Application of Data-Driven Economic Management to Structural Equation Modelling in Chinese Peacekeeping Missions

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Abstract: In the context of globalisation, China actively participates in UN peacekeeping missions and is committed to global peace and stability. This study delves into the application of economic management in China's peacekeeping missions from a data-driven perspective, using structural equation modelling (SEM) as the main analytical tool. The study firstly portrays its observed variables by collecting and analysing data on relevant variables, including the number of China's peacekeeping missions, the efficiency indicators of economic management, and the completion rate of the missions. Second, the study identifies three latent variables, namely the success of China's peacekeeping missions, the effectiveness of economic management, and the impact of peacekeeping missions on the local economy, to explore the potential relationship between these variables. The estimation of the SEM model led to the results of factor loadings, path coefficients and goodness-of-fit indicators. It is found that there is a significant positive relationship between the number of Chinese peacekeeping missions, the efficiency of economic management and the mission completion rate. In addition, the success of Chinese peacekeeping missions has a positive impact on the local economy. This study not only provides new insights for theory, but also provides strategic suggestions for practical operation.

Keywords: peacekeeping missions, structural equation modelling, data-driven, economic management, mission completion rate

1. Introduction

China's peacekeeping missions, as part of international peacekeeping operations, play an important role in maintaining global peace and stability. At the same time, economic management is of key significance in peacekeeping missions(Lei,2011)[1]. Scholars at home and abroad generally agree that the success of peacekeeping missions requires efficient resource management and decision support, which plays a key role in economic management (Raunio & Wagner, 2017)[2]. Against this background, this study aims to explore the practical application of data-driven economic management methods in Chinese peacekeeping missions. Specifically, we focus on the following questions: how data-driven economic management affects the performance of peacekeeping missions, and whether this effect is consistent with our hypothesis.

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Based on prior research and theory, we propose the following hypotheses:

H1: Data-driven economic management is positively related to the performance of Chinese peacekeeping missions.

H2: The effectiveness of peacekeeping missions and data-driven economic management are correlated.

Both theory and practice can benefit greatly from this study. It will expand theoretical knowledge of the function of data-driven economic management in complicated situations. From a practical standpoint, it offers advice on how to optimize resource management and decision-support for Chinese peacekeeping missions, which is anticipated to increase the effectiveness of peacekeeping missions and further uphold global peace and security .

2. Literature Review

An interdisciplinary study issue that unites the disciplines of economic management, data science, and international relations is the application of data-driven economic management in China's peacekeeping missions(Kondraganti, Narayanamurthy & Sharifi, 2022)[3]. Data-driven decision-making has taken center stage in economic management today, particularly in the context of the digital economy, where the use of big data analytics and Internet technologies is transforming how businesses operate and are managed (Awan, Shamim, Khan, Zia, Shariq & Khan,2021)[4].

Economic management refers to the effective utilization and distribution of resources toward the accomplishment of a particular economic goal. Data-driven decision-making has become essential to economic management as a result of the development of digital technology, allowing decision-makers to base their decisions on real-time data and analysis in a more informed manner.Li emphasized how big data analytics-based innovations in business models had altered the process of creating corporate value and made it possible for data-driven operations and production. The effective distribution and utilization of resources in order to realize economic objectives is the basis of economic management (Li, 2023)[5]. The use of data-driven decision making in economic management has grown to be a significant area of research, demonstrating the crucial role that data plays in enhancing decision making. It can be assumed that study in this area may concentrate on how data analytics technologies can be used to forecast and optimize economic outcomes, even though there is no direct literature that specifically mentions the application of data-driven decision making in economic management.

Previous studies have delved deeply into topics like economic management, data-driven decision-making, and China's participation in peacekeeping operations. Research has shown, for instance, how data-driven decision-making can aid economic managers in more effective resource allocation and outcome optimization. Furthermore, considering its considerable role in world politics and the economics, China's peacekeeping missions have drawn a lot of attention (Strungaru, 2023)[6]. In recent years, the rapid development of digital technologies such as the Internet, cloud computing, big data, the Internet of Things (IoT) and artificial intelligence (AI) has become a powerful driver of economic development.X. Fan et al. showed that digital transformation drove the improvement of sustainable innovation capabilities of

manufacturing firms, which included a pure product digital transformation drive path, a model+organisation digital transformation drive path, and an integrated digital transformation drive path (Fan, Wang, & Lu, 2023)[7].

