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Innovative Behavior in The Health Sector During the Covid-19 Pandemic: A Moderated- Mediated Perspective

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ABSTRACT

The Covid-19 pandemic has forced rapid changes. To support this acceleration of change, employees' innovative behavior is essential. Innovative behavior serves as a construct for generating ideas and implementing them. This study aims to develop a model of innovative behavior influenced by job design, with a moderating perspective of knowledge sharing and a mediating perspective of intrinsic motivation. The sample in this study consists of 258 respondents, with data analysis techniques using SEM-PLS and WarpPLS 7.0. The findings indicate that job design has a significant positive effect on intrinsic motivation, knowledge sharing, and employees' innovative behavior. Intrinsic motivation serves as a mediator, influencing the indirect relationship between job design and innovative behavior, partially mediating this relationship. Meanwhile, knowledge sharing as a moderator strengthens the relationship between job design and innovative behavior among employees. This suggests that knowledge exchange among employees generates information related to the pandemic, facilitating opportunities and changes through creative solution concepts that promote and implement their innovative ideas in the workplace.

Keywords: Innovative Behavior; Work Design; Intrinsic Motivation; Knowledge Sharing; Covid-19; SEM-PLS

INTRODUCTION

The COVID-19 pandemic, which emerged in late 2019, has had a profound impact on global society, marking one of the most significant health crises in modern history. As cases rapidly increased worldwide, Southeast Asia emerged as a new epicenter, with Indonesia among the worst-affected nations, reporting over 3.2 million confirmed cases by mid-2021 (World Health Organization, 2021). In South Sumatra, the situation was similarly dire, with high daily infection and mortality rates ranking the province sixth in Indonesia for COVID-19 transmission. This unprecedented crisis demanded swift and innovative responses from health organizations to manage the rising caseload and mitigate the pandemic's effects.

In South Sumatra, nine of the province's 17 districts entered the high-risk zona merah “red zone,” prompting the implementation of public activity restrictions (PPKM) and strict health protocols. The provincial health department, Dinas Kesehatan Sumatera Selatan (Dinkes Sumsel), alongside hospitals and other institutions, played a pivotal role in ensuring healthcare delivery under these challenging circumstances. Collaboration and technological innovation became central to their strategy, with initiatives such as the Sumsel Tanggap 119 emergency response system and public health campaigns addressing misinformation and stigma surrounding COVID-19. Recent studies highlight the effectiveness of digital health platforms in managing healthcare delivery during pandemics, suggesting that technology adoption played a critical role in mitigating the impact of COVID-19.

Innovations in healthcare have proven indispensable during the pandemic. They not only address immediate challenges but also pave the way for sustainable improvements in healthcare systems. Innovation requires organizational commitment, supportive cultures, and individual-level motivation among employees to foster creative problem-solving and the implementation of novel solutions (Akinwale & AboAlsamh, 2023; Arshad et al., 2018; Bamel et al., 2023; Guarcello & de Vargas, 2020; Zahlan et al., 2023). With such initiatives, responses to crises like COVID-19 would be far more effective, jeopardizing public health outcomes. The pandemic has underscored the importance of fostering an innovation-driven environment, particularly in resource-limited settings like South Sumatra.

Employee innovative work behavior (IWB) is critical in driving organizational innovation. This behavior involves generating, promoting, and implementing new ideas within the workplace, enabling organizations to adapt to rapidly changing environments (Janssen, 2022). Motivational factors, particularly intrinsic motivation, play a significant role in fostering such behavior. Employees motivated by intrinsic factors are more likely to engage in innovative activities, take initiative, and explore new methods to enhance their work performance (Adam, 2022; Akram et al., 2020; Li et al., 2022). Recent research emphasizes that intrinsic motivation fosters creativity and problem-solving, which are crucial in high-pressure scenarios like the COVID-19 pandemic.

Knowledge sharing is another key factor influencing IWB. By facilitating the exchange of information and ideas among employees, organizations can foster creativity and collaboration, leading to innovation. However, preliminary surveys at Dinkes Sumsel and affiliated hospitals indicate low levels of knowledge sharing, resulting in insufficient information flow and limited implementation of new ideas. Enhancing knowledge-sharing practices is essential for overcoming these barriers and sustaining innovation in public health services, particularly in crises (Alheet et al., 2021; Hisyam Selamat & Zhang, 2019; Tan et al., 2021; Uppathampracha, 2022).

Job design is also instrumental in promoting IWB, mainly when it incorporates elements such as autonomy, skill variety, and opportunities for development. In response to the pandemic, Dinkes Sumsel adapted its service delivery model, shifting vaccination programs to public spaces like malls and schools. This shift underscores the importance of flexible job designs that allow employees to respond effectively to dynamic challenges, demonstrating the value of adaptive work environments in fostering innovation (De Vries et al., 2022). Such innovations have been linked to better service delivery and enhanced employee satisfaction in the healthcare sector.

Despite these efforts, gaps still need to be identified in understanding the interplay between intrinsic motivation, knowledge sharing, and job design in shaping Employee Innovative Behavior (IWB). Previous studies have yielded mixed results, with some highlighting the significant influence of these factors on innovation (Tung et al., 2023; Lee & Kim, 2022), while others report negligible or inconsistent effects (Gao et al., 2021; Zhang et al., 2021). For instance, Tung et al. (2023) emphasize the critical role of intrinsic motivation in fostering creativity in healthcare organizations during crises, while Lee and Kim (2022) highlight that the organizational culture surrounding knowledge sharing can either enhance or hinder IWB, depending on contextual factors. On the other hand, research by Gao et al. (2021)

found that while knowledge sharing can lead to innovation, its effects are often contingent on job design and management support, with some organizations reporting little to no impact. Similarly, Zhang et al. (2021) argue that job design alone may only be sufficient to spark IWB if intrinsic motivation is also present, suggesting a complex relationship between these variables.

A review of existing literature reveals a need for more clarity regarding how these variables interact within public health organizations during a crisis, particularly in regions like South Sumatra, where local healthcare systems face unique challenges (Smith et al., 2022; Johnson et al., 2021). Recent studies on the COVID-19 pandemic have highlighted the importance of adaptive job design and knowledge sharing in sustaining innovation (Yamamoto & Liu, 2022). However, only some have explicitly focused on the provincial healthcare context in Indonesia (Sari et al., 2022). This research aims to address these gaps by examining the relationship between these variables within the context of Dinas Kesehatan Sumatera Selatan (Dinkes Sumsel) and South Sumatra's provincial hospitals. By doing so, it will contribute to a better understanding of the factors that enable innovation in public health crises, particularly in resource-constrained settings. Understanding these dynamics could be crucial for developing strategies that enhance organizational resilience and responsiveness during future public health emergencies (Raj & Ghosh, 2022; Choi & Lee, 2021; Kato & Hashimoto, 2024).

The study will provide critical insights into the mechanisms driving employee innovation in public health organizations during crises. By identifying key enablers and barriers, the study aims to inform strategies that enhance organizational resilience and responsiveness, ensuring that healthcare systems remain adaptable and practical in the face of future challenges. These insights will also assist policymakers in creating environments that support innovation, which is vital for improving public health outcomes in emergencies.

METHOD

This study employs a quantitative approach, which, according to Uma Sekaran (2017), is a scientific method involving numerical data that is systematically analyzed using mathematical or statistical calculations. Data were collected through a questionnaire method, which was directly administered to the respondents, including employees from the Dinas Kesehatan Provinsi(Provincial Health Office) and provincial hospitals. The questionnaire contained questions regarding job design, innovative behavior, intrinsic motivation, and knowledge sharing. The population in this study consisted of 721 individuals, and the sample size used was 258 individuals. SEM-PLS techniques were applied to analyze the data using WarpPLS 7.0 software, enabling the analysis of relationships between variables in this study (Hair et al., 2014; Henseler et al., 2015).

RESULTS AND DISCUSSION

Discriminant validity can also be assessed by examining the square root of the AVE values, where the square root of AVE (shown in parentheses) should be higher than the correlations between latent variables in the same row (above or below). This is presented in Table 1, based on the output of the square root of AVE and the correlations among latent variables and errors.

Table 1. Output The Square Root of AVE

	DesPek	MotInte	KnowSha	PerIno	KnowSha
DesPek	**0.667**	0.663	0.575	0.463	-0.283
MotInte	0.663	**0.704**	0.561	0.407	-0.331
KnowSha	0.575	0.561	**0.876**	0.413	-0.208
PerIno	0.463	0.407	0.413	**0.803**	-0.196
KnowSha	-0.283	-0.331	-0.208	-0.196	1.000

Source: Processed Data WarpPLS, 2024

The reliability test for the variables in this study is indicated by the values of composite reliability and Cronbach's alpha. The parameters used to determine the reliability of these variables are that both composite reliability and Cronbach's alpha should be greater than 0.70. The data regarding the values of composite reliability and Cronbach's alpha are presented in Table 2 below.

Table 2. Composite Reliability and Cronbach's Alpha

	DesPek	MotInte	KnowSha	PerIno	KnowSha
Composite Reliability	0.897	0.872	0.929	0.916	1.000
Cronbach's alpha	0.873	0.827	0.899	0.889	1.000

Source: Processed Data WarpPLS, 2024

Based on Table 2, it can be seen that the composite reliability and Cronbach's alpha for each variable are above 0.70, indicating that all variables are reliable. Therefore, it can be concluded that all construct variables meet the reliability requirements and are suitable for further analysis.

The coefficient of determination, represented by R-squared, indicates the percentage of variation in the endogenous construct/criterion that can be explained by the hypothesized influencing constructs (exogenous/predictors). Below is a table showing the R-squared values for each research variable that is influenced by other variables.

Table 3. *Adjusted R-squared coefficients*

	DesPek	MotInte	KnowSha	PerIno	KnowSha
Adj R-Square		0.455	0.352	0.250	

Source: Processed Data WarpPLS, 2024

Based on the data in Table 3, the Adjusted R-squared value for the intrinsic motivation variable is 0.455 (45.5%), indicating that other variables outside of this model influence 54.5%. The Adjusted R-squared value for the knowledge-sharing variable is 0.352, and for the innovative behavior variable, it is 0.250. This means that 25% of innovative behavior can be explained by job design, intrinsic motivation, and knowledge sharing, with the remaining percentage explained by other variables not covered in this study or factors outside the model.

The indicators can evaluate model fit and quality indices, the results of which are presented in Table 4 below.

Table 4. Nilai *Model F*it and *Quality Indeces*

No	*Model Fit* and *Quality Indeces*	Criteria	Result	Description
1	Average path coefficient (APC)	Accepted if p < 0,05	0.310, P<0.001	Accepted
2	Average R-squared (ARS)	Accepted if p < 0,05	0.359, P<0.001	Accepted
3	Average adjusted R-squared (AARS)	Accepted if p < 0,05	0.353, P<0.001	Accepted
4	Average block VIF (AVIF)	Accepted if ≤ 5	2.036, acceptable if <= 5, ideally <= 3.3	Accepted
5	Average full collinearity VIF (AFVIF)	Accepted if ≤ 5	1.664, acceptable if <= 5, ideally <= 3.3	Accepted
6	Tenenhaus GoF (GoF)	Small ≥ 0.1; Medium ≥ 0.25; Large ≥ 0.36	0,490	Large
7	Sympson's paradox ratio (SPR)	Accepted if ≥ 0.7; ideally = 1	0.999	Accepted
8	R-squared contribution ratio (RSCR)	Accepted if ≥ 0.9; ideally = 1	1.000	Accepted
9	Statistical suppression ratio (SSR)	Accepted if ≥ 0.7	1.000	Accepted
10	Nonlinear bivariate causality direction ratio (NLBCDR)	Accepted if ≥ 0.7	1.000	Accepted

Source: Processed Data WarpPLS, 2024

In Table 4, all the standard values for model fit and quality indices in this model have been met as required. This indicates that the model in this study has good Goodness of Fit, and there are no multicollinearity issues between indicators and exogenous variables.

Q-squared, also known as Stoner-Geiser coefficients, is a nonparametric measure used to assess the predictive validity or relevance of a set of latent predictor variables on the criterion variable. A model is considered good if its Q-squared value is greater than zero. According to the estimation results in Table 5, the Q-squared values for intrinsic motivation, knowledge sharing, and innovative behavior are 0.451, 0.349, and 0.266, respectively. This indicates that the model has good predictive validity.

Table 5. Result Q-squared

	DesPek	MotInte	KnowSha	PerIno	KnowSha
Q-Square		0.451	0.349	0.266	

Source: Processed Data WarpPLS, 2024

For effect size (F-squared), the contribution of each predictor latent variable to the R-squared value of the criterion variable is calculated. The effect size is categorized into three levels: small (0.02), medium (0.15), and large (0.35). As shown in Table 6, the effect size of job design on innovative behavior is 0.457 (large), on knowledge sharing is 0.354 (medium), and on innovative behavior is 0.127 (small). Intrinsic motivation's effect on innovative

behavior is 0.046 (weak), while knowledge sharing's effect on innovative behavior is 0.094 (weak).

Table 6. *Effect Size for Path Coefficients*

	DesPek	MotInte	KnowSha	PerIno	KnowSh
MotInte	0.457				
KnowSha	0.354				
PerIno	0.127	0.046	0.094		0.001

Source: Processed Data WarpPLS, 2024

Hypotheses Testing

Hypothesis testing using SEM-PLS will show nine hypotheses used to assess the significance level (p-value) and the relationships between variables in this research model, which can be seen from each path of influence between variables. Below is the diagram of the results from the testing using WarpPLS 7.0.

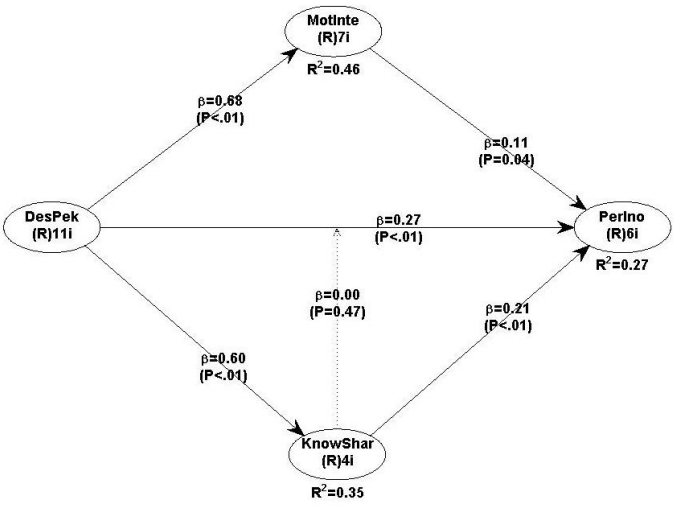

Figure 1. Testing the Indirect Effect Model with WarpPLS 7.0
Source: Processed Data WarpPLS, 2024

Here are the results of the estimated path coefficients from the hypothesis testing 1-3:

Tabel 7. The Results Of The Estimated Path Coefficients

No	Hypothesis	*Path Coefficient*	*P-value*	Description
1	DP→MI	0.68	P<0.01	Positive and significant
2	MI→PI	0.11	P=0,04	Positive and significant
3	DP→PI	0.27	P<0.01	Positive and significant

Source: Processed Data WarpPLS, 2024

Here are the results of the mediated effect from hypothesis testing 4:

Table 8. The Results Of Indirect Effect Mediated

No	Hypothesis	*Path Coefficient*	*P-value*	Description
1	DP→PI	0.27	P<0.01	Positive and significant

Source: Processed Data WarpPLS, 2024

Here are the results of the estimated path coefficients from the hypothesis testing 5-6:

Table 9. The Results Of The Estimated Path Coefficients

No	Hypothesis	*Path Coefficient*	*P-value*	Description
1	DP→KS	0.60	P<0.01	Positif dan Signifikan
2	KS→PI	0.21	P<0.01	Positif dan Signifikan

Source: Processed Data WarpPLS, 2024

Here are the results of the moderated effect from hypothesis testing 7:

Table 10. The Results Of Indirect Effect Moderated

No	Hypothesis	*Path Coefficient*	*P-value*	Description	Moderated
1	DP*KS→PI	0.00	P=0.47	Positive moderation (able to strengthen) and not significant	Predictor Moderating

Source: Processed Data WarpPLS, 2024

Job design refers to the structuring of tasks to achieve organizational goals and enhance employee motivation. Elements such as skill variety, task identity, task significance, autonomy, and feedback influence the intrinsic motivation of employees at the Dinas Kesehatan (Health Department) and Regional Hospitals of South Sumatra Province, particularly during the COVID-19 pandemic. Clinical skills, communication, and technology were essential to face the challenges, while task identity increased motivation as employees felt their work had a significant impact. Autonomy and flexible working hours also enhanced motivation by giving employees more control over their tasks. The findings support Judge et al. (2004), who demonstrated that job design has a positive effect on intrinsic motivation. Pee and Lee (2015) also argue that job design creates conditions that foster intrinsic motivation, while Li et al. (2021) and Al-Dajani et al. (2023) caution that autonomy without support can have a negative impact.

Intrinsic motivation drives employees to generate new ideas and innovate. Employees who are intrinsically motivated are more likely to propose new solutions and adjust work methods, as seen in the development of the Gadget Tanggap 119 app and other innovative programs during the pandemic. The freedom to choose work methods and the implementation of Work From Home (WFH) increased flexibility and work-life balance, facilitating innovative behavior. These findings align with Zhang and Bartol (2010), who emphasize that intrinsic motivation encourages innovative behavior. Hammond et al. (2011) and Kundu et al. (2019) also found a positive relationship between intrinsic motivation and innovation. However, Johnson et al. (2022) warn that high motivation can lead to burnout, which may hinder creativity.

Job design plays a critical role in fostering innovative behavior. By offering autonomy, complexity, support, and opportunities for growth, job design encourages employees to be creative and implement new ideas. Autonomy allows employees to take risks and try new approaches, which is key to innovative behavior. During the pandemic, remote collaboration tools like Zoom meetings supported communication and innovation, showing the importance of flexible job design in maintaining productivity. This aligns with research by De Spiegelaere et al. (2012) and Jiang et al. (2014), who found that job design positively impacts innovation.

Theurer et al. (2018) highlighted autonomy as a crucial factor for innovation. However, Wang et al. (2022) argued that excessive autonomy could hinder creativity, while Gao et al. (2023) found job stress to affect innovation negatively.

Intrinsic motivation mediates the relationship between job design and innovative behavior. Jobs that offer autonomy and support increase intrinsic motivation, encouraging employees to stay focused and innovative despite challenges. Research by Amabile & Conti (1999) and Baer et al. (2003) supports this, showing that motivated employees engage more in innovative behavior when job design is supportive. Kundu et al. (2019) also found that intrinsic motivation mediates the effect of role clarity on innovation.

Job design that fosters interaction and collaboration enhances knowledge sharing. During the pandemic, employees at the Dinas Kesehatan Sumatera Selatan (South Sumatra Health Department) and Regional Hospitals shared information to solve tasks efficiently. This supports the findings by Tsai and Foss et al. (2015), who showed that challenging job designs promote knowledge sharing. Gong et al. (2018) also found that job designs offering autonomy and safety encourage knowledge sharing. However, Wang et al. (2021) found no significant impact of job design on knowledge sharing.

In the Dinas Kesehatan Sumatera Selatan and Provincial Hospitals, effective knowledge sharing plays a significant role in enhancing innovative behavior. By facilitating knowledge exchange, organizations create an environment conducive to innovation. Sharing knowledge helps employees view problems from different perspectives, fostering creative solutions. Even during the COVID-19 pandemic, employees felt supported by colleagues and superiors, which helped them develop new ideas and services.

This aligns with Amabile et al. (2008), who found that knowledge sharing boosts creativity and innovation. Wang & Noe (2010) noted that knowledge sharing increases creativity through intrinsic motivation. Studies by Mura et al. (2013), Wang et al. (2017), and Chunling Zhu (2017) confirmed that knowledge sharing facilitates the development of innovative ideas. Akhavan et al. (2015) and Abukhait et al. (2019) also demonstrated a positive impact of knowledge sharing on innovative behavior. However, Resta et al. (2021) found that excessive knowledge sharing can cause information overload, hindering innovation. Al-Dajani et al. (2023) added that over-sharing knowledge may lead to the loss of competitive advantage.

Knowledge sharing is crucial for enhancing innovative behavior within organizations. In the Dinas Kesehatan Sumatera Selatan and Hospitals, it was found that knowledge sharing amplifies the effect of job design on innovative behavior. The higher the job design, the more innovative the employees become, thanks to effective knowledge sharing. This supports Almulhim (2020), who found that knowledge sharing boosts confidence and encourages creative solutions in challenging situations. Gerlach et al. (2020) and Saffar and Obeidat (2020) showed that knowledge exchange strengthens employee learning and increases involvement in innovative activities. Montani & Staglianò (2021) found that knowledge sharing improves innovative performance and reduces stress, particularly during the COVID-19 pandemic, by facilitating creative problem-solving and identifying new opportunities.

CONCLUSION

Job design directly impacts employees' intrinsic motivation, especially in the context of the COVID-19 pandemic, which has introduced unprecedented challenges to the workplace. In

South Sumatra, provincial health offices and provincial hospitals have become essential, and adaptive job designs, such as flexible scheduling and granting autonomy to healthcare workers, have become crucial. During the pandemic, increased work pressure necessitated job designs that support the balance between work and personal life, thus enhancing intrinsic motivation. Moreover, job design significantly influences innovative behavior among healthcare workers, a vital aspect in responding to the COVID-19 pandemic. Job design elements such as autonomy, task variety, and developmental opportunities empower healthcare workers to innovate in developing healthcare protocols or utilizing resources efficiently in hospitals. In this context, intrinsic motivation serves as a critical mediator that strengthens the relationship between job design and innovative behavior. Additionally, knowledge sharing has emerged as a crucial factor during the pandemic. This process allows healthcare workers in provincial hospitals and Dinas Kesehatan to exchange experiences, medical information, and best practices for managing COVID-19 patients, thereby enhancing their innovative capabilities.

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