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Review Article

Occupational Biosecurity Derived from The Sdgs in The Context of The Pandemic

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Abstract:

Job security has worried organizations in recent years. Different substrata of society have different perceptions about job security. This document explores the reliability and validity of an instrument that measures job security in a public institution in central Mexico by reviewing seven dimensions: territorial, national, public, human, public (self-protection), private and internet. Consequently, fit and residual values allowed us to accept the null hypothesis of a significant relationship between the theoretical dimensions with respect to the weighted factors.

Keywords: reliability of the instrument; factor structure; reflective model; occupational safety; validity of the instrument

Introduction

The history of occupational biosafety has evolved significantly, especially in the context of the COVID-19 pandemic, influenced by the UN Sustainable Development Goals (SDGs), particularly those related to health and well-being (SDG 3) and decent work and economic growth (SDG 8). Before the adoption of the SDGs in 2015, occupational biosafety was mainly focused on preventing occupational accidents and diseases, with a focus on national and international regulations and legislation (Ahmad et al., 2020). Organizations followed standards such as those of the International Labour Organization (ILO) and the World Health Organization (WHO) to protect workers. The implementation of the SDGs introduced a more holistic perspective on occupational biosafety. SDG 3, which promotes good health and well-being, and SDG 8, which advocates for decent work and economic growth, have driven increased awareness on the importance of safe and healthy working conditions (Ma et al., 2020). This goal reinforces the need to ensure that all workers have access to health services and safe conditions in their workplaces, with an emphasis on the prevention of occupational diseases. The goal highlights the importance of a safe working environment as an essential component of decent employment, promoting labour standards that ensure the protection of workers. The COVID-19 pandemic brought with it unprecedented challenges in the field of occupational biosafety (Albert, Baez & Rutland, 2021). The need to protect workers from the virus led to a rapid adaptation of biosafety policies and the creation of new protocols, such as the mandatory use of personal protective equipment (PPE), social distancing, teleworking, and the implementation of strict health controls in the workplace. During the pandemic, the principles of the SDGs served as a guide for many organizations and governments in developing responses to the crisis. The physical and mental health of workers was prioritized, with public health measures implemented to prevent the spread of the virus in workplaces (Antonelli et al., 2022). The pandemic exacerbated inequalities at work, and organizations with poor labor practices were more vulnerable. The SDGs called for ensuring fair working conditions even in times of crisis. The experience of the pandemic has accelerated the adoption of stricter biosecurity measures, which are aligned with the SDGs. Occupational biosecurity has evolved towards greater integration with public health and sustainability, recognizing that workers' health is fundamental to sustainable economic and social development.The COVID-19 pandemic acted as a catalyst that reinforced the importance of occupational biosafety, highlighting the relevance of the SDGs in creating safe and sustainable work environments.Job security, in several countries, has suffered from a lack or absence, particularly when it comes to government participation. As mentioned by Molina-Ruiz, García-Mungía, Rojano-Chávez & Moreno-Gutiérrez (2017), public security can be understood as the

work of the State to protect and safeguard its population from internal dangers or threats. In Latin American countries, public security is perceived as absent, due to the large amount of journalistic coverage that exposes this lack.In the case of Mexico, a greater amount of red notice coverage appears in the news every day, which shows a violent face of the country (Molina-Ruiz *et al*., 2017). The objective of this work is to establish the reliability and validity of an instrument that measures the perception of security in: Territorial security; National security; Public security (State as attorney general); human security; Public security (Self-protection); private security; and, Internet perception of security, scope. Public safety protection events occur around the world that pose a threat to personal and property safety and national security (Wu *et al.*, 2016). Mexico's security problems are similar in many ways to the general context of Latin America (Romero, Magaloni and Díaz-Cayeros, 2016). However, Mexico has a particular influence from organized crime due to the levels of consumption of illegal things in the US market (Molina-Ruiz *et al.*, 2017).As mentioned by Aguilera-García & Uribe-Arzate (2014), it has traditionally been understood as the function of the State that consists of protecting its citizens from illegal attacks (or crimes against) their property, their physical integrity, their sexual freedom and their sexual freedom. soon. In Chianca-Dantas (2015), the meaning of public custody is inferred as the safety of people. Khalili-Dehdezi & Qaleh-Sardi (2016) present 4 specific characteristics of public custody: inherence, inseparability, comprehensiveness and focus on justice.In Hernando (1999), it is stated that the perception of our reality is subjective and that the perception of our world depends on our particular living conditions. The perception of reality operates from a higher order, from a mesosystem that would include both (perception and reality), and in which each appears as elements and not as closed and independent units (Nescolarde-Selva, Usó-Doménech & Gash, 2014) . The notion that what we see may not be what really exists, has disturbed and tormented [...] (Lotto, 2017), the entire population in each sector, class or role of our society (Molina-Ruiz *et al.*, 2017). Different sectors of the population would have different perceptions of security.It can also be mentioned that the cultural stigma in the country also affects and promotes the lack of public protection, due to the general way of thinking of the Mexican population, which, compared to other cultures, seems slow and with little interest. develop in academic, professional, social aspects, among others (Molina-Ruiz *et al.*, 2017). The administration of public security is the implementation of public policies that justify the orientation of the State in the prevention of crime and the administration of justice, but only the distrust of citizens towards government action is evidenced in a growing perception of insecurity reported in Literature. in seven dimensions: territorial, national, public (government), human, public (self-protection), private and Internet.As Molina-Ruiz (2015) mentions, Mexico can be seen from diverse areas such as economic, historical or social. In that sense, there are other sub-areas (or subscales in the social sphere) such as health, public safety, education, environmental awareness, among others. As mentioned above, different sectors of the population have different perceptions of social sub-areas (or subscales). In the case of Bachelor's students, given that their academic training provides the possibility of generating critical thinking, this sector of the population can generate a solid perception of a factor that affects the context of society.

Method Design.

A cross-sectional, correlational and psychometric study was conducted with a sample of 100 students selected for their affiliation with institutions committed to the SDGs in the context of the pandemic.Instrument. The Occupational Biosafety Scale was used (see Annex A). It includes the following dimensions: 1) Implementation of Protocols and Health, 2) Access to Health Services, 3) Monitoring and Epidemiological Surveillance, 4) Safe Working Conditions, 5) Adaptability and Response to Crisis, 6) Equity and Equal Access, 7) Commitment to Health and Safety, 8) Training and Capacity Building, 9) Communication and Transparency.Procedure. Respondents were invited via institutional email. They were informed about the objectives and responsibilities of the project. Respondents were invited to a focus group to discuss the meaning of the indicators. Respondents were invited to a Delphi study to evaluate the items. The surveys were administered at the university facilities.The Delphi technique was used to establish the homogeneity of the concepts in the items. We examined the exhibit in the lobby of his university library. The data were processed with the Statistical Analysis Package for Social Sciences (SPSS) and Structural Analysis of Moments (AMOS). Versions 18.0. Reliability was estimated with Cronbach's alpha, Bartlett's validity test, KMO and factor weight.Cronbach's alpha was estimated to establish the internal consistency of the general scale and the subscales. The Bootstrap parameter was calculated to establish sampling when it is not possible to fully use the data and only part of the distribution is used. Adequacy and sphericity were calculated with the Kaiser Meyer Olkin parameters and the Bartlett test. An exploratory factor analysis was performed with obliquity criteria and promax rotation of the principal axes. The hypothesis test was carried out with the estimation of the adjustment and residual parameters.Analysis. The data were captured in Excel and processed in Google Colab (see appendix B). The coefficients of reliability, linearity, adequacy, sphericity, validity, adjustment and residuals were estimated. Values close to unity, except for the residuals, were assumed as evidence of non-rejection of the null hypothesis.

Results

The factor weight analysis suggests the degree of involvement between the items with respect to the factor in order to structure the confirmatory model. The results of the factor weights exceed the minimum threshold of 0.300 and range between 0.351 and 0.750 except for the case of the second indicator of the Communication and Transparency factor. The analysis of the variances of the factors indicates the degree of structuring around a common factor. The results show that the two factors related to Access to Health Services and the Communication and Transparency factor correspond to a common factor that the literature identifies as occupational biosafety. The analysis of residual variances suggests the inclusion of other factors in the model. The findings indicate the absence of significant values, which could indicate the inclusion of other indicators in the model. The analysis of the intercepts suggests that the model is not due to the residuals but to the explanatory term. The results show non-significant values, so it is assumed that the model is not equal to zero because the variables are not equal to zero. The analysis of the variance matrix involved suggests the degree of inclusion of other indicators in the model as long as the values tend to zero. The results suggest the non-inclusion of other indicators that

could contribute to the factorial confirmation of the model. The analysis of the covariance matrix of the residuals indicates the degree of inclusion of other factors by inferring the incidence of residual variance in the model. The values tend to be significant, so the inclusion of other indicators in the two established factors is suggested. Structural equation analysis in confirmatory factor analysis mode suggests testing the hypothesis of the theoretical model against the established model. The results indicate that the model confirms two of the nine factors reported in the literature, as well as three indicators for each factor and a second-order factor that the literature identifies as biosecurity. The fit and residual values ⌈ χ 2 = 40.429 (7 gl) p < 0.001; GFI = 984; MFI = 0.935; CFI = 0.768; NFI = 0.745; IFI = 0.780; RNI = 0.768; RMSEA = 0.09; SRRM = 0.07⌋ suggest that the hypothesis regarding the differences between the theoretical structure and the empirical test of the model is not rejected.

Discussion

The contribution of this work to the state of the art lies in the establishment of a confirmatory model of two of nine factors related to occupational biosafety. The results highlight adjustment values that suggest the non-inclusion of factors, but the increase of indicators that would increase the predictive power of the model. The COVID-19 pandemic has highlighted the importance of biosecurity measures in various sectors, such as health communication, open science, laboratory biosecurity, and traveler behavior (DiEuliis & Giordano, 2022). The importance of health communication, and biosecurity in pandemic management highlights the lessons learned from data sharing and biosecurity in the context of open science and innovation during the COVID-19 crisis. It highlights the increased importance of laboratory biosecurity and biosecurity in the face of the pandemic. A retrospective of the intellectual contributions of expert groups in the field of biosecurity before and after the COVID-19 outbreak underlines the increasing relevance of biosecurity issues on the global stage. The study of biosecurity delves deeper into travelers' biosecurity behavior during the pandemic, exploring the effects of interventions, resilience, and sustainable development goals on biosecurity practices (Rutjes et al., 2023). COVID-19 vaccine biosecurity sheds light on the importance of ensuring the safety and security of vaccine development and distribution processes. Messaging delivery strategies can influence compliance with biosecurity practices, highlighting the effectiveness of graphical messages combined with linguistic phrases to promote adherence to biosecurity measures. The complementarity of international instruments in the field of biosecurity emphasizes the need for States to take additional measures to prevent and defend against intentional biological threats (Al Shehri et al., 2022). Biosecurity perceptions during the COVID-19 pandemic reveal gaps in research on biosecurity practices and the potential influence of current events on attitudes towards biosecurity measures. Unlike the state of the art, which explores the biosecurity of the environment in which the SDGs arise in organizations in the face of the pandemic, this work warns that the factors of access to health services and communication and transparency confirm a latent structure that the literature identifies as biosecurity derived from the SDGs against COVID-19. Therefore, the areas of opportunity lie in the inclusion of indicators that allow revealing latent factors in the proposed model. To this end, it is recommended to extend the scale and the sample in order to increase the percentage of total variance explained by the model. In Mexico, the interpretation or idea that the country lacks security is common. This lack of protection is influenced by the presence of organized crime, the illegal trade in drugs and weapons and the corruption available in each branch of the government, among the main aspects. The correlations of reliability and validity when the unit shows that there are other dimensions linked to the construct. In this sense, the inclusion of self-control explains the effects of state propaganda on crime prevention, law enforcement, and peace education on the lifestyles of civilian sectors. The contribution of this study refers to the reliability and validity of an instrument that measures seven dimensions of security: territorial, national, human, public, private and digital.

Conclusion

The objective of this study was to confirm the factor structure of nine latent variables reported in the literature with respect to the observations of this study. The results confirm two of the nine factors but recommend increasing the number of indicators in order to reveal factors that the literature links to occupational biosafety. Thus, the area of opportunity of this study lies in increasing the number of indicators and factors to increase the predictive and confirmatory power of the proposed model.