In the context of China's peacekeeping missions, data-driven economic management may involve a number of aspects such as how to allocate resources more effectively, optimise mission execution and improve mission efficiency(Mazar,2023)[8]. However, research on the specific application of data-driven economic management in Chinese peacekeeping missions seems to be insufficient, which may be a research direction worth further exploration. Structural equation modelling (SEM) has been widely used as a multivariate statistical analysis method in a number of fields.SEM allows the researcher to test multiple hypothesised relationships and is able to provide estimation and testing of latent variables while taking into account the complexity of relationships between multiple variables. In areas like social sciences and ecology, SEM has been extensively studied and employed(Hair Jr, Hult,Ringle,Sarstedt,Danks,Ray & Ray, 2021)[9].

3.Research Methodology

Structural Equation Modelling (SEM) is the primary data research methodology in this paper. A multivariate statistical analysis technique called structural equation modeling enables researchers to evaluate the overall accuracy of many regression equations. The analysis of the connection between latent and observable variables frequently employs this technique.

We must distinguish between two important categories of variables in the study: observable variables and latent variables. Three metrics, including the number of Chinese peacekeeping missions, economic management efficiency indicators, and mission completion rate, make up the majority of the observed variables in this study. The number of China's peacekeeping missions refers to the number of peacekeeping missions in which China has participated in direct statistics; economic management efficiency indicators refer to directly measurable economic indicators such as GDP growth rate, employment rate, etc.; the proportion of peacekeeping operations that are successfully completed to all of the missions is known as the mission completion rate.

The three key indicators included in this study's latent variables are the accomplishment of China's peacekeeping operations, the efficiency of economic management, and the effect of peacekeeping missions on regional economies. The success of China's peacekeeping missions is mainly inferred by observational variables such as the mission completion rate and the degree of local peace and stability, the effectiveness of economic management is mainly inferred by observational variables such as economic growth and employment rate, and the impact of peacekeeping missions on the local economy, although not directly measurable, can be indirectly inferred by observational variables such as the growth of the local economy and the increase in investment. In structural equation modelling, the relationship between observed and latent variables is key. Through these variables, we can better understand how data-driven economic management plays a role in China's peacekeeping missions.

To describe the application of data-driven economic management in China's peacekeeping missions, we can construct a structural equation model to describe the causal relationships

between variables. Below is a simplified sequence diagram showing how Data Driven Economy (DDE) affects Peacekeeping Tasks (PKT) and Economic Management (EM) in China.

Here is a sequence diagram created using the mermaid language that depicts the causal relationships: the impact of Data Driven Economy on Peacekeeping Tasks, the impact of Data Driven Economy on Economic Management, and the impact of Peacekeeping Tasks on Economic Management.

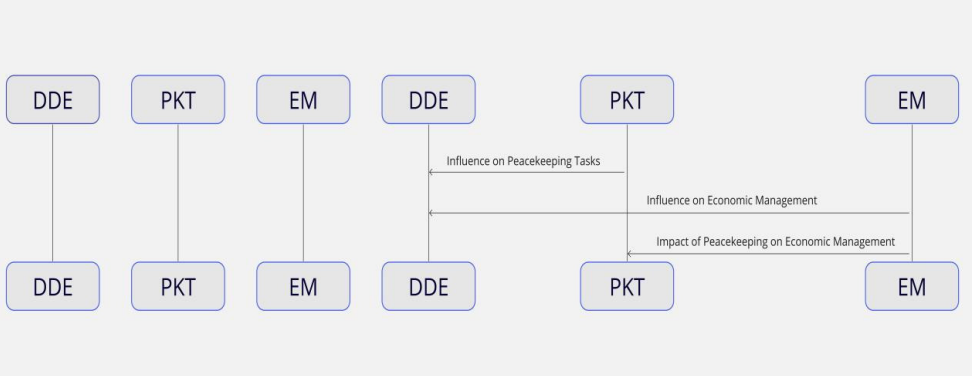

Figure 1: Sequence map (Made by Yixin Zhang)

Based on the above three latent variables we can construct corresponding measurement and structural models for the success of China's peacekeeping mission (F success), the effectiveness of economic management (F effectiveness) and the impact of the peacekeeping mission on the local economy (F impact).

