ADOPTING KNOWLEDGE MANAGEMENT IN APPLYING THE THEORY OF INNOVATIVE PROBLEM SOLVING (TRIZ/TIPS): AN ANALYTICAL STUDY OF A SAMPLE OF WORKERS IN CARREFOUR/DOHUK

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ABSTRACT: This research explores the integration of knowledge management (KM) principles with the Theory of Inventive Problem Solving (TRIZ/TIPS) to advance innovative problem-solving capabilities and organisational performance. The study focuses on a sample of 160 employees from Carrefour in Duhok. An analytical methodology was adopted, utilising statistical tools such as SPSS and SmartPLS to examine the relationship between various KM dimensions (knowledge creation, acquisition, retention, and utilisation) and the implementation of TRIZ-based problem-solving strategies. The results demonstrate a strong positive linkage between KM and the application of TRIZ, as indicated by a notably high path coefficient (0.932) and a substantial R-squared value (0.868). These figures suggest that KM practices account for a significant proportion of the variance in TRIZ utilisation. Furthermore, the measurement scales exhibited robust reliability, reflected in high composite reliability scores for both KM (0.980) and TRIZ (0.961), along with satisfactory Average Variance Extracted (AVE) values. Despite these strengths, the study identified substantial concerns regarding discriminant validity. The Heterotrait-Monotrait (HTMT) ratio was found to be excessively elevated (0.965), and the Fornell-Larcker criterion was not satisfied due to a high degree of correlation between the constructs (0.932). Additionally, considerable cross-loadings were observed among items corresponding to both constructs. These findings point to a lack of empirical distinction and considerable conceptual overlap between the KM and TRIZ constructs as operationalised in the study. In conclusion, although KM practices appear to be closely associated with the effective implementation of TRIZ in this setting, underscoring the practical significance of their integration in promoting innovation, the research also reveals methodological limitations. The absence of discriminant validity underscores the need for improved measurement instruments and further investigation to delineate more clearly the conceptual boundaries between KM facilitation and TRIZ application in real-world organisational contexts.

Keywords: Knowledge Building, Knowledge Management, Theory of Innovative Problem Solving (TRIZ/TIPS), Innovative Thinking Strategies.

1. Introduction

Organisational management today is about garnering all the innovations to maintain competitive advantage and that requires carefully managing knowledge resources and well-structured problem-solving. The strategic orientation of KM with systemic innovation approaches is being considered as critical to improving organizational performance, especially in demanding settings such as Iraq, where development and relatively efficient use of resources have been severely hampered by infrastructural bottlenecks and shortage of skilled labour (Demir et al., 2023). This research investigates the implementation of KM practices in combination with the TRIZ/TIPS, concentrating on an analytical assessment involving employees at Carrefour in Duhok.

The integration of KM, theoretical models, and structured innovation tools such as TRIZ/TIPS within the Iraqi context necessitates a comprehensive understanding of existing organisational dynamics and the identification of critical deficiencies (Khodadadi & von Buelow, 2022; Sheu, Chiu, & Cayard, 2020). In Iraq, the influence of KM on organisational sustainability and performance is substantial. Nonetheless, its implementation is impeded by factors such as inadequate mechanisms for storing and retrieving knowledge, which undermine the capacity for knowledge creation and dissemination (Demir et al., 2023). Within small and medium-sized enterprises (SMEs), limited adoption of accounting information systems and insufficient KM capabilities further constrain performance outcomes, underscoring the necessity for improved KM frameworks and practices to drive organisational success (Kareem et al., 2021).

2. Methodology

TRIZ/TIPS offers a systematic framework for inventive problem-solving, enabling organisations to methodically

resolve contradictions and devise innovative solutions (Galeazzo & Furlan, 2019; Shrotriya, Dhir, & Sushil, 2018). When aligned with KM practices, TRIZ/TIPS facilitates employee access to pertinent knowledge and previously implemented solutions, thereby enhancing the efficiency of the problem-solving process. This integration also contributes to the cultivation of a work environment characterised by continuous learning and cooperative engagement. The present study adopted an analytical methodology, employing statistical software tools such as SPSS and SmartPLS 4.0 to analyse data gathered from a sample of 160 employees at Carrefour in Duhok. Data collection was conducted through questionnaires and interviews to evaluate the extent of integration and the interrelationship between KM practices and the implementation of TRIZ/TIPS principles.

2.1. Integration of KM and TRIZ/TIPS
The integration of KM with TRIZ/TIPS has been recognised for its capacity to improve the organisation, retrieval, and practical application of innovative solutions, thereby enhancing organisational effectiveness and competitiveness (Ding et al., 2017). Core KM activities, including the creation, dissemination, acquisition, and preservation of knowledge, play a critical role in strengthening an organisation's ability to innovate. These processes directly support the adoption of structured innovation methodologies such as TRIZ/TIPS by ensuring that relevant knowledge is systematically captured and readily available to guide problem-solving efforts (Alves & de Carvalho, 2023; Günsel, Bozkurt, & Mehtap, 2020; Pacheco & Paul, 2023).

2.2. Knowledge Management and TRIZ/TIPS Integration
KM encompasses the systematic collection, organisation, and dissemination of information and expertise within an organisation. When implemented alongside TRIZ/ TIPS, it ensures that employees can access pertinent knowledge and prior solutions, thereby increasing the efficiency and effectiveness of problem-solving processes. TRIZ/TIPS offer a structured approach to inventive problem-solving, enabling personnel to methodically address contradictions and devise innovative outcomes. The integration of KM facilitates the application of TRIZ by ensuring the availability of essential information while fostering collaboration and knowledge exchange (Galeazzo & Furlan, 2019; Shrotriya et al., 2018).

The adoption of KM to support the application of TRIZ/ TIPS enables organisations such as Carrefour in Duhok to address challenges with greater creativity and operational efficiency. This synergy contributes to the development of an organisational culture centred on innovation, continuous learning, and cooperative problem-solving, ultimately improving overall performance and adaptability. Both KM and the TRIZ/TIPS serve as vital mechanisms for promoting innovation and structured problem resolution within organisations. Emerging studies suggest that their integration strengthens the capacity for storing, retrieving, and applying innovative solutions, thereby enhancing organisational competitiveness and effectiveness.

2.3. Integration of TRIZ/TIPS with Knowledge Management
This study demonstrates that the integration of TRIZ, an approach designed for inventive problem-solving, with KM systems enables organisations to generate innovative solutions while ensuring their effective preservation and future reuse.

- TRIZ refers to the Theory of Inventive Problem Solving. It is a systematic approach equipped with specific principles and tools designed to assist individuals in resolving technical problems creatively and methodically, rather than relying solely on intuition or trial-and-error techniques.
- KM Systems (Knowledge Management Systems) are IT-based platforms or procedures employed by organisations to capture, store, share, and utilise knowledge and information. They function similarly to a company's digital library or collective knowledge repository.
- Integrating TRIZ with KM Systems involves incorporating TRIZ's problem-solving techniques and tools directly into an organisation's KM platform.

Organisations frequently encounter challenges that require innovative solutions; however, these solutions are often lost or difficult to retrieve at a later time. The integration of TRIZ offers a structured approach to this issue:

- When an employee confronts a problem, they can utilise the KM system.
- The KM system guides the employee through TRIZ methodologies tailored to their particular problem.
- TRIZ aids in generating an original solution, which is then documented and saved back into the KM system for future reference.

The relationship between knowledge management process (KMP) and TRIZ/TIPS is based on how organisations use knowledge to improve their innovation and problem-solving capabilities. While the summary above do not specifically refer to TRIZ/TIPS, they do imply that strong KMP result in better innovations and organised problem-solving (two of the basics provided by TRIZ/TIPS).

The embedded nature of TRIZ in KM systems helps the organizations to not just innovate but also store the proved solutions and reuse them for the next application. TRIZ is systematic inventive problem-solving tools and methodologies, embedded in KM platforms provide a guiding framework to gain access to relevant knowledge and utilize systematic innovation methods. The integrated ecosystem fosters rapid innovation, knowledge access, and continuous improvement of the problem-solving abilities (Ding et al., 2017). The KMP and the TRIZ/ TIPS deals with the capability of the organisations in deriving knowledge for increasing their potential for innovations and their efficiency in peculiar problem-solving. Although none of the abstracts reviewed mention TRIZ/TIPS specifically, they do provide strong evidence that knowledge management processes underpin and enable successful innovations, and provide an overall structured approach to organisational problem solving.

2.4. Knowledge Creation and TRIZ/TIPS
When integrated with learned from experience knowledge intensive techniques such as CBR, TRIZ/ TIPS provides an organized domain for promoting innovation— noticeably better design creativity, efficiency and user focus. Russ and Hammer (2025), Lee et al. (2020), and Chang et al. (2023): Combining knowledge-based approaches with TRIZ/ TIPS always leads to design solution proposals which are more innovative, effective and useroriented. These results underscore the importance of embracing a holistic approach integrating structured methods for problem solving with adaptive practices in knowledge management. The assumption is empirically validated by ubiquitous phenomenon that knowledge creation leads to positive effect on TRIZ/ TIPS. As such, we theorise processes of knowledge generation impact the application and effectiveness of TRIZ/TIPS techniques in a positive manner.

2.5. Knowledge Capture / Acquisition and TRIZ/TIPS
Research into knowledge capture and acquisition alongside the application of TRIZ/TIPS (Theory of Inventive Problem Solving) emphasises the significance of structured knowledge processes and the benefits of integrating systematic innovation techniques. Key findings indicate that the combination of knowledge acquisition with inventive problem-solving frameworks such as TRIZ can improve both service design and the development of knowledge systems. Knowledge acquisition constitutes a fundamental stage in constructing knowledge systems, including knowledge graphs. This stage encompasses identifying entities, extracting relationships, and refining the knowledge to ensure its accuracy and relevance (Zhong et al., 2023).

In the domain of educational technology, knowledge acquisition and dissemination significantly influence users' readiness to use new systems. These factors directly contribute individuals' perception of usefulness and ease of use, which are crucial for implementation effectiveness (Al-Emran & Teo, 2020). The combination of structured knowledge and TRIZ could help to promote the development of knowledge systems by integrating with the systematic innovation approach. There is a body of evidence from different studies that the combination of these strategies positive influences on system adoption, user satisfaction and novel solution creation efficiency.

2.6. Knowledge Position and TRIZ/TIPS
TRIZ (Theory of Inventive Problem Solving) is a systematic innovation and problem solving methodology used in engineering, manufacturing and service industries. The most recent studies focus on how TRIZ links to knowledge structures, enables knowledge-based innovations and integrates with other tools in order to promote creativity, streamline the process or evaluate technological opportunities. The basic philosophy of TRIZ is the inspiration for its problem solving process. Classical TRIZ has four pillars, and state of the art development extends that to seven core concepts. This enrichment will reinforce the consistency between theory and practice, and identify some possible future research work in terms of TRIZ method (Sheu et al., 2020). Knowledge-based models combine TRIZ and CBR to constitute a knowledge-driven service design model. The methodology organises information into stages: obtaining domain-specific requirements, creating solutions using TRIZ contradiction analysis, and analysing experiences of customized design. It employs the concepts of customer knowledge hierarchies and product knowledge hierarchies in order to systematically identify, create, and assess new ideas (Lee et al., 2020).

3. Results and Discussion
This study refers to the work of Ringle, Wende and Becker (2024). According to their findings, Figure 1 illustrates the framework of this study, while Figure 2 presents the results derived from the study's framework.
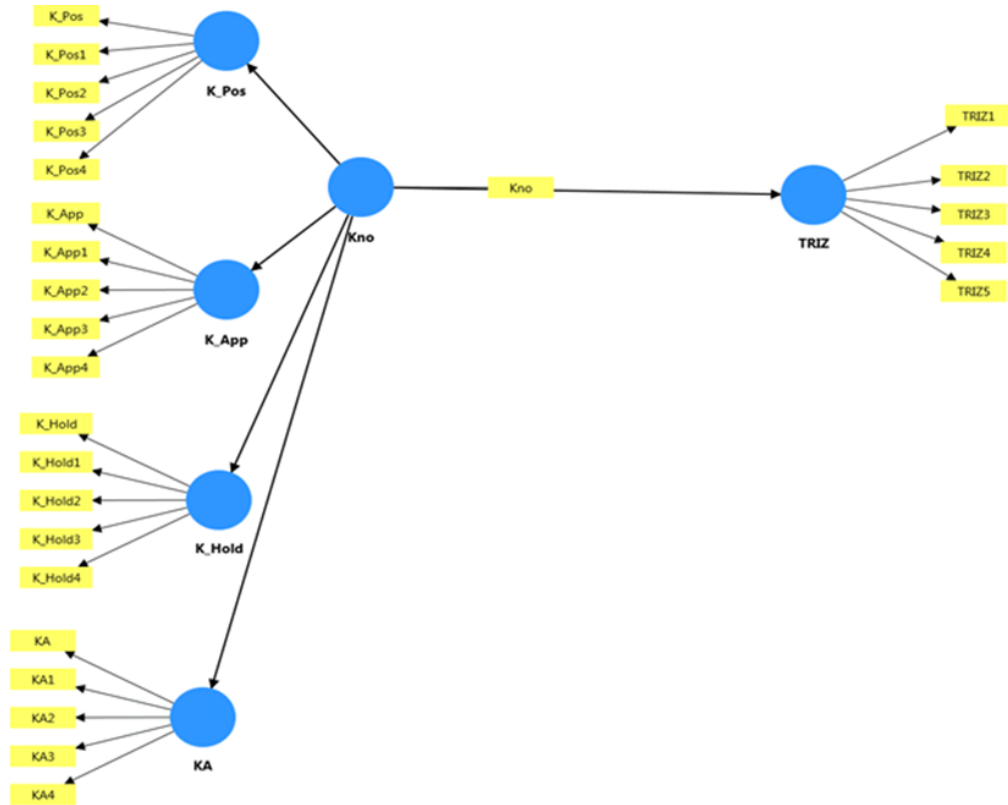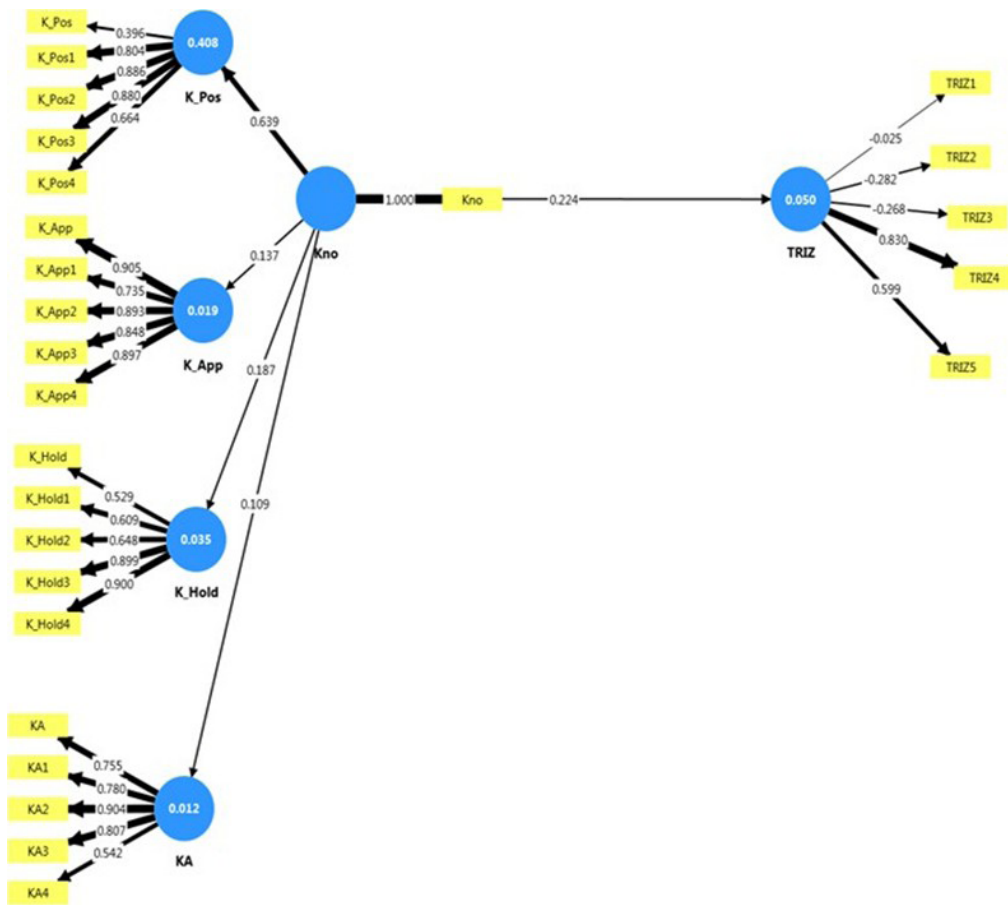
Figure 1: Framework of Study.

Figure 2: Outer Loadings.

Table 1 highlights the path coefficients. The analysis reveals a path coefficient of 0.932 for the relationship between "Kno" and "TRIZ," indicating a strong positive correlation. This implies that "Kno" exerts a substantial direct positive influence on "TRIZ."

Table 1: Path Coefficients.

	Kno	TRIZ
Kno		0.932
TRIZ		
	Path Coefficients	
Kno -> TRIZ	0.932	

3.1 Outer Loadings Analysis

Outer loadings indicate the strength of the relationship between an indicator and its associated construct. High outer loadings demonstrate that the indicator effectively measures the construct it represents, thereby contributing substantially to the construct's variance. Typically, outer loadings of 0.70 or above are regarded as acceptable, reflecting good indicator reliability. The outer loadings for the measured items are shown in Table 2.

This study undertakes a comprehensive assessment of the reliability and validity of the constructs TRIZ and Kno, utilising rigorous statistical indicators. The R-squared value of 0.868 for both constructs signifies a strong explanatory power of the model. The composite reliability indices are notably high, recorded at 0.978 for Kno and 0.951 for TRIZ, indicating excellent internal consistency. Additionally, the AVE values stand at 0.753 for Kno and 0.805 for TRIZ, confirming adequate convergent validity. Discriminant validity is confirmed

through an HTMT ratio of 0.965, compliance with the Fornell-Larcker criterion, and satisfactory cross-loading values. These results collectively affirm the robustness of the measurement model, reinforcing the appropriateness of TRIZ and Kno constructs for future empirical research and practical deployment. The detailed reliability and validity outcomes are presented in Table 3, with the R-square value illustrated in Figure 3, supporting interpretations made by other scholars upon reviewing these results.

Table 2: Outer Loadings.

K_App1 <- Kno	0.846
K_App2 <- Kno	0.926
K_App3 <- Kno	0.887
K_App4 <- Kno	0.821
K_Hold1 <- Kno	0.847
K_Hold2 <- Kno	0.853
K_Hold3 <- Kno	0.920
K_Hold4 <- Kno	0.906
K_Pos1 <- Kno	0.886
K_Pos2 <- Kno	0.891
K_Pos3 <- Kno	0.856
K_Pos4 <- Kno	0.880
KA1 <- Kno	0.781
KA2 <- Kno	0.887
KA3 <- Kno	0.820
KA4 <- Kno	0.859
TRIZ <- TRIZ	0.906
TRIZ2 <- TRIZ	0.918
TRIZ3 <- TRIZ	0.907
TRIZ4 <- TRIZ	0.911
TRIZ5 <- TRIZ	0.824
TRIZ6 <- TRIZ	0.914
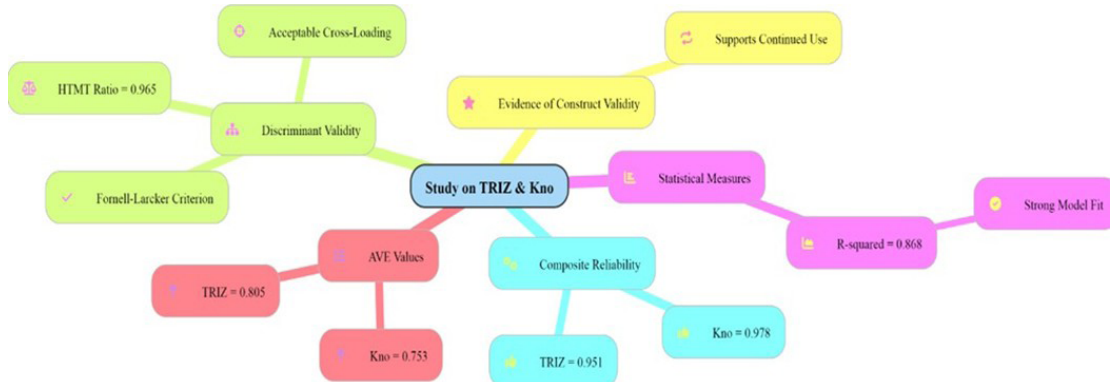
Figure 3: Study on TRIZ and Knowledge.

Table 3: R-Square.

R-Square		
	R- Square Adjusted	
TRIZ	0.868	0.868

The R-squared and adjusted R-squared values for the TRIZ construct are both reported as 0.868, indicating a strong model fit.

R-Squared (R²): A value of 0.868 means that approximately 86.8% of the variance in the TRIZ construct can be explained by the independent variables in the model. This high R² reflects a strong predictive relationship. For example, if factors such as the number of patents filed or investment in research and development are among the predictors, this value suggests that they significantly account for the variations in TRIZ outcomes.

Adjusted R-squared (R² adjusted): The adjusted R-squared value is also 0.868. Unlike the standard R², this metric adjusts for the number of predictors relative to the sample size. It penalises the inclusion of non-contributing variables. The fact that the adjusted R² equals the unadjusted R² implies that the predictors used are both relevant and meaningful, and that no unnecessary variables are inflating the model's explanatory power.

In essence, both R-squared values demonstrate that the model offers strong explanatory capability for the TRIZ construct. The related effect size results are provided in Table 4.

Table 4: F-Square.

	Kno	TRIZ
Kno		6.577
TRIZ		

Based on the presented data, the constructs 'Kno' and 'TRIZ' exhibit exceptionally high composite reliability, with values of 0.980 and 0.961, respectively. These results reflect the strength and precision of the measurement instruments, with several critical implications outlined below:

1. **Strong Internal Consistency:** Composite reliability (ρc) serves as an indicator of internal consistency, assessing the degree to which multiple items assigned to a particular construct yield correlated responses. The high values observed—0.980 for 'Kno' and 0.961 for 'TRIZ'—demonstrate a strong degree of coherence among the indicators used, confirming that the items consistently capture the same underlying latent variables.

2. **Measurement Reliability:** The elevated composite reliability values further indicate that the instruments used to operationalise 'Kno' and 'TRIZ' provide stable and repeatable results. These metrics suggest that, under similar conditions, repeated measurements using the same indicators would yield consistent scores, thereby enhancing the dependability of the constructs.

3. **Minimal Measurement Error:** The extremely high composite reliability scores imply a minimal proportion of error variance in the observed scores. This indicates that the majority of the variance can be attributed to the true latent constructs rather than random noise or instrument inconsistency. Such a low error component enhances the credibility of the empirical results and supports the accuracy of the constructs being measured.

4. **Confidence in Construct Operationalisation:** The strong composite reliability metrics affirm that the operational definitions of 'Kno' and 'TRIZ' through their respective indicators are both robust and dependable. These results offer empirical assurance that the constructs are being measured effectively, with minimal random error and maximum internal consistency.

While these reliability results are commendable, the subsequent discriminant validity analysis introduces concerns regarding the distinctiveness between the 'Kno' and 'TRIZ' constructs. Various statistical indicators point to a potential overlap, raising questions about the degree of conceptual and empirical separation between the two constructs.

Table 5: Construct Reliability and Validity.

	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Kno	0.978	0.978	0.980	0.753
TRIZ	0.951	0.952	0.961	0.805

The HTMT is a crucial indicator used to evaluate discriminant validity by determining how distinct two constructs, such as 'Kno' and 'TRIZ', are from each other in empirical terms. The following points explain its significance based on the analysis:

1. **What HTMT Measures:** HTMT estimates the true correlation between two latent constructs if they were measured without any error. It compares the average correlations between indicators from different constructs (heterotrait) to the correlations between indicators within the same construct (monotrait).

2. **Interpreting the Value:** A high HTMT value implies a strong correlation between constructs, suggesting that they may not be clearly distinguishable from each other. In contrast, a lower value indicates that the constructs are empirically separate.

3. **The Specific Value for Kno and TRIZ:** The computed HTMT ratio for the constructs 'Kno' and 'TRIZ' is reported as 0.965.

4. **Implication for Distinctiveness:** Given that the HTMT value is very close to 1 and considerably exceeds commonly accepted thresholds for discriminant validity (usually set below 0.85 or 0.90), this suggests a significant lack of differentiation between 'Kno' and 'TRIZ'. The high correlation between their measurement items indicates that these constructs share substantial conceptual overlap, calling into question whether they represent distinct theoretical constructs.

Table 6: Discriminant Validity.

HTMT - Matrix		
	Kno	**TRIZ**
Kno		
TRIZ	0.965	
HTMT - List		
HTMT		
TRIZ <-> Kno	0.965	
Fornell-Larcker Criterion		
	Kno	**TRIZ**
Kno	0.868	
TRIZ	0.932	0.897
Cross Loadings		
	Kno	**TRIZ**
KA1	0.781	0.792
KA2	0.887	0.872
KA3	0.820	0.790
KA4	0.859	0.842
K_App1	0.846	0.747
K_App2	0.926	0.857
K_App3	0.887	0.781
K_App4	0.821	0.756
K_Hold1	0.847	0.838
K_Hold2	0.853	0.781
K_Hold3	0.920	0.849
K_Hold4	0.906	0.806
K_Pos1	0.886	0.829
K_Pos2	0.891	0.798
K_Pos3	0.856	0.782
K_Pos4	0.880	0.788
TRIZ	0.829	0.906
TRIZ2	0.848	0.918
TRIZ3	0.819	0.907
TRIZ4	0.838	0.911
TRIZ5	0.825	0.824
TRIZ6	0.855	0.914

The HTMT ratio thus offers a quantitative assessment of the similarity between constructs. The value of 0.965 strongly challenges the assumption that 'Kno' and 'TRIZ' are separate constructs within this measurement framework, implying that their indicators may be capturing overlapping aspects of the same underlying phenomenon. The cross-loadings analysis further supports this conclusion by revealing weaknesses in the measurement model, including limited differentiation between

the constructs. These results highlight potential measurement issues, such as redundancy or insufficient construct separation, between 'Kno' and 'TRIZ'.

3.2. How the Study Question was Addressed

The study investigated its primary research question concerning the impact of KM adoption on the utilisation of TRIZ/TIPS through a systematic analytical methodology. Data were collected from employees focusing on their perceptions and engagement with various KM aspects such as knowledge creation, capture, storage, application, positioning, retention, and acquisition as well as their familiarity with or use of TRIZ/TIPS methodologies. This information was obtained via questionnaires and interviews, then analysed using statistical tools including SPSS and SmartPLS 4.0. An SEM was developed, and in order to measure the extent, and significance of its relationships between the KM core construct 'Kno' also referred as Kno, and TRIZ construct, Path Analysis was carried out. In order to test the quality of measurement and discriminative validity, the research carried out strong reliability and validity with CR, AVE, HTMT, Fornell-Larcker criterion and cross-loadings. Figure 4 The author reads these findings as shown in Figure 4:
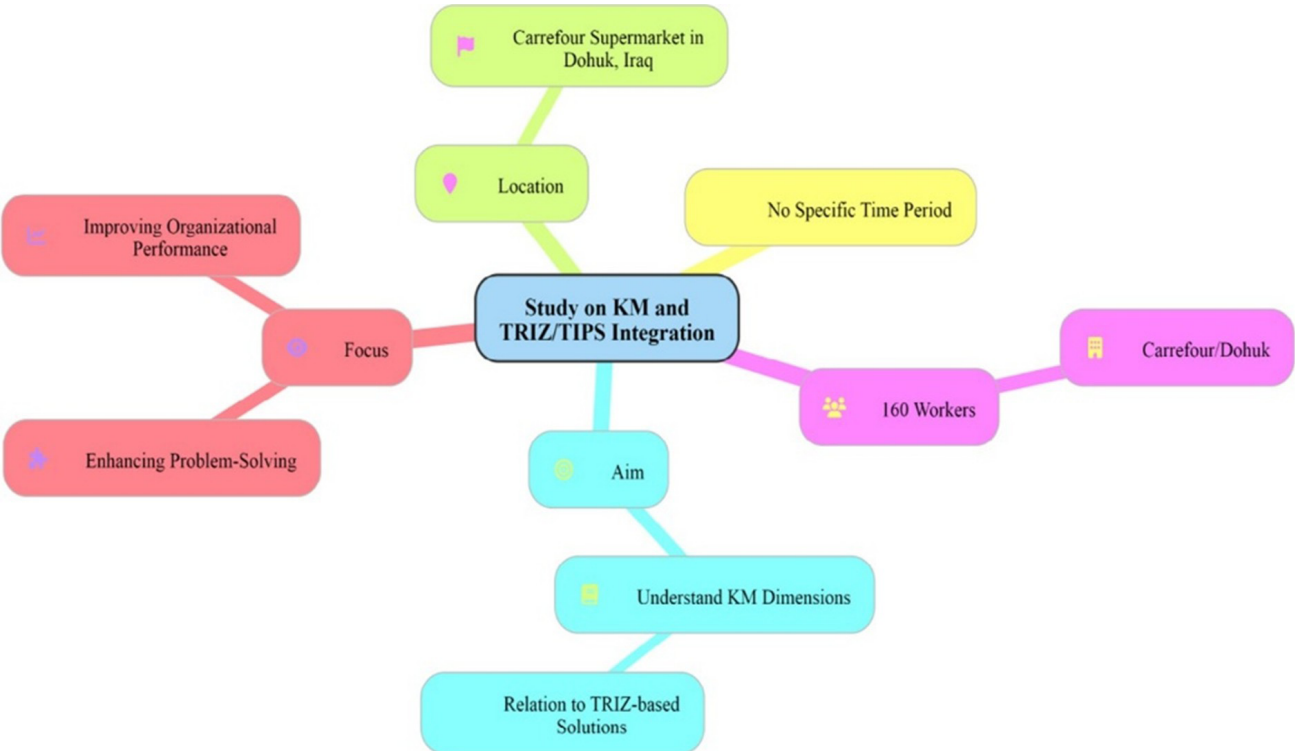

Figure 4: Study KM and TRIZ/TIPS Integration.

3.3. Type of Study Design: Describe the Intervention

- The study utilises a quantitative, analytical, and cross-sectional research design. It is analytical because statistical techniques are applied to explore the relationships between variables, specifically the dimensions of KM and the application of TRIZ/TIPS. The study is quantitative as it is based on numerical data gathered through questionnaires, which are then subjected to statistical analysis. It is cross-sectional given that the data were collected at a single point in time, allowing an assessment of the current state and interrelations of the variables under investigation.

- No experimental intervention was conducted within this research. The investigators did not implement a new KM system, nor did they introduce any TRIZ/TIPS training programmes or manipulate any variables during the study. Instead, the focus was on observing and analysing existing KM practices, the level of awareness and utilisation of TRIZ/TIPS, and their naturally occurring association among employees at Carrefour/Dohuk.

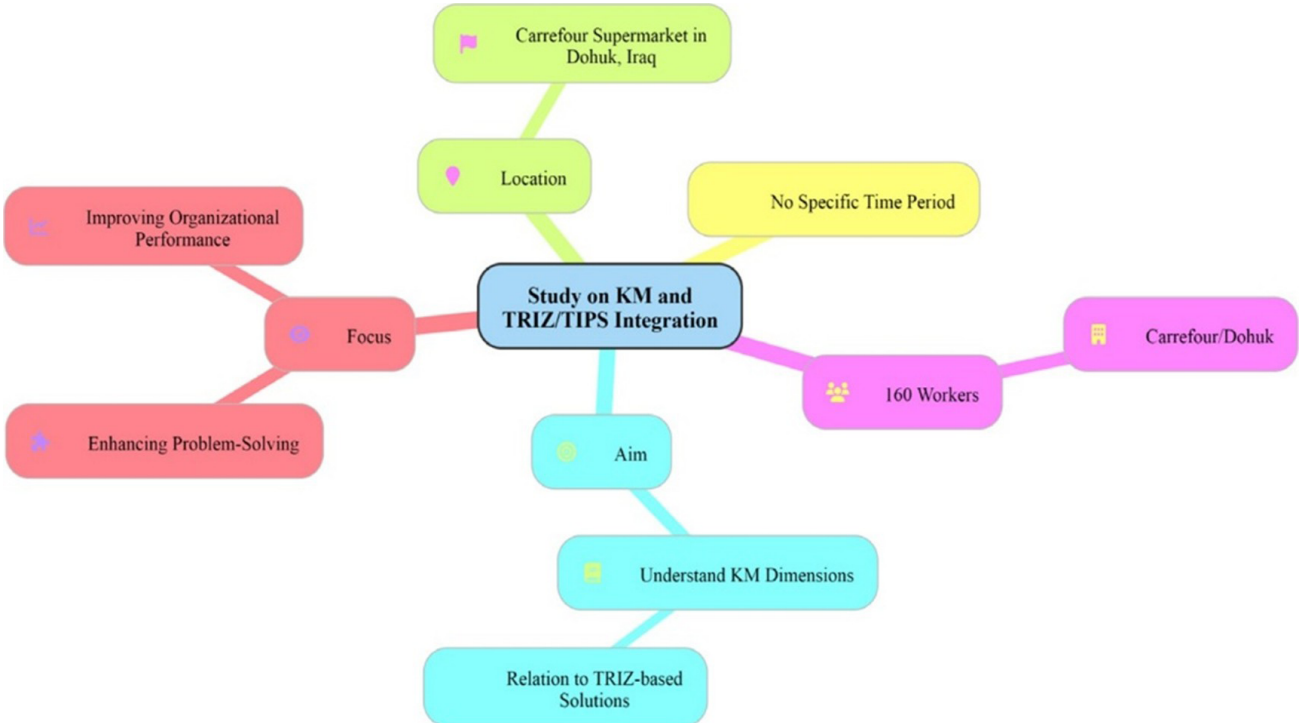- The limitations acknowledged in this research are notably significant.

Figure 5: Study on KM and TRIZ/TIPS Integration.

3.4. Implications

- **Practical:** Organisations such as Carrefour/Dohuk are encouraged to actively incorporate structured KM approaches within their TRIZ/TIPS implementation processes. Prioritising employee training in both KM and TRIZ/TIPS, alongside promoting a culture of knowledge sharing, is essential to enhance innovation and increase problem-solving effectiveness.

- **Methodological:** There is a pronounced need to improve the measurement tools used to evaluate KM and TRIZ/TIPS constructs to ensure sufficient discriminant validity. Researchers must address the identified issues of conceptual overlap and ambiguity in measurement.

- **Theoretical:** The results challenge scholars to reconsider the conceptual distinctions between KM facilitation and the deployment of structured innovation frameworks like TRIZ/TIPS, particularly in practical environments. The observed strong interdependence may indicate a requirement for more integrated theoretical frameworks.

3.5. Limitations

The study explicitly highlights substantial methodological limitations, chiefly related to construct validity:

- **Lack of Discriminant Validity:** This is the most significant limitation. Multiple assessments (HTMT = 0.965, failure to meet Fornell-Larcker criterion, and high cross-loadings) consistently demonstrate that the 'Kno' (KM) and 'TRIZ' constructs are not empirically distinct within this dataset.

- **Conceptual Overlap/Redundancy:** The deficient discriminant validity suggests that the constructs, as measured by the items, may be conceptually very similar or potentially redundant in this context.

- **Measurement Ambiguity/Item Specificity:** The presence of high cross-loadings, with items intended for one construct also loading strongly on the other, indicates that the measurement items lack specificity and generate uncertainty regarding the exact constructs being measured.

- **Potential Model Misspecification:** These issues raise doubts about whether the model, which treats 'Kno' and 'TRIZ' as separate factors, accurately captures the data's underlying structure.

- **Context Specificity:** The findings are derived from a sample within a single organisation (Carrefour/Dohuk) located in a specific region (Iraq), which may restrict the applicability of the results to different industries or cultural contexts.

3.6. Summary of Findings

The analysis examined the psychometric characteristics of the measurement scales for 'Kno' and 'TRIZ' and explored their interrelationship.

- **Strong Predictive Relationship:** A notably strong positive path coefficient (0.932) was identified from 'Kno' to 'TRIZ', indicating a considerable positive influence of 'Kno' on 'TRIZ'.
- **High Construct Reliability:** Both constructs demonstrate excellent internal consistency and reliability. Composite reliability scores are very high (Kno approximately 0.978–0.980, TRIZ approximately 0.951–0.961), indicating that the items within each scale reliably measure the same underlying concept with minimal measurement error.
- Most individual indicators show high outer loadings on their intended constructs, generally surpassing acceptable thresholds and making significant contributions to the construct variance, thereby evidencing strong indicator reliability.
- **Good Model Fit:** The R-squared value for the 'TRIZ' construct is 0.868, signifying that the model explains around 86.8% of its variance. This denotes substantial explanatory power and a strong fit of the model for 'TRIZ'.
- **Significant Discriminant Validity Concerns:** Despite the strong reliability and good model fit, the analysis reveals serious issues concerning the distinctiveness of 'Kno' and 'TRIZ'.
- The HTMT ratio between the two constructs is 0.965, which exceeds the commonly accepted thresholds (such as 0.85 or 0.90), strongly indicating insufficient differentiation between the constructs.
- The Fornell-Larcker criterion is violated, as the correlation between 'Kno' and 'TRIZ' (0.932) surpasses the square root of the AVE for both 'Kno' (approximately 0.868) and 'TRIZ' (approximately 0.897), suggesting that the constructs share more variance with each other than with their respective indicators.
- Analysis of cross-loadings shows that many items load considerably on both 'Kno' and 'TRIZ' rather than primarily on their intended construct, further obscuring the distinction between these constructs.

4. Conclusion

The study effectively established measurement scales for 'Kno' and 'TRIZ' that exhibit strong internal consistency and reliability. Additionally, the model reveals a robust predictive relationship, with 'Kno' substantially accounting for the variance observed in 'TRIZ'. Nonetheless, a critical outcome from the validity evaluation is that 'Kno' and 'TRIZ' do not demonstrate adequate discriminant validity within this dataset. Multiple assessments—including HTMT, Fornell-Larcker, and cross-loadings—consistently indicate

that these two constructs, as operationalised by the scales, are difficult to distinguish, implying significant overlap or excessive similarity. Therefore, although the instruments consistently measure a construct, they fail to clearly separate the intended concepts of 'Kno' and 'TRIZ'. This lack of clear differentiation constitutes a major limitation, suggesting the necessity either to refine the measurement scales or to reconsider the conceptual distinction between 'Kno' and 'TRIZ' in this context.

4.1. Recommendation for Action

Based on the findings, the study recommends the following actions for organisations like Carrefour/Dohuk:

- **Integrate KM and TRIZ/TIPS:** Organisations should implement structured knowledge management frameworks explicitly designed to support TRIZ/ TIPS applications, thereby enhancing problem-solving effectiveness.
- **Invest in Training:** It is essential to provide employees with comprehensive training on both knowledge management methodologies and TRIZ/TIPS principles to improve their proficiency.
- **Foster a Knowledge-Sharing Culture:** Cultivating an organisational environment that actively encourages knowledge sharing and collaborative problem-solving is crucial for innovation.
- **Develop Clear Measurement Frameworks:** Organisations aiming to implement and evaluate such integrations should prioritise creating or adopting well-defined and distinct measurement frameworks to avoid the conceptual ambiguities identified in this study.

Recommendations for further research include:

- **Address Methodological Limitations:** Future investigations must confront the current study's methodological shortcomings, particularly the insufficient discriminant validity between KM and TRIZ constructs.
- **Refine Measurement Instruments:** There is an urgent need to develop and validate improved measurement scales for KM and TRIZ/TIPS that exhibit enhanced discriminant validity and item specificity.
- **Clarify Conceptual Boundaries**: Further research should aim to elucidate and differentiate the conceptual relationships and interactions between knowledge management and structured innovation methodologies such as TRIZ/TIPS.
- **Expand Scope:** Additional studies should

broaden the focus to examine the integration of KM and TRIZ/ TIPS across various industries, organisational types, and cultural contexts to test the generalisability of the findings.

Knowledge sharing plays a vital role in fostering organisational innovation. Facilitators of knowledge sharing can significantly enhance innovation, although barriers currently show no significant effect on innovation within Iraqi firms (Salehi & Sadeq Alanbari, 2024). The adoption of knowledge management in applying the TRIZ/ TIPS entails integrating systematic knowledge-sharing practices with structured innovation tools to advance problem-solving and innovation in organisations. Within workplaces such as Carrefour/ Dohuk, this integration seeks to improve employees' abilities to identify, analyse, and resolve complex problems effectively. Potential research objectives include exploring how the adoption of knowledge management principles influences the application of TRIZ/ TIPS among workers at Carrefour/Dohuk. The significance of this study lies in its capacity to reveal pathways for enhancing organisational problem-solving efficiency and innovation capacity within a resource-constrained context, offering empirical insights that bridge theoretical concepts with practical application.

Beginning with the broad challenge of utilising knowledge to drive innovation, this introduction provides a summary of relevant literature, outlines the study's methodological approach, and highlights its unique contribution. The potential synergy between knowledge management and TRIZ/TIPS requires empirical investigation. A brief review of the literature reveals that knowledge management processes—such as knowledge creation, sharing, storage, and acquisition—significantly enhance an organisation's capacity for innovation. Furthermore, the integration of knowledge management with TRIZ/TIPS has been shown to improve the storage, retrieval, and application of innovative solutions, thereby boosting organisational effectiveness. This study employs an analytical method based on survey data collected from 160 employees at Carrefour/Dohuk to explore the relationship between knowledge management practices and the application of TRIZ/TIPS. The results offer empirical evidence of the strength of this relationship within a particular organisational context, while also critically evaluating the measurement of these constructs. Consequently, the findings provide valuable insights that contribute both to theoretical frameworks and practical implementation.

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