References

1. Aguilera-García, ER & Uribe-Arzate, E. (2014). Towards a society oriented to human security, conception of security in the context of globalization, Ciencia Ergo Sum, 21, 1, 71–76
2. Ahmad, T., Haroon, H., Dhama , K., Sharun, K., Khan, FM, Ahmed, I., ... & Hui, J. (2020). Biosafety and biosecurity approaches to restrain/contain and counter SARS-CoV-2/COVID-19 pandemic: a rapid-review. *Turkish journal of biology* , *44* (7), 132-145.
3. Al Shehri, S.A., Al-Sulaiman, A.M., Azmi, S., & Alshehri, S.S. (2022). Bio-safety and bio-security: A major global concern for ongoing COVID-19 pandemic. *Saudi journal of biological sciences* , *29* (1), 132-139.
4. Albert, C., Baez, A., & Rutland, J. (2021). Human security as biosecurity: Reconceptualizing national security threats in the time of COVID-19. *Politics and the Life Sciences* , *40* (1), 83-105.
5. Antonelli, V., Bigoni , M., Funnell , W., & Cafaro , E.M. (2022). Accounting for biosecurity in Italy under COVID-19 lockdown. *Accounting, Auditing & Accountability Journal* , *35* (1), 120-130.
6. Chianca -Dantas, A (2015). Police media, public security and human security: a reflexive approach, Direito, *Estado e Sociedade* , 46, 72–100.
7. DiEuliis , D., & Giordano, J. (2022). The Need for Modernization of Biosecurity in the Post-COVID World. *Msphere* , *7* (2), e00025-22.
8. Hernando, A. (1999). Perception of reality and prehistory. Relationship between the construction of identity and socioeconomic complexity in human groups, Works on Prehistory, *Higher Council for Scientific Research*, 56, 2, 19–35.

9. Khalili-Dehdezi, A., & Qaleh-Sardi, F.K. (2016). The role of public security in society, *International Journal of Humanities and Cultural Studies*, 1, 1, 1-10.
10. Lotus, B. (2017). *Going Away: The Science of Seeing Differently* , Hachette Books Group, 1290 Avenue of the Americas, New York, NY 10104,
11. Ma, H., Zhu, J., Liu, J., Zhang, X., Liu, Y., & Yang, Q. (2020). Hospital biosecurity training: Analysis and recommendations for the prevention and control of COVID-19. *Journal of Biosafety and biosecurity* , *2* (1), 5-9.
12. Molina-Ruiz, HD (2015). Mexico and its economic, historical and social contexts, in the business environment: an approach from the perspective of globalization as a tool for decision making, *Innovation and Technological Development Revista Digital* , 7 (1), 8—33.
13. Molina-Ruiz, HD, García- Mungía , M., Rojano-Chávez, SM & Moreno-Gutiérrez, SS (2017). Chapter: Perception of public security from the crowd-search approach: using the impact of social networks, advancing the use of knowledge of collective consciousness, In: *Emerging technologies for an intelligent world*.
14. Nescolarde -Selva, JA, Usó-Doménech, JL & Gash, H. (2014). A theoretical point of view of reality, perception and language, *Complexity* , 20, 1, 27–37.
15. Romero, V., Magaloni, B. & Díaz-Cayeros, A. (2016). Presidential Approval and Public Safety in Mexico's War on Crime, Latin American Politics and Society, University of Miami.
16. Rutjes , S.A., Vennis, I.M., Wagner, E., Maisaia , V., & Peintner , L. (2023). Biosafety and biosecurity challenges during the COVID-19 pandemic and beyond. *Frontiers in Bioengineering and Biotechnology* , *11* , 1117316.
17. Wu, S., Liu, Q., Bai, P., Wang, L., and Tan, T. (2016). SAPE: A System for Situation Aware Public Safety Assessment, Proceedings of the Thirtieth AAAI Conference on Artificial Intelligence (AAAI-16), Association for the Advancement of Artificial Intelligence.