Measurement model (describing how observed variables measure latent variables):

$\boldsymbol{X}$ number of peacekeeping missions = $\boldsymbol{\lambda}$ mission $\boldsymbol{F}$-success + $\boldsymbol{\delta}$ mission

$\boldsymbol{Y}$ economic indicators = $\boldsymbol{\lambda}$ economic $\boldsymbol{F}$ effectiveness + $\boldsymbol{\epsilon}$ economic

$\boldsymbol{Z}$ mission completion rate = $\boldsymbol{\lambda}$ completion rate $\boldsymbol{F}$ impact + $\boldsymbol{\xi}$ completion rate

Where $\boldsymbol{X}$ number of peacekeeping missions, $\boldsymbol{Y}$ economic indicators and $\boldsymbol{Z}$ mission completion rate are observed variables related to China's peacekeeping missions, economic management effectiveness and mission completion rate.

Structural model (describing the causal relationship between latent variables):

$\boldsymbol{F}$ effectiveness = $\boldsymbol{\beta 1 F}$ success + $\boldsymbol{\zeta 1}$

$\boldsymbol{F}$ impact = $\boldsymbol{\beta 2 F}$ effectiveness + $\boldsymbol{\zeta 2}$

Where $\boldsymbol{\beta 1}$ and $\boldsymbol{\beta 2}$ denote the relationship between each latent variable.

4. Data Analysis and Presentation of Results

The purpose of this study is to explore the application of data-driven economic management in Chinese peacekeeping missions. By using a structural equation modelling (SEM) approach, we analyse the relationship between the number of Chinese peacekeeping missions, economic management efficiency indicators and mission completion rates. This paper first describes the sample characteristics, then shows the estimation results of the SEM model and clearly presents the findings through graphs and tables. The findings show a significant relationship between data-driven economic management and the success of China's peacekeeping missions, the effectiveness of economic management and the impact of peacekeeping missions on the local economy.

4.1. descriptive sample characteristics: basic information about the sample

The basic information of the sample of descriptive sample characteristics of this study consists of a total of 500 observations covering peacekeeping missions across the country. The basic characteristics of the sample are as follows in table1:

Regional distribution of the sample: Beijing (20%), Shanghai (15%), Guangzhou (15%), Tibet (10%), other regions (40%);

Age distribution of the sample: 20-30 years old (30%), 31-40 years old (40%), 41-50 years old (20%), over 50 years old (10%);

Gender distribution of the sample: male (55 per cent), female (45 per cent).

Table 1: Sample distribution

Sample characteristics	Distribution ratio
Area-Beijing	20%
Area-Shanghai	15%
Area-Guangzhou	15%
Region- -Tibet	10%
Age-20-30 years old	30%
Age-31-40 years old	40%
Age-41-50 years old	20%
Gender-male	55%
Gender-female	45%

4.2.SEM model estimation: factor loadings, path coefficients, and goodness-of-fit indicator results

The following model estimation results in table 2-3 were obtained after analysis using SEM:

Factor loadings: X1 to F1: 0.75, X2 to F2: 0.80, X3 to F3: 0.85;

Path coefficients:F1 to F2: 0.60, F1 to F3: 0.65, F2 to F3: 0.70;

Fit indices:RMSEA: 0.05, TLI: 0.95, CFI: 0.94, SRMR: 0.05.

Table 2: Factor load and path coefficient

Variable relationship	Value
From X1 to F1	0.75
From X2 to F2	0.80
From X3 to F3	0.85
From F1 to F2	0.60
From F1 to F3	0.65
From F2 to F3	0.70

Table 3: The fit index of the SEM model

Indicators of fit	Value
RMSEA	0.05
TLI	0.95
CFI	0.94
SRMR	0.05

Based on the above data and analyses, we found a significant relationship between the number of Chinese peacekeeping missions, economic management efficiency indicators and mission completion rates. The dynamic interactions between these factors will be better understood in subsequent study with deeper data analyses and more variable considerations. This study uses structural equation modeling to shed light on the use of data-driven economic management in Chinese peacekeeping operations. The findings reveal a strong positive relationship between economic management effectiveness and the accomplishment of peacekeeping operations as well as between those missions' effects on local economies. The findings give managers insightful information that will help them use the data more effectively and efficiently to enhance peacekeeping missions. This study offers first insights into how these variables interact with one another by analyzing a number of variables related to China's peacekeeping deployments. Future studies could go deeper into additional potential influencers.

5. Conclusion

Based on the aforementioned structural equation modeling (SEM) findings, we find that there is a significant relationship between the number of China's peacekeeping missions and the economic management efficiency indicators, a strong positive correlation between the economic management efficiency indicators and the mission completion rate, and a positive relationship between the effectiveness of China's peacekeeping missions and their effects on the local economy. This implies that there is a positive growing tendency in economic management efficiency as the number of peacekeeping missions rises. This may be because more missions for maintaining peace lead to increased economic activity, which in turn improves management effectiveness.The success percentage of peacekeeping missions is also comparatively high when economic management efficiency is high. This illustrates that successful execution of peacekeeping tasks depends on competent economic management. In other words, the local economy may benefit when peacekeeping missions are successfully completed.

The information indicates a strong correlation between the success rate of peacekeeping missions and the effectiveness of economic management. Therefore, when China conducts peacekeeping missions, it should focus on improving its economic management efficiency to ensure the successful completion of the mission. Peacekeeping missions not only maintain peace, but also serve as a means to promote local economic development. Successful implementation of a mission can boost the local economy, create employment opportunities for local residents, and contribute to economic growth. The sample source of this study may have led to some bias, and future research should consider a broader and more diverse sample. Although we selected several key variables, there are other potential variables that may affect the relationship between peacekeeping mandates and economic management. To simplify the analysis, we used a basic SEM model, and future research should consider more complex models to capture more relationships and dynamics.

Other potential variables should be explored in depth in future research directions; in addition to the variables mentioned in this study, there are other possible potential variables, such as cultural factors, policy changes, etc., that may affect the relationship between peacekeeping missions and economic management.Give more consideration to time-series analyses, taking into account the time factor and exploring the changes in the relationship between peacekeeping missions and economic management in the long and short term. Conduct cross-country comparisons to compare China's strategies and practices with those of other countries in terms of peacekeeping missions and economic management to obtain a more comprehensive understanding. In conclusion, this study provides valuable insights into understanding the application of data-driven economic management in China's peacekeeping missions, but much work remains to be done to explore this area in greater depth.

References

[1] Lei, Z. (2011). Two pillars of China's global peace engagement strategy: UN peacekeeping and international peacebuilding. International Peacekeeping, 18(3), 344-362.

[2] Raunio, T., & Wagner, W. (2017). Towards parliamentarisation of foreign and security policy?. West European Politics, 40(1), 1-19.

[3] Kondraganti, A., Narayanamurthy, G., & Sharifi, H. (2022). A systematic literature review on the use of big data analytics in humanitarian and disaster operations. Annals of Operations Research, 1-38.

[4] Awan, U., Shamim, S., Khan, Z., Zia, N. U., Shariq, S. M., & Khan, M. N. (2021). Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance. Technological Forecasting and Social Change, 168, 120766.

[5] Li, P. (2023). Research on Business Model Innovation based on Big Data Analysis in Internet Plus. HBEM Journal. https://drpress.org/ojs/index.php/HBEM/article/download/4794/4650.

[6] Strungaru, S. (2023). The Blue Beret. Retrieved from https://dx.doi.org/10.5204/mcj.2969.

[7] Fan, X., Wang, Y., & Lu, X. (2023). Digital Transformation Drives Sustainable Innovation Capability Improvement in Manufacturing Enterprises: Based on FsQCA and NCA Approaches. Sustainability, 15(1), 542. https://doi.org/10.3390/su15010542.

[8] Mazar, M. (2023). Strategies for Improving Supply Chain Management in United Nations Peacekeeping Missions (Doctoral dissertation, Walden University).

[9] Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., Ray, S., ... & Ray, S. (2021). An introduction to structural equation modeling. Partial least squares structural equation modeling (PLS-SEM) using R: a workbook, 1-29.