Muttaqin Knowledge Worker in Halal Logistics: Conceptualization, Scale Development, and Validation

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ABSTRACT

This study develops and validates an instrument for assessing the professional-competence domain of the *Muttaqin* Knowledge Worker (MKW) construct in halal logistics. While MKW is conceptually grounded in an Islamic normative framework, including the notion of *taqwa*, the present study focuses empirically on the knowledge-based professional capabilities that can be operationalized in halal logistics. An exploratory sequential design was employed. An initial pool of 18 items was developed from the MKW literature and reviewed by experts in logistics management, management, and Islamic studies. Exploratory Factor Analysis (EFA) was conducted with 82 managers and leaders in Indonesian logistics organizations, followed by Confirmatory Factor Analysis (CFA) with 200 respondents to assess the resulting factor structure. The EFA supported a one-factor structure, indicating that the measured indicators of knowledge, learning, experience, decision-making, problem-solving, teamwork, motivation, and professional responsibility represent a common underlying domain of professional competence in halal logistics. CFA supported the one-factor model, with generally strong fit across several indices, although the RMSEA indicated less optimal approximate fit. The resulting 12-item scale demonstrated very high internal consistency (Cronbach's α = .984; McDonald's ω = .984) and convergent validity (AVE = .835). This study provides an empirically validated measure of the manifestation of professional competence in MKW within halal logistics, extending knowledge-worker research into a context characterized by specialized halal requirements. The study also clarifies the distinction between the broader conceptualization of MKW and its present empirical operationalization. The current scale should not be interpreted as a direct measure of *taqwa* or Islamic spirituality; explicit measurement of these dimensions remains an important direction for future MKW scale development.

Keywords: *Halal Logistics, Human Capital Muttaqin, Knowledge-Based View, Knowledge Worker, Scale Validation.*

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INTRODUCTION

The halal economy has experienced rapid growth, with Indonesia, the world's largest Muslim-majority country, occupying a strategic position in the global halal value chain. Halal logistics has emerged as a critical enabler of halal supply-chain integrity, customer trust, and market competitiveness for firms serving Muslim consumers (Masudin et al., 2022). From a knowledge-based perspective, organizations operating in halal logistics require specialized technical competence and contextual knowledge about religiosity-informed procedures to ensure product integrity across complex distribution networks (Aziz et al., 2024; Grant, 1996).

This combination of technical expertise and context-specific requirements positions human capital, particularly knowledge workers, as an important resource for halal logistics organizations. Knowledge workers contribute through the acquisition, application, and integration of specialized knowledge, as well as through problem-solving, decision-making, and continuous learning. In halal logistics, these capabilities are exercised within a regulatory and normative environment in which the integrity of halal products must be maintained throughout logistics activities (Anggoro et al., 2024; Sidek et al., 2017). Thus, there is a need to understand and assess the professional capabilities of knowledge workers, specifically within the halal logistics context.

Existing research on Islamic work values and Islamic work ethics provides an important foundation for understanding the relationship between work-related behavior and Islamic principles (Akhmadi et al., 2023; Ali, 1988). However, Islamic work ethic measures primarily focus on ethical orientations, values, attitudes, and conduct toward work rather than on the knowledge-based professional capabilities required in specialized occupational contexts. This distinction is important because a knowledge worker in halal logistics must not only demonstrate appropriate work values but also possess specialized knowledge, practical experience, learning orientation, decision-making ability, and the capability to manage complex halal logistics activities.

To address this gap, this study aims to develop and validate a concise, reliable scale for the Muttaqin Knowledge Worker tailored to the halal logistics context in Indonesia. The study pursues three interrelated objectives: (1) develop an initial pool of scale items reflecting blended professional spiritual competencies of MKW; (2) identify underlying construct dimensionality through Exploratory Factor Analysis using 82 managers and leaders in Indonesian logistics firms; and (3) confirm and validate the emergent structure via Confirmatory Factor Analysis using an independent sample of 200 managers and leaders.

The concept of the Muttaqin Knowledge Worker (MKW**)** provides a broader framework for linking knowledge-worker characteristics to an Islamic normative context. The concept draws on the Islamic terms '*muttaqin'* (God-conscious ones) and '*taqwa'* (God-consciousness) as a foundation for responsible conduct, while retaining the knowledge-based characteristics of contemporary knowledge workers (Anggoro et al., 2024, 2025). Conceptually, therefore, MKW may encompass professional capability alongside ethical and value-oriented attributes. However, these broader conceptual attributes should be distinguished from the specific dimensions that can be empirically operationalized and validated through measurement items.

The halal logistics context provides a relevant setting for examining this operational domain of MKW, as professional knowledge and capability are directly linked to the requirements for maintaining halal integrity throughout logistics processes (Aziz et al., 2024; Karim et al., 2021; Omar et al., 2022; Zain et al., 2022). In this study, the empirical focus is therefore on the professional-competence domain of MKW, particularly knowledge, experience, learning, decision-making, problem-

solving, teamwork, and professional responsibility as they manifest in halal logistics. This approach allows the study to examine whether these indicators constitute a coherent and empirically valid measurement structure without assuming that broader attributes, such as *taqwa* or spirituality, are directly captured by the same indicators.

Despite growing attention to knowledge workers, Islamic work ethics, and halal supply chain practices, a context-specific instrument for assessing the professional competence domain of knowledge workers in halal logistics remains underdeveloped. Existing knowledge-worker and human-capital perspectives provide important conceptual foundations, but they do not provide a validated measurement instrument specifically oriented toward professional capability within halal logistics. Addressing this gap is important for developing a more precise understanding of the human capabilities required to sustain halal logistics operations. Accordingly, this study aims to develop and validate an instrument to assess the professional competence domain of the *Muttaqin* Knowledge Worker in the halal logistics context in Indonesia. The study pursues three interrelated objectives: (1) to develop an initial pool of items representing knowledge-based professional capabilities relevant to MKW in halal logistics; (2) to explore the underlying factor structure through Exploratory Factor Analysis (EFA) using 82 managers and leaders in Indonesian logistics organizations; and (3) to confirm the emergent structure through Confirmatory Factor Analysis (CFA) using an independent sample of 200 managers and leaders.

LITERATURE REVIEW

Knowledge-Based View and the Limits of Conventional Knowledge Worker Conceptualization

Knowledge-Based View (KBV) positions knowledge as a strategic resource that must be continuously acquired, integrated, and applied to create value (Grant, 1996; Grant & Phene, 2022). Through these dynamic capabilities, organizations can transform their knowledge into innovation and adaptation (Fachrunnisa et al., 2020; Jakubik & Müürsepp, 2022; Teece, 2022). Consequently, organizational success hinges on the ability to mobilize knowledge to solve complex operational problems (Abdillah et al., 2024; Monica, 2026; Nonaka, 1994). This theoretical perspective provides a foundation for understanding the "knowledge worker." A knowledge worker is an individual whose primary contribution involves acquiring, interpreting, applying, and creating knowledge in relatively complex work settings (Drucker, 1999; Muzam, 2023). Conventional conceptualizations of knowledge worker capabilities place strong emphasis on the mastery of specialized knowledge, autonomy, problem-solving skills, continuous learning, and the ability to work with information (Khaksar et al., 2023; Morawski, 2020).

However, this framework has fundamental limitations. The KBV tends to treat knowledge solely as an organizational resource, thereby limiting its ability to explain how normative and religious values shape the individuals who apply it. As a result, the conventional concept of the knowledge worker fails to explain how professional knowledge is applied in environments subject to religious regulations, such as halal logistics.

Human Capital Theory and the Individual Capability of Knowledge Workers

Human Capital Theory (HCT) provides a conceptual framework for understanding how an individual's productive capacity is formed and accumulated (Akyıldız, 2025; Becker, 1975; Schultz, 1961). The concept of human capital encompasses the abilities, knowledge, and attitudes of human resources, which collectively serve as strategic assets for enhancing organizational productivity and performance (Almekhlafi, 2022; Aman-Ullah et al., 2022; Anwar & Abdullah, 2021;

Evangelista et al., 2023). In the context of knowledge workers, this theory posits that a worker's productive value is determined by the accumulation of their education, skill levels, expertise, and extensive experience, as well as their ability to work autonomously in managing their knowledge (Davenport, 2005; Khaksar et al., 2023; Kintu, 2025; Morawski, 2020). Although HCT explains the productive value of individual capabilities, it tends to remain neutral about the normative or spiritual foundations that shape how those capabilities are exercised.

Consequently, a critical evaluation of conventional management literature reveals a significant theoretical gap between these two major theories. The KBV conceptualizes knowledge as a strategic organizational asset, whereas HCT focuses on individual capabilities grounded in expertise and experience. However, neither theory can explain the Islamic normative dimension, which links a worker's spiritual consciousness to their professional responsibilities. The absence of this dimension leaves a conceptual gap in modeling a worker who is not only technically competent but also possesses absolute moral integrity rooted in their spiritual beliefs.

Islamic Human Capital, Spiritual Capital, and the Distinctiveness of MKW

Establishing a clear conceptual boundary for the *MKW* construct requires positioning it relative to existing, related frameworks. While both conventional and Islamic management literature have extensively conceptualized workers' capabilities and behaviors, current models remain insufficient to meet the specialized demands of halal logistics. To address this limitation, the MKW construct provides a unique theoretical contribution that extends beyond current managerial literature.

Table 1. *Critical Comparison of MKW and Related Constructs*

Construct	Primary focus	What it explains	Current Study Limitations
Knowledge Worker	Specialized knowledge, autonomy, problem-solving, and learning	Professional knowledge work	Limited Islamic/normative dimension
Human Capital	Knowledge, skills, education, experience	Individual productive capability	Does not specify Islamic normative orientation
Islamic Human Capital	Human capability informed by Islamic values	Integration of human capability and Islamic values	Often broad/value-oriented; limited context-specific measurement for halal logistics knowledge work
Spiritual Capital	Spiritual beliefs, values, meaning, moral resources	Spiritual resources influencing individuals/ organizations	Not specifically focused on professional halal logistics competence
Islamic Work Ethic	Islamic work values, attitudes, and ethical orientation	Normative work behavior	Measures work ethic/value orientation rather than specialized knowledge-worker capability

MKW	Knowledge-worker capability within the Islamic/halal context	Professional knowledge, skills, learning, experience, decision-making, etc.	The present study empirically validates only the professional-competence domain.

Source: Authors' synthesis from various literature

Through comparative mapping, the MKW construct presents a novel hybrid framework that bridges existing conceptual gaps. It integrates the professional capabilities of conventional knowledge workers with a normative Islamic paradigm centered on *taqwa*. However, this study deliberately confines its scope to empirically validating the professional competency domain in halal logistics, thereby providing a tangible methodological baseline for future theoretical advancements.

Conceptualizing the Muttaqin Knowledge Worker in Halal Logistics

The MKW construct is developed by integrating the characteristics of conventional knowledge workers, the KBV perspective, HCT, and the normative Islamic context within the halal logistics environment. Prior conceptualizations of knowledge workers have emphasized the critical role of specialized knowledge, skills, autonomy, continuous learning, and problem-solving capabilities as defining characteristics of individuals performing knowledge-intensive tasks (Drucker, 1999; Khaksar et al., 2023; Morawski, 2020). Grounded in the KBV, knowledge attains strategic value when it is acquired, integrated, and deployed across organizational activities (Adhiatma et al., 2021; Grant & Phene, 2022). Concurrently, HCT frames individual education, skills, experience, and abilities as capital forms that drive productivity and performance (Deming, 2022; Marvel et al., 2020).

In the context of halal logistics, these capabilities operate within an environment constrained not only by operational demands but also by strict halal compliance and normative Islamic principles (Karia, 2025). Knowledge-sharing mechanisms, collective learning, and *taqwa*-based Islamic knowledge systems serve as vital catalysts for the development of the MKW construct (Abdillah et al., 2024; Sharif et al., 2025; Sidek, 2018). Consequently, the Islamic context provides a foundational distinction separating the MKW construct from conventional knowledge workers. An MKW can be conceptualized as human capital equipped with specialized job-related knowledge grounded in intrinsic religious values (*muttaqin*) (Yahya & Rahmat, 2019). Thus, while fundamental dimensions such as knowledge, skills, experience, learning, decision-making, and problem-solving remain central to MKW competence, their application is explicitly contextualized within tasks aimed at maintaining halal integrity (Aziz et al., 2024; Omar et al., 2022; Zain et al., 2022).

Conceptually, the MKW construct encompasses a broader scope than the professional competencies empirically validated in this study. A holistic conceptualization of MKW may embrace personal character, community orientation, spiritual motivation, and broader value dimensions inherent to the Islamic context (Anggoro et al., 2024, 2025; Sudarti & Fachrunnisa, 2021). Conceptually, the MKW construct encompasses a broader scope than the professional competencies empirically validated in this study. A holistic conceptualization of MKW may embrace personal character, community orientation, spiritual motivation, and broader value dimensions inherent to the Islamic context (Zainol & Hashim, 2025). This study operationalizes MKW as a unidimensional construct that harmoniously integrates both domains. Specifically, this study focuses on instrument development and validation within the MKW professional competency domain. This deliberate delimitation ensures conceptual alignment between the theoretical construct and the specific dimensions measured empirically.

The professional competency domain examined in this research is embodied in the capabilities and attributes reflected by the instrument items: specialized knowledge of halal logistics, knowledge acquisition and accessibility, continuous learning, practical experience, formal qualifications, technical skills, decision-making autonomy, achievement motivation, and professional integrity and responsibility (Aziz et al., 2024; Karia, 2022; Karim et al., 2021; Omar et al., 2022; Zain et al., 2022). Ultimately, this domain represents an individual's capability to acquire, advance, and apply knowledge and expertise toward executing professional duties with rigor within the halal logistics ecosystem.

Existing knowledge-worker perspectives explain how specialized knowledge and individual capabilities generate value, while Human Capital Theory emphasizes the productive role of education, skills, and experience. Islamic-oriented perspectives further recognize the relevance of Islamic values, ethics, and spirituality in shaping human and work-related behavior. However, these perspectives do not sufficiently specify how the capabilities of professional knowledge workers can be operationalized within the specific normative and operational requirements of halal logistics. At the same time, existing Islamic-oriented constructs tend to emphasize values, ethics, or spirituality rather than the specialized knowledge, learning, experience, and decision-making capabilities required in halal logistics. This creates a conceptual space for the *MKW* as a contextualized knowledge-worker construct.

Nevertheless, the broader conceptualization of MKW is potentially multidimensional, whereas the present study empirically examines only its professional-competence domain. The study, therefore, does not interpret the resulting scale as a direct measure of *taqwa*, spirituality, or the full range of ethical and value-oriented attributes that may be associated with the broader MKW concept. Instead, the present study focuses on whether the professional competence indicators relevant to knowledge work in halal logistics constitute a coherent and empirically supported measurement structure. Accordingly, the dimensionality of these indicators is treated as an empirical question rather than being imposed a priori from the broader conceptual framework.

RESEARCH METHOD

Research design

This study employed an exploratory sequential scale-development design consisting of two quantitative stages: EFA followed by CFA. The EFA stage was conducted to explore the underlying structure of the initial MKW item pool without imposing a predetermined factor structure. The resulting factor structure was subsequently examined through CFA using an independent sample. This two-stage approach was employed to identify the instrument's empirical structure and subsequently assess the extent to which that structure was supported in an independent sample (Hair et al., 2019).

Population and sample

Data were collected in two independent stages using purposive sampling. The target population comprised managers and leaders in logistics organizations in Indonesia. This population was considered relevant because managerial and leadership roles in logistics involve professional knowledge, operational decision-making, and responsibility for logistics activities. The first stage involved 82 respondents and was used for EFA, while the second stage involved 200 respondents and was used for CFA. The CFA sample was independent from the EFA sample, enabling the factor structure identified during the exploratory stage to be examined in a separate sample. The use of independent samples strengthened the exploratory–confirmatory scale-development process by reducing the likelihood that the final factor structure was specific to the initial sample. Accordingly, the empirical analysis

comprised 82 respondents in the EFA stage and 200 respondents in the CFA stage. The original data collection records did not provide sufficient documentation of the total number of questionnaires distributed and returned; therefore, a response rate could not be calculated reliably and is not reported.

Instrument development and Expert Review

The initial instrument was developed based on the conceptualization of the *Muttaqin* Knowledge Worker and the knowledge-worker literature, with particular attention to professional capabilities relevant to halal logistics. An initial pool of 18 items was developed to represent knowledge of halal logistics, knowledge application, learning orientation, practical experience, decision-making, teamwork, problem-solving, motivation, qualifications, and professional responsibility within the context of the Halal Product Assurance System. Before empirical testing, the items were reviewed by a three-member expert panel comprising experts in logistics management, management, and Islamic studies. The expert review assessed the clarity, relevance, contextual appropriateness, and conceptual alignment of the items. The resulting instrument used a 10-point Likert-type scale ranging from 1 (strongly disagree) to 10 (strongly agree).

Although MKW is conceptually situated within an Islamic normative framework, including the notion of *taqwa*, the initial item pool did not include dedicated indicators that directly assess God-consciousness, religious worship, or explicit spiritual motivation. Accordingly, the present instrument was developed to empirically examine the professional-competence domain of MKW as manifested in halal logistics. The broader spiritual and ethical dimensions of MKW are treated as part of its conceptual foundation rather than as dimensions directly measured by the present instrument.

Exploratory Factor Analysis

EFA was conducted using Principal Axis Factoring (PAF) with Promax rotation to examine the underlying structure of the initial 18-item instrument. The suitability of the data for factor analysis was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity (Bartlett, 1954; Kaiser, 1974). Factor retention was evaluated using the resulting eigenvalues, factor structure, and the substantive interpretability of the extracted factors. Item factor loadings were examined to determine the contribution of individual indicators to the emerging factor structure. The EFA resulted in a one-factor solution. The empirical findings were subsequently used to refine the instrument before its structure was examined through CFA. The transition from the initial 18-item pool to the final 12-item instrument is explicitly reported in the Results section, along with the item-level basis for item retention and elimination.

Confirmatory Factor Analysis

CFA was conducted on an independent sample of 200 respondents to assess the factor structure identified in the EFA. The CFA examined the extent to which the observed indicators adequately represented the underlying professional-competence domain of MKW in halal logistics. Model fit was evaluated using the chi-square statistic and multiple complementary fit indices, including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Normed Fit Index (NFI), Incremental Fit Index (IFI), Relative Noncentrality Index (RNI), Root Mean Square Error of Approximation (RMSEA) with its confidence interval, and Standardized Root Mean Square Residual (SRMR). Standardized factor loadings and squared multiple correlations (R^2) were also examined to assess the contribution of individual indicators to the latent construct.

Reliability and Convergent Validity

The reliability of the resulting scale was assessed using Cronbach's alpha and McDonald's omega. Convergent validity was assessed using Average Variance Extracted (AVE). High reliability coefficients were interpreted alongside the item-level results, as very high internal consistency may also indicate substantial similarity among indicators. Similarly, evidence of convergent validity was considered alongside the factor structure rather than interpreted as evidence that the instrument captures all theoretically proposed dimensions of MKW.

Table 2. *Proposed Items of Knowledge Worker Construct in the Context of Halal Product Assurance System*

Items	Statements
MKW.1	I have knowledge about professional halal logistics standards an principles.
MKW.2	I possess high-quality, reliable knowledge of halal logistics managemen
MKW.3	I always prioritize increasing my knowledge about halal logistics.
MKW.4	I have practical experience related to halal logistics operations.
MKW.5	I apply my halal logistics knowledge with full integrity and professiona responsibility.
MKW.6	I use highly specialized knowledge to handle halal products.
MKW.7	I always prioritize new knowledge about halal logistics.
MKW.8	I have independence in my work.
MKW.9	I am always motivated to provide the best performance.
MKW.10	I can effectively utilize relevant halal logistics information in the decisio making process.
MKW.11	I can access various sources of knowledge on halal logistics.
MKW.12	I am highly motivated to continually seek new knowledge related to hal logistics.
MKW.13	I am able to work together in a team on halal logistics activities/processe
MKW.14	I am able to solve challenges that arise related to halal logistics activitie
MKW.15	I have connections to knowledge sources on halal logistics.
MKW.16	I have educational qualifications in halal logistics.
MKW.17	I have skills and qualifications in halal logistics.
MKW.18	I can manage complex tasks in halal logistics.

Source: Authors & experts panel

Data Analysis

Data analysis was conducted in two stages corresponding to the exploratory and confirmatory phases of the research design. In the first stage, EFA was performed using JASP version 0.19.3 (JASP Team, 2025) with Principal Axis Factoring (PAF) and Promax rotation. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity were used to assess the suitability of the data for factor analysis. Factor retention was assessed based on eigenvalues, the resulting factor structure, and the substantive interpretability of the extracted factors. Item factor loadings were examined to assess each indicator's contribution to the emerging factor structure.

In the second stage, CFA was conducted using JASP version 0.19.3 (JASP Team, 2025) with an independent sample to evaluate the factor structure identified through EFA. Model fit was assessed using multiple indices, including the chi-square statistic (χ^2), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Normed Fit Index (NFI), Incremental Fit Index (IFI), Relative Noncentrality Index (RNI), Root Mean Square Error of Approximation (RMSEA) with its confidence interval, Standardized Root Mean Square Residual (SRMR), and Goodness of Fit Index (GFI). Standardized

factor loadings and squared multiple correlations (R^2) were also examined. Reliability was assessed using Cronbach's alpha and McDonald's omega, while convergent validity was assessed using Average Variance Extracted (AVE).

RESULTS

Descriptive statistics were examined to provide an overview of the central tendency and variability of the study constructs. As presented in Table X, the mean values ranged from 7.97 to 8.96, with standard deviations ranging from 1.06 to 1.40. The results indicate relatively high response levels across all constructs, including Islamic HRM practices, Muttaqin Knowledge, and Halal Logistic Performance.

Table 3. *Summary of Means, Standard Deviations, and Correlations*

Variable	Mean	SD	1	2	3	4	5	6	7
1. ISRP	8,19	1,33	1						
2. ITDP	7,97	1,12	.550**	1					
3. ICDP	8,95	1,25	.540**	.580**	1				
4. IRMP	8,02	1,06	.600**	.687**	.562**	1			
5. MKWAq	8,01	1,32	.580**	.584**	.557**	.614**	1		
6. MKWAp	8,08	1,09	.558**	.640**	.522**	.636**	.872**	1	
7. HLP	8,96	1,40	.521**	.553**	.528**	.576**	.587**	.566**	1

Note. ** $p < .01$, * $p < .05$. *M* = Mean; *SD* = Standard Deviation; ISRP = Islamic Selection and Recruitment Practices; ITDP = Islamic Training and Development Practices; ICDP = Islamic Career Development Practices; IRMP = