, o estímulo financeiro a ciência e a tecnologia, o apoio a ideias e práticas inovadoras, até o ambiente interno, como a redução de custos de produção, otimização de rotinas e procedimentos organizacionais, novas características aos produtos e serviços mercadológicos.

A indústria, que representa o mercado, então, precisa estar aberta para aplicação de tecnologias. A ampliação de suas relações sociais, deve ir além do planejamento, transformação, organização e comercialização tradicionais, chegando aos pressupostos de inovação produtiva e mercadológica, para adquirir maior valor agregado e sistematizar especialidades e técnicas efetivas de preocupações com o desenvolvimento sustentável.

A universidade teve pouco envolvimento em relações interinstitucionais, por isso, constata-se que ela deve encontrar seu papel dentro desse contexto. A construção de pesquisas e extensões, a transformação de tecnologias e a formação do capital intelectual estão no rol de suas atividades. No entanto, depende de recursos financeiros para a viabilização de suas ações.

Vale ressaltar que, aqui é uma via de mão dupla, entre a universidade-indústria. Ambos, devem se permitir diálogos e debates, no que tange à sugestão de demandas de mercado, aplicação de produtos e serviços, no fomento e no apoio em pesquisas científicas e de resultados técnicos, na prestação e

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recebimento de assistência técnica, entre outros produtos e serviços.

Por isso, as soluções das situações-problemas devem ser fortemente encorajadas. Uma razão para isso é que os interessados, em geral, devem abrir-se para decisões conjuntas na piscicultura brasileira.

Assim, a transformação do setor rural atual, para um setor produtivo interinstitucional, envolverá investimentos em aspectos de ciência, gestão interna, logística, insumos e máquinas para a atividade piscícola. Assume-se que esse processo sinérgico, não só preservará a identidade institucional, como será homogêneo, em se tratando de estratégias de vantagens competitivas.

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Predictive Testing for the Management of Hidden Costs in Organizations

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Abstract- The management of hidden costs in organizations requires compliance with the precepts of socio-economic theory, which imply reaching the four stages of investigation: situational diagnosis, strategic worksheet, prescription and predictive test. To this end, a proposal for a solution is conceived that suggests knowing its effectiveness through a test through reobservation of the motivations achieved among workers after implementing some measures contained in the presented solution. It is in this event that the investigation was developed, with the application of interventionist research, the frequency of malfunctions that cause hidden costs evaluated at 8,392, 259.29 Kz in the investigation carried out in December 2022 was observed and applied through the Plan of Priority Activities (PAP) tool, a short-term tool with seventy-two (72) proposed activities, however, it was tested with the frequency´s subsequent reobservation of the same dysfunctions. Forty-seven (47) took the name of strategic activity, those activities with a value that appeared in the range of 1.5 to 2 according to the results of the spss software, that can mitigate the frequency of dysfunctions and associated hidden costs.

Keywords: *organizations, hidden cost management, solution and predictive test.*

GJMBR-A Classification: *JEL codes: D24, M41*



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Predictive Testing for the Management of Hidden Costs in Organizations

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Abstract- The management of hidden costs in organizations requires compliance with the precepts of socio-economic theory, which imply reaching the four stages of investigation: situational diagnosis, strategic worksheet, prescription and predictive test. To this end, a proposal for a solution is conceived that suggests knowing its effectiveness through a test through reobservation of the motivations achieved among workers after implementing some measures contained in the presented solution. It is in this event that the investigation was developed, with the application of interventionist research, the frequency of malfunctions that cause hidden costs evaluated at 8,392, 259.29 Kz in the investigation carried out in December 2022 was observed and applied through the Plan of Priority Activities (PAP) tool, a short-term tool with seventy-two (72) proposed activities, however, it was tested with the frequency´s subsequent reobservation of the same dysfunctions. Forty-seven (47) took the name of strategic activity, those activities with a value that appeared in the range of 1.5 to 2 according to the results of the spss software, that can mitigate the frequency of dysfunctions and associated hidden costs. Therefore, the proposed solution became a solution to the diagnosed dysfunctions, as it was possible to verify the decrease in the frequency of malfunctions and hidden costs in the order of 4,251,442.27 Kz and as performing costs evaluated at 4,930,039.86 Kz in the research carried out in March 2023. This reduction resulted from the tendency of the solution's effectiveness, serving from now on as an application tool whenever dysfunctions are found, since it is flexible to adaptations according to the company's internal context.

Keywords: organizations, hidden cost management, solution and predictive test.

I. Introduction

The production of accounting information linked to the costs that companies assume during operation is, therefore, fundamental when it comes to the concept of survival, continuity of the company, economic-financial and social satisfaction of shareholders and workers. This requirement is supported on the one hand by cost and management accounting through the recording of internal accounting economic facts, i.e. costs of a visible nature and on the other hand by socio-economic theory through the accounting recording of internal economic facts but, hidden nature that give rise to hidden costs, since external accounting economic facts are the responsibility of financial accounting to register them.

Costs of a visible nature are known to be easy to account for because they are, in principle, identifiable in the company's financial statements and in the different reports whenever a certain expense is assumed internally.

This reality is not analogous when it comes to accounting for hidden costs, because these costs are not, in principle, documented in the statements or even cost information reports, these are only subject to measurement through the use of socio-economic methodology. Therefore, this fact is achieved with the diagnosis of dysfunctional "pathologies" that prevent the normal company'sfunctioning.

Once known, they deserve an interpretation and, therefore, a prescription or even adoption of a conduct to be followed for their control, mitigation and termination, at least in the short term, since, in the medium and long term, they would happen again if they are not accompanied by judging from the permanence of interaction between the company's structures and the behavior of workers in the informal environment.

According to socio-economic theory, the identified malfunctions and the accounting of the hidden costs resulting from these malfunctions deserve treatment through the presentation of factual solutions taking into account the peculiar reality of each company. However, it obliges the conception of a solution to the identified dysfunctions in order to minimize them or even put an end to them in the short term, in the medium and long term to proceed with measures to monitor the company's operation.

Thought already approached by Savall & Zardet (1987), when referring that, the socio-economic theory methodologically possesses theoretical and practical conditions to solve the dysfunctions that result in hidden costs during the functioning of the organizations, in that it presents the tools to choose given the reality of each company and, therefore, the explanatory variables of the solution domain. That is, did you diagnose a malfunction or pathology during the operation of the company? It interprets it and then solves the referred dysfunction for the ortho functioning of the company.

This condition takes us back to the algorithm followed by a doctor when dealing with a patient in the hospital. The patient is diagnosed by exposing him to the symptoms, the doctor questions and, in order to

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confirm or refute the diagnosis, resorts to interpretation through the results of the analyzes recommended by him. These results for the doctor serve as a barometer for the conclusions of the types of drugs to prescribe or even advise a conduct to be followed by the patient. This cycle does not stop there, if not, the doctor monitors the patient's evolution taking into account the given prescription or the recommended conduct. If it does not have substantiated positive effects in improving the patient's health, the doctor will certainly evolve to another prescription according to the degree of the drugs.

In the investigation of Deco, Napoleão, Tamo, & Simbo (2023), malfunctions were diagnosed that caused hidden costs linked to the absenteeism indicator and, therefore, in this article, the results of all the indicators studied were presented, and then the proposed solution was presented. Those dysfunctions that, with the measurement of its effectiveness by means of a predictive test, weconcluded that the proposed solution is a solution to be able to reduce the dysfunctions that caused the hidden costs accounted for, naturally in a later period with reference to the same variables.

a) Problematic Context

The need to see organizations as living beings, as Tamo (2014) refers, is imperative, as it provides positive indicators to approach the best management practices of organizations. This is a thought materialized in the socio-economic theory Savall & Zardet (1975), regardless of the fact that they did not equate organizations with human beings.

In this investigation, therefore, it was possible to sustain this thought, that of adopting the patient management model by the doctor, making the methodology richer and more proactive in favor of the survival and continuity of organizations, substantiated in the presentation of a proposal for solutions to malfunctions found and that cause hidden costs and that deserved a predictive test for its validation.

Allied to this, the concept of follow-up is also adopted, which derives from the idea of solutions to be proposed to safeguard a positive position that prevents the return of those dysfunctions that caused the aforementioned hidden costs.

At first, the object studied was unaware of the existence of dysfunctions of an occult nature, unaware of the theory that studies dysfunctions and, therefore, the possibility of existing in the investigative scope a feasible solution to the dysfunctions diagnosed to the specific reality of the company, constituting facts that animated the investigation and which resulted in the results presented below.

To this end, the solution conceived in the light of the company's reality was tested by developing a new investigation, in a period different from that of the first investigation, taking into account the same hidden cost indicators studied, the same diagnosed malfunctions that caused the hidden costs in view of the activities regarded as strategic because they are capable of addressing the malfunctions found or at least reducing their frequency.

With these questions verified by the studied object, he suggested proposing the following scientific question: *how can a proposal for a solution to the diagnosed malfunctions be conceived to contribute to the mitigation of the hidden costs levels accounted for in the organizations regular functioning?*

For this purpose, the general objective consisted of designing a proposed solution to the malfunctions found and which caused the hidden costs accounted for during the first investigation.

In order to achieve this objective, specific objectives were achieved by carrying out the following activities in the research space: to substantiate the theoretical basis that sustains the socio-economic theory; present the results of the first investigation object of a proposed solution; identify the explanatory and solution domain variables adaptable to the reality of the studied object; propose activities in each variable; verify the reliability and adjustment to normality of the new data structure; carry out a descriptive analysis to identify strategic activities; perform predictive testing of strategic activities; count the paid time (hours) without any counter-work taking into account the related indicator; accounting for hidden costs according to the time of each indicator; ensure the qualimetric approach for accounting for all costs incurred during operation from: determination of the production cost and cost price with and without hidden costs, determination of the analytical result without and with hidden costs and measuring the hidden costs weight resulting from predictive testing in the company's visible cost structure; reveal the visible and unknown economic performance provided by the predictive test.

II. Materials and Methods

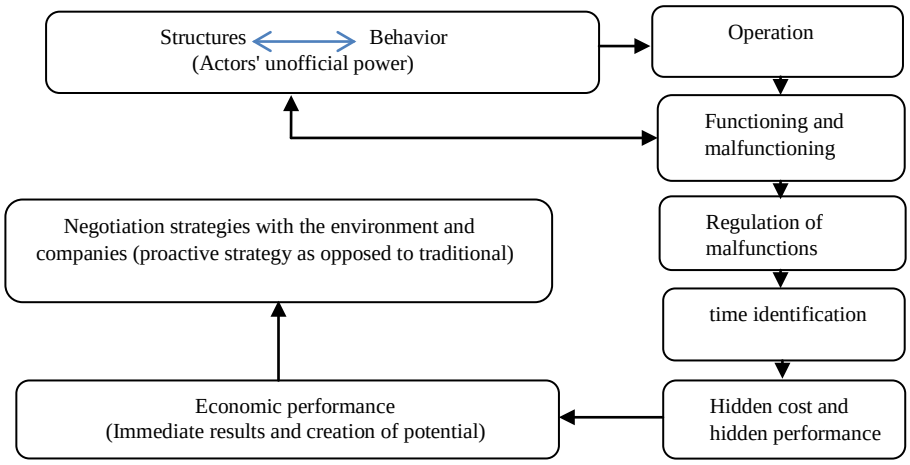
a) Theoretical Framework

Based on the investigations developed by the authors Savall (1975); Savall (1979); Savall (1987), Savall & Zardet (2009) and Savall & Zardet (2010), when stating that the structure variable overlaps the behavior variable, and that having a variation in structures can vary the way workers act, this reality makes the behaviorist theory to the detriment of the structuralist theory taken into account.

To support this thought Savall & Zardet (1987), studied two identical structures, but produce different results in terms of personnel, given the differentiation of working conditions and levels of motivation that each structure provides to its workers.

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Thus, the central hypothesis lies in the behavior to be presented by the employees in face of the organizational structures placed at their disposal, hence Savall et al (2008) apud Moreno et al (2020), refer that the hypothesis that guides the socio-economic methodology recognizes the unofficial power of the company's employees, taking into account the organizational structures.



Source: Adaptation to Figure Saval Et Al (2008)

Figure 1: Fundamental Hypothesis of Socio-Economic Theory

For the successful measurement of hidden costs, the fundamental hypothesis rests around two concepts, one of which is added to this investigation: dysfunctions generated by the interaction between the behavior of workers and the structures of the organization in the informal sphere, time as the moment in which they occur and regulation of dysfunctions and the hidden costs generated.

The first concept, the malfunctioning that they are, is the result of the workers' unofficial power vis-à-vis the company's structures Savall et al (2008), representing the difference between normal functioning and the real or effective functioning obtained by workers in the performance of their duties.

The second concept is variable time, which allows measuring hidden costs in the face of malfunctions. For the regularization of dysfunctions, time is taken as a unit (hours, minutes…) translated into currency Savall & Zardet (2010).

This thought was applied by the author Lobo (1999), apud Oliveira et al (2019), when making an accounting connotation to hidden costs over time, noting that excessive overtime, excessive waiting hours in staff rotation, idleness due to production scheduling errors and consecutive time devoted to reducing failures and time spent to respond to customer complaints, are the basis for dealing with hidden costs in companies and organizations through the anticipated measurement of the corresponding time.

The third concept is, therefore, the hidden cost that is the result of malfunctions as the generating factor through the measurement ahead of time in the face of a certain indicator Savall et al (2008); corroborating with the emphasis mentioned by Martins (2013), when he says that identifying hidden costs is the initial step for companies and knowledge-based organizations to achieve their objectives.

Thus, the hidden costs respect the expression of the informal power of the employees of the organizations that is expressed through behavior, Brand, Vivanco and González (2017) and that are grouped into five (5) components (Over wages, overtime, overconsumption, non-production and non-creation of potential) with also five (5) indicators of hidden costs (absenteeism, accidents at work, staff turnover, quality defects, deviation in direct productivity and idleness) at the time of their evaluation.

III. Methodology

The research focuses on the management of organizations, referring to the main theory, which is socio-economic, and the accounting of visible costs was through absorption costing, according to the thoughts of Ferreira, Caldeira, Asseiceiro & Vicente (2019), Caiado (2011), Tepa (2012) and Martins (2013) and, regarding hidden costs, was based on the socio-economic method in the thinking defended by the authors Savall et al (2008) and Savall & Zardet (2010) through a specific qualification for simultaneous management of costs in organizations.

Based on the thinking of Tamo (2012), the requirement of a peculiar methodology capable of leading the researcher to achieve research results and with quality is fundamental in the originality of empirical knowledge.

The viability of the investigation was achieved, as always, by bringing together works by various authors, such as: books, newspapers, scientific articles

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that highlight the state of the art of the referenced theories, the results achieved for the second time in the field and which figured as the second structure of data to be analyzed and interpreted. The results were processed with software spss.

The software in the first instance was used to verify: reliability of the results achieved through Cronbachs Alpha and for the descriptive analysis of the data contained in the Capacity Grid, adapted to the competence grid of Savall & Zardet (2010), also adapted to the Likert scale, in order to identify the strategic activities capable of mitigating the levels of hidden costs observed in the first analysis.

However, the average was used as a determining indicator in identifying activities understood as strategic with a tendency to reduce the frequency of appearance of dysfunctions that caused the high level of hidden costs accounted for.

The set of activities in each explanatory variable and domain of solution originated the elaboration of the Capacity Grid for each indicator adapted to the competence grid Savall & Zardet (2010) and Tamo, (2012), resorting to the adaptation of the Likert scale where (1 - unimportant, 2- important) and, one (1) corresponds to "No" and two (2) corresponds to "Yes" in the structured interview carried out.

The strategic activities that can mitigate the dysfunctions that cause hidden costs are those that have average values that are in the range of 1.5 to 2 and are considered "important" and emphasize that the worker has little theoretical and practical knowledge on the referred variables and, therefore, the worker has difficulties in putting the knowledge into practice, meking it difficult for him to master the activities associated with the variables, thus causing dysfunctions that originate hidden costs through the generation of marginal time, hence the explanatory and domain variables solution in relation to the activities identified as being important and subject to re-observation after the mirror effect.

Activities with average values between 1 and 1.4 indicate that workers have theoretical and practical knowledge of explanatory and solution domain variables, and therefore, workers do not have difficulties in putting this knowledge into practice theorists. These activities cannot effectively cause hidden costs, hence they are not important in mitigating the frequency of malfunctions that cause hidden costs.

The interpretation of the results considers that, the higher value of the average score, the greater degree of the activity importance to the point of taking on the strategic name for the worker, and with that, thinking about monitoring it to mitigate the time of delays, absence and regulation of dysfunctions.

a) Validation of Proposed Activities for Strategic Activities

The verification of the activities pertinence in the proposed solution is conditioned by the average value to have to conclude whether or not it takes the name of strategic activity. For this purpose, the spss software was used to determine the average value of each activity.

To this end, the behavior of the same department workers was again observed, in March 2023, in order to measure the degree of motivation achieved by them after the company had improved some working conditions, given training, had reinforced security levels, improved channels and means of communication and ways of controlling, after the mirror effect that occurred in the first survey.

Therefore, only the significant indicators were re-observed, as well as the malfunctions that caused the hidden costs during the first investigation. Refers to the indicators: absenteeism, staff turnover, quality defects, deviation in direct productivity and idleness, taking into account the malfunctions that caused the hidden costs accounted for.

b) Surveys, Techniques and Instruments Built for Data Collection

Following the thinking of Savall, et al (2008), the research-intervention was applied as the main one and which allowed direct contact with the Port Company of Cabinda-EP, information/knowledge was co-produced between the researchers and the workers of the referred company.

For data collection, two of the three techniques recommended in the socio-economic methodology were used and implemented simultaneously: participant observation and document analysis Savall & Zardet (2010). Two instruments were built: questinaire, questionaire grid and an observation grid or card.

The questionaire was appliedto the department head and the three (3) heads of each shift, and with every worker whenever necessary during observation and accidentally by a group of two or thre technicians. The questionaire served as a basis for identifying the activities considered strategic, with the worker simply stating that this activity can motivate him to better perform his duties.

From the participant observation it was possible to re-observe the dysfunctions for each worker in order to account for the frequency of occurrence of each dysfunction of hidden costs through the observation grids. Therefore, each form corresponded to a worker, satisfying eighty-nine (89) copies and were coded with the first letters of the first name and last name of the observed.

Therefore, three (3) previously trained observation groups were created to collect data with the necessary quality and reliability, composed of four (4)

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elements, namely: the researcher, each shift manager (three managers) and two (2) department technicians.

And for the documentary analysis, we were provided with the payroll for the month of March 2023, shift scales, functional organization chart, vacation plans, financial execution and the company's status, which served as the basis for data collection.

c) Practices for Accounting the Frequency of Results

It was possible to analyze and account for the frequency of dysfunctions, through the number of minutes, of hidden hours that each file contained, using the techniques of document analysis and analysis of questionair results according to Savall & Zardet (2010), so that, if the exhaustion of the information analysis that each file presented, exhausting the analysis of all the information contained in the observation grid.

The documental analysis was fundamental in the analysis of the content they contained, enabling the calculation of the unit hours in each form, through the each factor frequency occurrence generating hidden cost taking into account its indicators: absenteeism, staff turnover, defects in quality, deviation in direct productivity and idleness.

With the payrolls, it was possible to extract the salary of the employees placed in the Operations Department in March 2023, identify the employees who were in full enjoyment of the disciplinary leave and the employees who earned overtime in the period under analysis; and with the statute it was possible to characterize the company, from its functioning to the knowledge of the procedures that regulate the operational activity of the Company, fact completed with its functional organigram.

With the interviews it was possible to analyse, identify the strategic activities and using the descriptive analysis of the spss software, for a precision of the results that were presented again to the heads of the department (mirror effect); as emphasized (Savall & Zardet, 2010) that the mirror effect is an important lever for the progress of the innovation process; if none of the actors does it, the analysis of the interviews would not be recognized; the status and competence of the interveners would be strongly questioned, which would slow down the efficiency of the process.

Thus, the hidden costs were accounted for in part together with the heads of the department, additional questionaire were organized with those in charge to calculate with them the hidden costs resulting from the frequencies that the cards presented during the mirror effect phase.

d) Qualimetry in Cost Accounting

For the complete accounting of the visible and hidden costs that occurred in the services provided by the company during the period under analysis, the qualimetry was used that made it possible to incorporate hidden costs in the cost accounting and management maps, that is, the accounting of costs visible and simultaneous accounting of hidden costs was only possible for the purposes of calculating costs and results, incorporating both types of costs in the absorption costing maps. Thus, one can verify the complementarity between socio-economic theory and cost and management accounting in terms of cost management in organizations.

e) Proposed Solution

In this investigation, a solution proposal was set up by Savall & Zardet (2010), which could at least mitigate the frequency of dysfunctions and, concomitantly, the hidden costs accounted for at the time of the first research in the company, since its complete elimination is a condition of medium and long term. For this, the Plan of Priority Actions tool was applied, using explanatory variables and solution domains, namely: improvement of competence, improvement of working conditions, control and improvement of internal communication in the company, through the formulation of a set of strategic activities substantiated to each of the explanatory and solution domain variables.

f) Hidden Costs AccountediIn the First Survey

At this point, the hidden costs accounted for in the research carried out in December 2022 are presented in a synchronized way, taking into account the combination between the components and the hidden cost indicators, for a general appreciation, as can be seen in the Table 1, according to the article published by the authors Deco, Napoleão, Tamo and Simbo (2023), regarding the indicator of hidden costs of absenteeism.

Table 1: General Assessment of Accounted Hidden Costs (€1=58 Kwanza "kz")

	Sobrecargas			Não produtos		
Components / Indicators	Extra wages (1)	Overtime (2)	Overconsumption (3)	Non-production (4)	Not creating potential (5)	Total hidden costs (1)+(2)+(3)+(4)+(5)
Absenteeism	5.681.308,80	2.752.092,82	0	0	0	5.843.590,63
Work accidents	0	0	0	0	0	0
Staff rotation	0	539.268,62	0	0	0	498.368,75
Quality defects	501.899,58	0	0	0	0	424.644,69

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Deviation in direct productivity	0	1.232.342,72	622.817,27	0	0	1.389.216,87
Idleness	0	364.575,97	0	0	0	236.438,35
Litigation	0	0	0	0	0	0
Totals	3.669.937,58	4.888.280,13	622.817,27	0	0	**8.392.259,29**

Source: Deco at al (2023)

When introducing the concept of the solution proposal, the result of the absenteeism indicator and other hidden cost indicators constitute, therefore, the bases of comparison with the results to be verified through the predictive test of the proposed solution to be conceived (PAP) according to the reality of the company and with that, conclude whether or not the referred solution proposal is effective.

IV. Results and Discussion

a) Data Confidence Level

Beforehand, it was necessary to verify the confidence level of the data in the results presented in the capacity grides of the absenteeism, staff rotation, quality defect, direct productivity deviation, and Idle indicators by observing the Cronbanch Alpha value obtained using the spss statistical software.

Table 2: Reliability Level Analysis

Indicators	Alpha of Cronbach	Number of itens
Absenteeism Capacity	0,729	18
Staff rotation capacity	0,871	7
Capacity for quality defect	0,832	18
Capacity in direct productivity deviation	0,797	18
Idle capacity	0,888	11

Source: Processed by Spss

The data collected as shown in the table above reveal a sufficient confidence level of Cronbach's Alpha, suggesting that the structure of the sample and the respective results obtained are confident.

b) Conceived Solution Proposal Versus the Observed Hidden Costs

In accordance with the precepts of socio-economic theory and, with the objective of contributing to the mitigation of the levels of malfunctions found that cause the hidden costs accounted for, at this stage a proposal for a solution was constructed in accordance with the peculiar reality of the company with the in order to maximize economic, financial and social results through the level of hidden performing costs to be recovered.

c) Proposed Explanatory and Solution Domain Variables

As the hidden costs were categorized by indicators and each dysfunction is categorized in its indicator, then, it was possible to relate the activities proposed by each indicator of hidden costs. Therefore, it was understood to confine in four (4) families the six (6) variables that explain the domain of solution of the hidden costs, as it can be seen below and that, controlled and improved, can excite the motivation of the workers.