Annex A

Occupational Biosafety Measurement Scale Derived from the SDGs
Dimensions and Subdimensions
Each dimension is measured on a Likert scale from 1 to 5, where:
1 = Very low (or non-existent)
2 = Low
3 = Moderate
4 = High
5 = Very high (or fully implemented)
1. Good Health and Well-being (SDG 3)
1.1 Implementation of Health Protocols
Indicator: Existence of biosafety protocols (use of PPE, distancing, hygiene).
Measurement: How comprehensive and enforced are workplace health protocols?
1.2 Access to Health Services
Indicator: Workers' access to medical and mental health services.
Measurement: How accessible are physical and mental health services for employees?
1.3 Epidemiological Monitoring and Surveillance
Indicator: Surveillance of COVID-19 cases and other infectious diseases.
Measurement: How effective is employee health monitoring and tracking in the workplace?
2. Decent Work and Economic Growth (SDG 8)
2.1 Safe Working Conditions
Indicator: Quality of working conditions in terms of safety and well-being.
Measurement: How safe and healthy are working conditions according to current standards?
2.2 Adaptability and Crisis Response
Indicator: Capacity of the organization to adapt and respond to health crises.
Measurement: How flexible and effective is the organization's response to public health emergencies?
2.3 Equity and Equal Access
Indicator: Equity in the implementation of biosafety measures for all workers.
Measurement: How equitable are biosecurity measures across the workforce, without discrimination?
3. Corporate and Social Responsibility
3.1 Commitment to Health and Safety
Indicator: Degree of commitment of the company to the health and safety of its employees.
Measurement: How committed is senior management to the implementation and continuous improvement of biosecurity measures?
3.2 Training and Capacity Building
Indicator: Biosafety training programs for employees.

Measurement: How well are employees trained on biosafety risks and practices?
3.3 Communication and Transparency
Indicator: Effectiveness of internal communication on risks and biosafety measures.
Measurement: How clear and frequent is communication on biosecurity and health policies?
Interpretation of the Scale
Total score: The scores for each indicator are added together to obtain an overall score.
Maximum score: 75 points (15 indicators x 5 points)
Minimum score: 15 points (15 indicators x 1 point)
Ranks:
Very low (15-30): Poor implementation of occupational biosafety, with serious gaps in compliance with the SDGs.
Low (31-45): Limited implementation, with some basic measures in place but important areas for improvement.
Moderate (46-60): Adequate implementation, with most indicators covered, but with room for improvement.
High (61-75): Robust implementation, with biosecurity practices fully aligned with the SDGs.

Appendix B

```
# Step 1: Installing required libraries
! pip install semopy pandas numpy
# Step 2: Import the necessary libraries
import pandas as pd
import numpy as np
from semopy import Model, Optimizer, calc_stats
# Step 3: Create mock data for the scale (just as an example)
# For real data, you will need to upload your dataset.
data = {
' Health_Protocols ': np.random .randint (1, 6, 100),
' Health_Access ': np.random .randint (1, 6, 100),
' Health_Monitoring ': np.random .randint (1, 6, 100),
' Work_Conditions ': np.random .randint (1, 6, 100),
' Work_Adaptability ': np.random .randint (1, 6, 100),
' Work_Equity ': np.random .randint (1, 6, 100),
' Responsibility_Commitment ': np.random .randint (1, 6, 100),
' Responsibility_Training ': np.random .randint (1, 6, 100),
' Responsibility_Communication ': np.random .randint (1, 6, 100)
}
df = pd.DataFrame (data)
# Step 4: Specify the CFA model
# In this example, each dimension is modeled as a latent factor
model_desc = """
# Latent factors
Health =~ Health_Protocols + Health_Access + Health_Surveillance
Work =~ Work_Conditions + Work_Adaptability + Work_Equity
Responsibility =~ Responsibility_Commitment + Responsibility_Training + Responsibility_Communication
# Correlations between latent factors (optional)
Health ~~ Work
Health ~~ Responsibility
Work ~~ Responsibility
"""
# Step 5: Create and adjust the model
model = Model ( model_desc )
opt = Optimizer ( model )
opt.optimize ( df )
# Step 6: Obtain and display the results of model fitting
stats = calc_stats (model)
print(stats)
# Step 7: Display the summary of the estimated parameters
estimates = model.inspect ()
print ( estimates )
```