Thus, the explanatory and solution domain variables of the factors that generate the hidden costs presented for mitigating the levels of dysfunction found were:

- Competence, working conditions, control and internal communication.

However, the explanatory variable implementation of the strategy was applied during the diagnosis process of hidden costs and which should be subsequently implemented at all levels of the company; the explanatory variable work organization is incorporated in the adequacy of jobs within the explanatory variable: working conditions, for better interdependence of the areas that make up the operations department; the time management variable was coupled to the control variable; and the variable integrated training was developed in the explanatory variable competence, while the variable communication-coordination and concertation was summarized in the variable internal communication.

Therefore, the aforementioned explanatory and solution domain variables were associated with the strategic activities to be developed, and, satisfied and/or applied by the company, they mitigate the malfunctions that cause hidden costs.

d) Activities Proposed in each Explanatory Variable

Because the four (4) families or explanatory and solution domain variables are interactive among themselves, taking into account the dysfunctions and hidden costs, seventy-two (72) activities were proposed according to each indicator of hidden costs that were the subject of a structured interview with the eighty (89) employees assigned to the studied department.

However, the intention in the interviews was that each worker indicated or opined which or which activities, once implemented, can improve their behavior in the workplace and combined with the results of the "average" descriptive analysis, therefore, the

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investigation concluded that they might or might not mitigate the levels of dysfunctions or at least reduce their frequency.

The hidden cost related to the overpayment component was not the subject of the creation of a strategy for its mitigation during the prescription phase because it depends on the Executive, that is, because it depends on the revision of the General Labor Law in force in the Republic of Angola. Refer to workers' benefits, such as the vacation subsidy, thirteenth month subsidy.

e) Proposed Activities for the Absenteeism Indicator

The table below illustrates the capacity grid relative to the results of the absenteeism indicator according to the structured interview carried out, for the purpose of measuring the level of reliability and descriptive analysis of the data to identify the strategic activities likely to mitigate the dysfunctions found and which originated the hidden costs observed in this indicator.

Table 3: Absenteeism Capacity Grid

Indicator	Explanatory variable	Activities	Code	Answers	
				1	2
Absenteeim	Competence	training by need	Cm1	47	42
		On-the-job training offered by the person in charge	Cm2	70	19
		Systematization of knowledge of each task	Cm3	54	35
		Responsibility for each task	Cm4	37	52
	Conditions of work	Modern and safe infrastructures	Ct1	20	69
		Modern and cutting-edge technology	Ct2	66	23
		Healthy sanitary facilities	Ct3	71	18
		Safety at work	Ct4	78	11
		Fair and adequate compensation	Ct5	77	12
		pay equity	Ct6	21	68
		reward valence	Ct7	28	61
	Control	Monitoring the completion of the task	C1	26	63
		Performance evaluation	C2	79	10
		Request for results	C3	40	49
	Internal Communication	Dissemination of information through conventional company channels	Ci1	85	4
		Broadcasting a single message	Ci2	24	65
		Dissemination of recognition of the merit of Workers	Ci3	36	53
		Diffusion of reinforcement of values and good conduct in the Leadership	Ci4	26	63

As for absenteeism, it is necessary to highlight all the explanatory variables of the solution domain when the issue is addressing the dysfunctions that cause hidden costs.

f) Results of the Descriptive Analysis to Identify Strategic Activities

The hidden cost indicator absenteeism is explained by the improvement of workers' skills, the improvement of some working conditions, the performance evaluation and the dissemination of internal information through conventional channels, as can be seen in the Table 4:

Table 4: Identification of Strategic Activities

Actividades	N	Mean		Statistical deviation	Statistical variation
		Statístice	Standard deviation		
Com1_Training by necessity	89	1,76	0,050	0,475	0,226
Com2_On-job training	89	1,88	0,044	0,420	0,176
Com3_Systematization of the knowledge of each task	89	1,75	0,051	0,479	0,230
Com4_Accountability of the task	89	1,47	0,051	0,486	0,236
Ct1_Modern and safe infrastructure	89	1,28	0,041	0,386	0,149

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Ct2_Modern technology	89	1,65	0,038	0,355	0,126
Ct3_Healthy sanitary facilities	89	1,78	0,035	0,331	0,110
Ct4_Safety at work	89	1,80	0,032	0,303	0,092
Ct5_Fair and adequate compensation	89	1,98	0,035	0,331	0,110
Ct6_Wage equity	89	1,31	0,044	0,412	0,170
Nt7_Valency of the reward	89	1,15	0,046	0,434	0,188
C1_Self control	89	1,37	0,047	0,446	0,199
C2_Performance evaluation	89	1,67	0,036	0,343	0,118
C3_Request for results	89	1,44	0,053	0,503	0,253
Ci1_Diffusion of information through conventional channels	89	1,83	0,027	0,252	0,064
Ci2_Single message broadcast	89	1,31	0,044	0,412	0,170
Ci3_Dissemination of workers' merit recognition	89	1,14	0,050	0,475	0,226
Ci4_Dissemination of reinforcement of values and good leadership conduct	89	1,23	0,050	0,471	0,222

Source: Processed by Spss

The high levels of hidden costs found in the absenteeism indicator are mitigated, in part by improving the competence of workers, namely: training by necessity, training must take place in the workplace "on the job" and systematize the knowledge of each task carried out in that department. It should be based on improving working conditions by adhering to new technologies, adequate sanitary facilities, safety at the height of the type of work carried out and receiving compensatory wages for the exerted effort. Based on self-control based on performance assessment and dissemination of information using the company's official channels (windows, circulars and intranet) so that all department workers are aware of the instructions issued by those responsible in time.

With this, time will be well managed to the point that each professional performs their duties in a timely manner by improving arrival time (being punctual), improving absences (being diligent at work), which actually inhibits procrastination, providing more individual and consequently collective productivity.

g) Activities Proposed for the Staff Rotation Indicator

According to the capacity grid below, it was understood that the company should monitor control and focus on internal communication using more efficient channels, measuring the level of reliability and adjustment to normality of the collected data.

Table 5: Staff Rotation Capacity Grid

Indicator	Explanatory Variable	Strategic Activity	Code	Answers	
				1	2
staff rotation	Control	Performance evaluation/Monitoring in carrying out the task	C1	21	68
		Performance evaluation	C2	56	33
		Request for results	C3	19	70
	Internal Communication	Dissemination of information through the company's conventional channels	Ci1	66	23
		Broadcasting a single message	Ci2	16	73
		Dissemination of recognition of the merit of Workers	Ci3	24	65
		Diffusion of reinforcement of values and good conduct in the Leadership	Ci4	38	51

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As can be seen in the table above, the worker answered affirmatively or negatively, the activities that may or may not motivate him. Therefore, they were the subject of descriptive analysis to find those that would be figured as strategic and capable of reducing the time to replace the colleague at the job.

h) Results of the Descriptive Analysis to Identify Strategic Activities

The Table 6 presents the results of the descriptive analysis for the identification of activities considered strategic according to the average value achieved.

Table 6: Identification of Strategic Activities

	Number	Non-parametric test (a,b)		Most extremes are different			Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
		Mean	Standar deviation	Absolute	Positive	Negative		
C1_Self control	89	1,31	0,412	0,484	0,484	-0,302	4,569	0,000
C2_Performance evaluation/task monitoring	89	1,85	0,434	0,468	0,284	-0,468	4,419	0,000
C3_Request for results	89	1,17	0,446	0,457	0,457	-0,273	4,316	0,000
Ci1_Dissemination of information through the company's conventional channels	89	1,75	0,355	0,513	0,340	-0,513	4,844	0,000
Ci2_Single message broadcast	89	1,29	0,395	0,495	0,495	-0,314	4,665	0,000
Ci3_Dissemination of workers' merit recognition	89	1,56	0,467	0,435	0,435	-0,250	4,105	0,000
Ci4_Dissemination of reinforcement of values and good leadership conduct	89	1,25	0,479	0,418	0,418	-0,261	3,944	0,000

Source: Processed by Spss

According to the table above, in order to motivate workers so that they can show up at the ideal time to relieve their colleague, it is necessary to monitor control and carry out internal communication using more efficient channels. Therefore, adhering to the intratnet, showcases, circulars, briefing and internal phone calls and to a performance assessment combined with monitoring the performance of tasks is essential to be able to positively influence the worker, to the point of winning their job in the recommended time.

i) Activities Proposed for the Quality Defect Indicator

The Table 7 illustrates the capacity grid of the indicator defect in the quality of the results of the structured interview for the purpose of measuring the level of reliability and testing the normality of the results.

Table 7: Capacity Grid for Quality Defect

Indicator	Explanatory variable	Strategic activity	Code	Answers	
				1	2
	Competence	Training by need	Cm1	55	34
		On-the-job training offered by the person in charge	Cm2	40	49
		Sistematização dos conhecimentos de cada tarefa	Cm3	67	22
		Responsibility for each task	Cm4	38	51
	Conditions of work	Modern and safe infrastructures	Ct1	44	45
		Modern and cutting-edge technology	Ct2	67	22
		Healthy sanitary facilities	Ct3	64	25
		Safety at work	Ct4	71	18
		Fair and adequate compensation	Ct5	69	20

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Absenteeism		Pay equity	Ct6	66	23
		Reward valence	Ct7	48	41
	Control	Monitoring the completion of the task	C1	30	59
		Performance evaluation	C2	58	31
		Request for results	C3	50	39
	Internal Communication	Dissemination of information through the company's conventional channels	Ci1	74	15
		Broadcasting a single message	Ci2	66	23
		Dissemination of recognition of the merit of Workers	Ci3	37	52
		Diffusion of reinforcement of values and good conduct in the Leadership	Ci4	32	57

j) Results of the Descriptive Analysis to Identify Strategic Activities

The decrease in paid time without any actual work departure for the quality defect indicator is explained by the improvement in workers' skills, in the improvement of some working conditions, in the improvement of some control actions and in the improvement of internal communication, as can be seen in the Table 8.

Table 8: Identification of Strategic Activities

Activities	N	Mean		Statistical deviation	Statistical variation
		Statistics	Standaed deviation		
Com1_Training by necessity	89	1,64	0,047	0,440	0,194
Com2_On-job training	89	1,74	0,053	0,501	0,251
Com3_Systematization of the knowledge of each task	89	1,79	0,048	0,457	0,209
Com4_Accountability of the task	89	1,64	0,053	0,501	0,251
Ct1_Modern and safe infrastructure	89	1,88	0,053	0,503	0,253
Ct2_Modern technology	89	1,68	0,044	0,420	0,176
Ct3_Healthy sanitary facilities	89	1,23	0,040	0,376	0,142
Ct4_Safety at work	89	1,69	0,044	0,412	0,170
Ct5_Fair and adequate compensation	89	1,56	0,050	0,475	0,226
Ct6_Wage equity	89	1,82	0,048	0,452	0,204
Nt7_Valency of the reward	89	1,34	0,053	0,503	0,253
C1_Self control	89	1,32	0,044	0,420	0,176
C2_Performance evaluation	89	1,69	0,044	0,412	0,170
C3_Request for results	89	1,77	0,053	0,497	0,247
Ci1_Diffusion of information through conventional channels	89	1,82	0,048	0,452	0,204
Ci2_Single message broadcast	89	1,62	0,048	0,452	0,204
Ci3_Dissemination of workers' merit recognition	89	1,26	0,051	0,483	0,233
Ci4_Dissemination of reinforcement of values and good leadership conduct	89	1,22	0,047	0,446	0,199

Source: Processed by Spss

Therefore, the mitigation of malfunctions and hidden costs accounted for in the quality defect indicator is explained in the improvement of skills levels (preferably providing on-the-job training, systematization of tasks), in the improvement of control levels (evaluating performance and monitoring achievement of activities to carry out the task on time and issue a report on its execution), improving some working conditions (opting for modern infrastructure, opting for equipment with the latest technology, improving safety in handling

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equipment, improving lighting in the park and facilities, improvement of dormitory conditions, salary equity and salary improvement) and the option of communication processed via personal telephone (mobile phone), i.e., the responsible person must communicate with the technicians through an existing fixed telephone and at mobile of each worker when it comes to guidelines.

k) Activities Proposed for the Direct Productivity Deviation Indicator

For the direct productivity deviation indicator, the company should monitor the variables: competence, working conditions, control and internal communication, as can be seen in the capacity grid of the structured interview.

Table 9: Capacity grid in direct productivity deviation

Indicator	Explanatory variable	Strategic activity	Code	Answers	
				1	2
Absenteeism	Competence	Training by need	Cm1	59	30
		On-the-job training offered by the person in charge	Cm2	45	44
		Sistematização dos conhecimentos de cada tarefa	Cm3	58	31
		Responsibility for each task	Cm4	49	40
	Conditions of work	Modern and safe infrastructures	Ct1	51	38
		Modern and cutting-edge technology	Ct2	47	42
		Healthy sanitary facilities	Ct3	73	16
		Safety at work	Ct4	71	18
		Fair and adequate compensation	Ct5	57	32
		Pay equity	Ct6	41	48
		Reward valence	Ct7	39	50
	Control	Monitoring the completion of the task	C1	51	38
		Performance evaluation	C2	79	10
		Request for results	C3	61	28
	Internal Communication	Dissemination of information through the company's conventional channels	Ci1	58	31
		Broadcasting a single message	Ci2	56	33
		Dissemination of recognition of the merit of Workers	Ci3	48	41
		Diffusion of reinforcement of values and good conduct in the Leadership	Ci4	50	39

l) Results of the Descriptive Analysis to Identify Strategic Activities

It can be understood from the table below that, in order to combat the level of dysfunctions related to the deviation in direct productivity, the company must experience improvements in all explanatory and solution domain variables presented: Skills, working conditions, control and internal communication.

Table 10: Identification of Strategic Activities

Actividades	N	Mean		Statistical deviation	Statistical variation
		Statistics	Standaed deviation		
Com1_Training by necessity	89	1,72	0,052	0,489	0,239
Com2_On-job training	89	1,55	0,051	0,479	0,230
Com3_Systematization of the knowledge of each task	89	1,71	0,042	0,395	0,156
Com4_Accountability of the task	89	1,58	0,053	0,503	0,253
Ct1_Modern and safe infrastructure	89	1,63	0,053	0,502	0,252
Ct2_Modern technology	89	1,78	0,035	0,331	0,110
Ct3_Healthy sanitary facilities	89	1,85	0,039	0,366	0,134
Ct4_Safety at work	89	1,95	0,019	0,181	0,033
Ct5_Fair and adequate compensation	89	1,80	0,048	0,452	0,204
Ct6_Wage equity	89	1,34	0,053	0,499	0,249
Nt7_Valency of the reward	89	1,59	0,053	0,503	0,253
C1_Self control	89	1,48	0,053	0,501	0,251
C2_Performance evaluation	89	1,77	0,036	0,343	0,118
C3_Request for results	89	1,58	0,053	0,503	0,253

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Ci1_Diffusion of information through conventional channels	89	1,78	0,047	0,440	0,194
Ci2_Single message broadcast	89	1,43	0,053	0,499	0,249
Ci3_Dissemination of workers' merit recognition	89	1,39	0,048	0,457	0,209
Ci4_Dissemination of reinforcement of values and good leadership conduct	89	1,28	0,052	0,489	0,239

Source: Processed by Spss

The activities considered strategic can optimize the moments for making a decision on the part of those responsible for the Department and reduce the time to recover the equipment whenever it breaks down and help the workers to recover their work position as soon as possible after the meal period, due to the increased levels of control, improved working conditions, improved skills and adoption of more efficient internal communication channels. With this, workers will receive more knowledge substantiated in the know-how, know-how, know-how, through training linked to the explanatory variables and mastery of solutions to the malfunctions and hidden costs accounted for.

m) Proposed Activities for the Idleness Indicator

The Table 11 illustrates the capacity grid of the results of the structured interview for the idleness indicator for the purpose of measuring the level of reliability and the normality adjustment test.

Table 11: Idle Capacity Grid

Indicator	Explanatory variable	Strategic activity	Code	Answers	
				1	2
Idleness	Conditions of work	Training by need	Ct1	54	35
		Modern and cutting-edge technology	Ct2	82	7
		Healthy sanitary facilities	Ct3	70	19
		Safety at work	Ct4	72	17
		Fair and adequate compensation	Ct5	68	21
		Pay equity	Ct6	24	65
		Reward valence	Ct7	59	30
	Internal Communication	Dissemination of information through the company's conventional channels	Ci1	73	16
		Broadcasting a single message	Ci2	41	48
		Dissemination of recognition of the merit of Workers	Ci3	39	50
		Diffusion of reinforcement of values and good conduct in the Leadership	Ci4	35	54

According to the table above, the interviewees answered yes or no to the priority activities that the company must improve in order to increase motivation levels and consequently reduce the time spent at home compared to the vacation time granted by law.

n) Results of the Descriptive Analysis to Identify Strategic Activities

There is good confidence in the data regarding the results found for the idleness indicator, as can be seen in the Table 2.

Table 12: Identification of Strategic Activities

	N	Non-Parametric Test (a, b)		Most Extremes are Different			Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
		Mean	Standar Deviation	Absolute	Positive	Negative		
Ct1_Modern and safe infrastructure	89	1,58	0,502	0,354	0,325	-0,354	3,344	0,000
Ct2_Modern technology	89	1,78	0,331	0,522	0,354	-0,522	4,924	0,000
Ct3_Healthy sanitary installations	89	1,89	0,366	0,509	0,334	-0,509	4,802	0,000
Ct4_Safety at work	89	1,87	0,181	0,540	0,426	-0,540	5,094	0,000
Ct5_Fair and adequate compensation	89	1,79	0,452	0,452	0,267	-0,452	4,264	0,000

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Ct6_Wage equity	89	1,35	0,499	0,372	0,372	-0,308	3,508	0,000
Nt7_Valency of the reward	89	1,59	0,503	0,343	0,343	-0,337	3,235	0,000
Ci1_Dissemination of information through the company's conventional channels	89	1,64	0,440	0,463	0,279	-0,463	4,368	0,000
Ci2_Single message broadcast	89	1,24	0,499	0,372	0,372	-0,308	3,508	0,000
Ci3_Dissemination of workers' merit recognition	89	1,69	0,457	0,446	0,446	-0,261	4,211	0,000
Ci4_Dissemination of reinforcement of values and good leadership conduct	89	1,34	0,489	0,401	0,401	-0,279	3,781	0,000

Source: Processed by Spss

In order to monitor idleness, it is understood that the company must base its strategy on the continuous improvement of working conditions and, therefore, instill a communication culture through formal channels in addition to informal channels, as can be seen in the table above.

Improving working conditions and focusing on efficient internal communication can positively persuade workers to avoid staying at home longer than that established in the general labor law in force in the Republic of Angola regarding the enjoyment of disciplinary leave (article number 129 in section II of the chapter VII), regarding the right to leave and (in article number 131) of the same section and chapter where the duration of the same is foreseen, a measure also supported in the company's internal instructions.

o) Plan of Priority Activities (Actions) Built

In order to combat the identified dysfunctions and the hidden costs accounted for in the first survey, a solution proposal was constructed, through the identification of activities considered to be strategic capable of mitigating the identified dysfunctions or at least reducing their frequency and, consequently, the costs accounted for and, therefore, summarized at this stage through the Priority Activities Plan (PAP) tool, as can be seen below:

Table 13: Priority Activities Plan (PAP)

Indicators	Observed Dysfunctions	Explanatory variables	Proposed activities	Average value of the activity	Strategic activities	Strategic activities triggered immediately	Decrease or not of hidden costs
Absenteeism	Paid compensation time	Competence	training by need	1,7629	training by need		See the results of predictive test
			On-the-job training offered by the person in charge	1,8753	On-the-job training offered by the person in charge	On-the-job training offered by the person in charge	
			Systematization of the knowledge of each task	1,7517	Systematization of the knowledge of each task	Systematization of the knowledge of each task	
	Paid vacation allowance time		Responsibility for each task	1,4708			
		Work conditions	Modern and safe infrastructures	1,2798			
			Modern and cutting-edge technology	1,6539	Modern and cutting-edge technology		
			Healthy sanitary facilities	1,7764	Healthy sanitary facilities	Healthy sanitary facilities	
	Thirteenth month		Safety at work	1,7989	Safety at work		
			Fair and adequate	1,9764	Fair and	Fair and	

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	allowance paid time		compensation		adequate compensation	adequate compensation
			pay equity	1,3135		
	Time paid in overtime (overtime)		reward valence	1,1472		
		Control	Monitoring the completion of the task	1,3697		
			Performance evaluation	1,6652	Performance evaluation	Performance evaluation
	Paid time for hours absent from the workplace (due to illness, deaths, food and solving personal problems)		Request for results	1,4444		
		Communication	Dissemination of information through conventional company channels	1,8326	Dissemination of information through conventional company channels	Dissemination of information through conventional company channels
			Broadcasting a single message	1,3135		
	Paid time of hours spent by the supervisor to deliberate production and to delegate tasks		Dissemination of recognition of the merit of workers	1,1371		
			Diffusion of reinforcement of values and good conduct in leadership	1,2258		
Staff rotation	Time paid in hours spent replacing or rotating between colleagues (in and out)	Control	Performance evaluation/Monitoring in carrying out the task	1,3135		
			Performance evaluation	1,8528	Performance evaluation	Performance evaluation
			Request for results	1,1697		
		Communication	Dissemination of information through the company's conventional channels	1,7539	Dissemination of information through the company's conventional channels	Dissemination of information through the company's conventional channels
			Broadcasting a single message	1,291		
			Dissemination of recognition of the merit of workers	1,5646	Dissemination of recognition of the merit of workers	Dissemination of recognition of the merit of workers
			Diffusion of reinforcement of values and good conduct in leadership	1,2483		
Quality defects	Time paid in hours spent to correct a fault (error) made by the colleague during the performance of his duties.	Competence	training by need	1,6416	training by need	
			On-the-job training offered by the person in charge	1,7393	On-the-job training offered by the person in charge	On-the-job training offered by the person in charge
			Systematization of the knowledge of each task	1,7879	Systematization of the knowledge of each task	

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			Responsibility for each task	1,6393	Responsibility for each task	Responsibility for each task
		Work conditions	Modern and safe infrastructures	1,8831	Modern and safe infrastructures	Modern and safe infrastructures
			Modern and cutting-edge technology	1,6753	Modern and cutting-edge technology	
			Healthy sanitary facilities	1,2315		
			Safety at work	1,6865	Safety at work	
	Observed Dysfunctions		Fair and adequate compensation	1,5629	Fair and adequate compensation	Fair and adequate compensation
			pay equity	1,8191	pay equity	
			reward valence	1,3431		
		Control	Monitoring the completion of the task	1,3247		
			Performance evaluation	1,6865	Performance evaluation	Performance evaluation
			Request for results	1,773	Request for results	
		Internal communication	Dissemination of information through the company's conventional channels	1,8191	Dissemination of information through the company's conventional channels	Dissemination of information through the company's conventional channels
			Broadcasting a single message	1,6191	Broadcasting a single message	Broadcasting a single message
			Dissemination of recognition of the merit of workers	1,2596		
			Diffusion of reinforcement of values and good conduct in leadership	1,2197		
Deviations in direct productivity	Time paid in hours derived from the difference between the time recommended to perform a task and the time actually spent to carry it out.	Competence	training by need	1,718	training by need	
			On-the-job training offered by the person in charge	1,5517	On-the-job training offered by the person in charge	On-the-job training offered by the person in charge
			Systematization of the knowledge of each task	1,709	Systematization of the knowledge of each task	
			Responsibility for each task	1,5831	Responsibility for each task	Responsibility for each task
		Work conditions	Modern and safe infrastructures	1,6281	Modern and safe infrastructures	Modern and safe infrastructures
			Modern and cutting-edge technology	1,7764	Modern and cutting-edge technology	
			Healthy sanitary facilities	1,8527	Healthy sanitary facilities	Healthy sanitary facilities
	Time paid in hours of		Safety at work	1,9463	Safety at work	

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	stopping or recovering a machine or other equipment (maintenance)		Fair and adequate compensation	1,7991	Fair and adequate compensation	Fair and adequate compensation	
			pay equity	1,3382			
			reward valence	1,5944	reward valence		
		Control	Monitoring the completion of the task	1,4807	Monitoring the completion of the task	Monitoring the completion of the task	
			Performance evaluation	1,7652	Performance evaluation	Performance evaluation	
	Time paid in hours of lower human productivity		Request for results	1,5756	Request for results	Request for results	
		Internal communication	Dissemination of information through the company's conventional channels	1,7816	Dissemination of information through the company's conventional channels	Dissemination of information through the company's conventional channels	
			Broadcasting a single message	1,4282			
			Dissemination of recognition of the merit of workers	1,3921			
			Diffusion of reinforcement of values and good conduct in leadership	1,282			
Idleness	Paid time in long hours of disciplinary leave	Work conditions	Modern and safe infrastructures	1,5781	Modern and safe infrastructures	Modern and safe infrastructures	
			Modern and cutting-edge technology	1,7764	Modern and cutting-edge technology		
			Healthy sanitary facilities	1,8927	Healthy sanitary facilities	Healthy sanitary facilities	
			Safety at work	1,8663	Safety at work		
			Fair and adequate compensation	1,791	Fair and adequate compensation	Fair and adequate compensation	
			pay equity	1,3482			
			reward valence	1,5944	reward valence		
		Internal communication	Dissemination of information through the company's conventional channels	1,6416	Dissemination of information through the company's conventional channels	Dissemination of information through the company's conventional channels	
			Broadcasting a single message	1,2382			
			Dissemination of recognition of the merit of workers	1,6921	Dissemination of recognition of the merit of workers	Dissemination of recognition of the merit of workers	
			Diffusion of reinforcement of values and good conduct n+E48:E75a leadership	1,342			

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Seventy-two (72) activities were proposed in the four (4) explanatory variables and domain of solution to the detected dysfunctions, and that, using the spss statistical software, it was possible to identify (47) strategic activities to be monitored by the company for the mitigation of the levels of malfunctions found and the hidden costs accounted for, which for that, as the PAP is usually short-term Savall & Zardet (2009), in the second month after the first investigation, implemented thirty (30) of these strategic activities that made if you think about testing the prescription, that is, testing the effectiveness of these activities, as you can see in the table above, how they were implemented if they can help mitigate the malfunctions found or their frequency and consequently the hidden costs.

The identification of strategic activities combined with the fulfillment of the mirror effect substantiated in the presentation of the dysfunctions that caused the hidden costs of the first investigation made the company improve some working conditions aiming to increase the levels of satisfaction of the workers in their jobs, the control , skills and began to communicate with workers using more conventional channels, as can be seen in the tool: Plan of Priority Activities goes up.

p) Predictive Testing of the Conceived Solution

In order to combat the malfunctions found and, at the same time, the hidden costs accounted for in December 2022, a proposal for a solution was conceived in March 2023 using the PAP tool, which, at this stage, highlighted its level of effectiveness, through re-observation of the same malfunctions that generated the hidden costs accounted for. However, the indicators were observed where the dysfunctions that originated the hidden costs were observed, refer to the indicators: absenteeism, staff turnover, quality defects, deviation in direct productivity and idleness.

i. *Time Accounting*

The length of delay, absence from the workplace, correction of malfunctions by the workers was re-observed, and the work was done in addition to what was recommended in carrying out tasks in each of the eighty-nine (89) workers in the month of March 2023. This aim was achieved with the observation grid and summarized in the table immediately below, for each malfunction in relation to its hidden cost indicator for the days ahead of the analyzed month.

Table 14: Frequency Observation Grid of Dysfunctions

Survey form of the Frequency of Hidden Costs in the Operations Department (Hours)

Indicator	Factor Gerador	Days Of The Month/Period Under Analysis												Total Hours
		01	02	03	04	05	...	26	27	28	29	30	31	
Absenteeism	Paid vacation allowance time													
	Time paid in overtime (overtime)													
	Time absent from the workplace due to illness, death, food and resolution of personal problems													
	Paid time of hours spent by the supervisor to deliberate production and to delegate tasks													
Staff Rotation	Time paid in hours spent replacing or rotating between													

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	colleagues (in and out)													
Quality Defects	Time spent by the supervisor to correct a fault (error) made by the colleague													
Desvios Na Produtividade Directa	Differential time between recommended to carry out a task and the effective one													
	Recovery time for damaged equipment (maintenance)													
	Time of lowest human productivity													
Ociosidade	Paid time in long hours of disciplinary leave													

For this purpose, the Table15 presents the results of the time calculated for each malfunction observed.

Table 15: Calculation of the Time of each Dysfunction (1€=58 Kwanza "Kz")

Indicators	Departmentof Operations			
	Generating Factor	Minutes	Hours	Days
Absenteeism	Vacation subsidy salary	77 190,00	1 286,50	53,60
	Overtime	6 156,00	102,60	4,27
	Time of absence from the workplace due to illness, death, food and personal problems	5 454,00	90,90	3,78
	Time spent by the supervisor to deliberate the production		-	
Staff Rotation	Time spent replacing colleagues	4 701,00	78,35	3,26
Quality Defects	Time spent by the supervisor to correct a failure	3.585,6	59,76	2,49
Deviation In Direct Productivity	Differential time between recommended to carry out a task and the effective one	3.051,6	50,86	2,11
	Time spent to recover damaged equipment (maintenance)	7 836,00	130,60	5,44
	Time of lowest human productivity	4070,4	67,84	2,82
Idleness	long vacation time	2 880,00	48,00	2

Souce: Observation of March 2023

According to the results in the Table 15, it is assumed that the company will be able to recover part of its productivity due to the decrease in the time lost in the observed malfunctions.

ii. *Determination of Production Cost without Hidden Costs*

The Table16 shows the production cost and the cost price of the EPC-EP in March 2023 without incorporating the hidden costs to be accounted for, taking into account the identified cost items covered in cost and management accounting.

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Table 16: Cost of Production without Hidden Costs (Kz)

Description of Costs	Loading and Unloading Containers and other Goods/1678/21.924	
	Quantities	Costs
Direct Charges		
Direct Labor Cost	89,00	30 987 561,88
Subtotal Of Direct Charges	**89,00**	**30 987 561,88**
Indirect Charges		
Cost Of Indirect Labor	332,00	91 144 269,45
Maintenance Cost	-	6 783 321,93
Amortization For The Year	-	98 654 895,10
Taxes	-	25 600 220,45
Energy And Water	-	22 985 644,44
Communication	-	2 563 276,58
Hygiene, Cleaning And Safety	-	12 963 489,32
Computer Supplies	-	542 878,54
Other Third Party Service Providers	-	100 795,77
Administrative Charges	-	23 987 659,28
Sponsorships And Donations	-	4 874 357,35
Bank Charges	-	2 136 783,84
Other Charges	-	40 935 484,64
Subtotal Of Indirect Charges	**332,00**	**333 273 076,69**
Total Production Cost	**421,00**	**364 260 638,57**
Production Unit Cost	**23 602,00**	**15 433,46**
Distribution Cost	-	4 675 394,62
Cost Price (Pc)	**-**	**368 936 033,19**
Unit Price Of Cost		**15 631,56**

There was a relative increase in personnel costs summarized in the increase in personnel wages, both in direct labor and in indirect labor, as well as production cost and cost price. For this purpose, the analytical result without the inclusion of hidden costs can be seen in the Table 17.

iii. *Analytical Result without Hidden Costs*

Compulsing the visible cost headings assumed in the said period of analysis and in accordance with the cost analysis procedures in cost and management accounting, the analytical result is, therefore, the difference between sales and production cost plus administrative charges.

Table 17: Analytical Result without Hidden Costs (Kz)

Headings	Loading And Unloading Containers And Other Goods (1,878/22,933)
Business Number (Cn)	437 579 782,50
Cost Price	368 936 033,19
Analytical Result	**68 643 749,31**

Without including hidden costs, the analytical result is estimated at 68,643,749.31 Kz (sixty-eight million, six hundred and forty-three thousand, seven hundred and forty-nine, thirty-one cents).

iv. *Accounting for Hidden Costs*

To determine the hidden costs over time, it is essential to determine the hourly contribution of the margin on variable costs (CHMSCV).

Table 18: Hourly Contribution (Kz)

Headings	Quantities	Values
Business Number	-	437 579 782,50
Variable Costs	-	273 116 369,12
Margin On Variable Costs (Ms/Cv)	-	164 463 413,38
Total Workers	421,00	-
Hours Worked/Days	8,00	-

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Total Business Days Worked/Month	22,00	-
Number Of Expected Hours	74 096,00	-
Hourly Margin Contribution On Variable Costs (Chms/Cv)	-	2 219,60

The hourly contribution of the margin on variable costs is estimated at Kz 2,219.60, as being crucial in the process of calculating hidden costs. This contribution corresponds to the cost of each hour worked by each worker, based on the variable costs incurred in production by the company.

Table 19: Hidden Costs by Indicator (Kz)

Indicators	Generating Factors	Chms/Cv	T Hours	Hidden Cost
Absenteeism	Vacation subsidy salary	2 219,60	1 286,50	2 855 514,22
	Overtime	2 219,60	102,60	227 730,87
	Time of absence from the workplace due to illness, death, food and personal problems	2 219,60	90,90	201 761,56
	Time spent by the supervisor to deliberate the production			
Absentism Subtotal		-	1 480,00	3 285 006,64
Staff Rotation	Time spent replacing colleagues	2 219,60	78,35	173 905,59
Staff Rotation Subtotal		-	78,35	173 905,59
Quality Defects	Time spent by the supervisor to correct a failure	2 219,60	59,76	132 643,24
Quality Defects Subtotal		-	59,76	132 643,24
Deviation In Direct Productivity	Differential time between recommended to carry out a task and the effective one	2 219,60	50,86	112 888,81
	Time spent to recover damaged equipment (maintenance)	2 219,60	130,60	289 879,64
	Time of lowest human productivity	2 219,60	67,84	150 577,60
Subtotal Deviations In Direct Productivity		-	249,30	553 346,05
Idleness	long vacation time	2 219,60	48,00	106 540,76
Idle Subtotal		-	48,00	106 540,76
Totals		-	1 915,41	4 251 442,27

The hidden costs in the general balance in the different indicators in relation to each of the dysfunctions decreased from Kz 8,392,259.29 to Kz 4,251,442.27.

The reduction of hidden costs after implementing the proposed solution through strategic activities in the explanatory and solution domain variables means, on the one hand, the service provided begins to be humanized by increasing the productivity of workers and the company as a whole. By doing so, the company gains more economic, financial and social capacity through more liquidity for the company to meet its obligations to investors and in particular to its employees.

The reduction of hidden costs is motivated by the reduction of negative interactions between the company's structures and the behavior of workers, which provided improvements in operation, aiming to achieve the ortho-operation expected for customers through more presence of the worker in the workplace , less time to perform a task and regularize it, exciting the increase in productivity and consequently the company's results.

v. Determination of Production Cost with Hidden Costs

After determining the hidden costs of each indicator, it is in a position to calculate the cost of production and the cost price of the company, based on the visible and hidden costs incurred by the company during the month of March 2023, as can be seen in the Table 20:

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Table 20: Cost of Production with Hidden Costs (Kz)

Description Of Costs	Loading And Unloading Containers And Other Goods (1,878/22,933)	
	QUANTITIES	COSTS: VISIBLE AND HIDDEN
Direct Charges		
Direct Labor Cost	89,00	30 987 561,88
Cost Of Absenteeism		3 285 006,64
Staff Rotation Cost		173 905,59
Idle Cost		106 540,76
Subtotal Of Direct Charges		**34 553 014,86**
Indirect Charges		
Cost Of Indirect Labor		91 144 269,45
Quality Defect Cost		132 643,24
Cost Of Deviation In Direct Productivity		553 346,05
Maintenance Cost		6 783 321,93
Cost Of Amortizations For The Year		98 654 895,10
Cost With Taxes		25 600 220,45
Cost With Energy And Water		22 985 644,44
Communication Cost		2 563 276,58
Cost With Hygiene, Cleaning And Safety		12 963 489,32
Cost With Computer Supplies		542 878,54
Others Supply Serv. Of Third Parties		100 795,77
Administrative Costs		23 987 659,28
Costs With Sponsorships And Donations		4 874 357,35
Bank Costs		2 136 783,84
Other Charges		40 935 484,64
Subtotal Of Indirect Charges		**333 959 065,98**
Total Production Cost	**421,00**	**368 512 080,84**
Production Unit Cost	23 602,00	15 613,60
Distribution Cost (Dc)		4 675 394,62
Cost Price (Pc)		**373 187 475,46**
Unit Cost Price		15 811,69

Production costs and the price of rose slightly to the detriment of improving skills, working conditions, control and internal communication, thus making it possible to reduce the frequency of malfunctions and consequently hidden costs, regardless of not being in the same proportions.

vi. *Unknown Economic Performance*

The hidden or unknown economic performance is determined based on the visible costs and hidden costs accounted for in the period under analysis, as can be understood in the Table 21.

Table 21: Unknown Economic Performance (Kz)

Description of Costs	Loading and Unloading Containers and other Goods
Total Production Cost With Hidden Costs	368 512 080,84
Total Production Cost Without Hidden Costs	364 260 638,57
Unknown Performance	**4 251 442,27**

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The hidden economic performance of the company is the result of the difference between the total cost of production with hidden costs and the total cost of production with only visible costs. Therefore, this difference constitutes the part of the value that the company loses in the present and that it would gain after monitoring the phenomena that cause the hidden costs, as being exactly the value accounted for costs to be obtained also in the difference between the total costs of production with the hidden costs and the cost of production without including hidden costs.

vii. *Analytical Result with Hidden Costs*

An analytical result of the company is observed with the inclusion of the hidden costs verified in the month of March 2023, through the inclusion of the determined unknown economic performance.

Table 22: Analytical Result with Hidden Costs (Kz)

Description of Items	Loading and Unloading Containers and other Goods
Business Number	437 579 782,50
Cost Price (Pc)	373 187 475,46
Analytical Result	**64 392 307,04**

The analytical result with the inclusion of hidden costs is grown from the unknown economic performance determined, as being, the total hidden costs calculated, since, in the beginning, they are costs and later they are performing costs. If the company operated at this level of productivity, there would be no malfunctions that would cause the hidden costs accounted for.

V. Conclusion

The intention was to build a proposed solution to the observed dysfunctions that originated the hidden costs accounted for in the investigation carried out in the period from December 5, 2022 to January 5, 2023, according to the precepts of socioeconomic theory, a solution proposal that deserved a test so that its effectiveness could be verified taking into account the peculiar reality of the company studied. Thus, as the hidden costs accounted for in the first investigation were evaluated at 8,392,259.29 Kz with the proposed solution undertaken versus the measures taken by the company, as the mirror effect was applied, the second investigation with test costumes for the proposed solution reveals a decrease in the frequency of malfunctions and how and also in the levels of hidden costs in the order of 4,251,442.27 Kz. The reduction in the frequency of malfunctions and hidden costs enhances the trend towards the effectiveness of the proposed solution. The value of performing hidden costs, that is, the amount of hidden costs recovered within the 8,392,259.29 Kz can be added to the company's operating costs, made possible by the increase in workers' productivity levels. This specific requirement predicted better economic, financial and social results for improving the lives of workers and the company as a whole. Therefore, the research on hidden costs, which was called a test because the solution had been conceived and applied beforehand, aimed to deepen knowledge (know-how) about socio-economic theory and its application (know-how), referring to to the socio-economic analysis of dysfunctions in order to better account for hidden costs, focusing on an attitude (knowing how to be and living) to achieve them, which contributed positively to the observation of the frequency of dysfunctions for the determination of hidden costs in the company studied.

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8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.
Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



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- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



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Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

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Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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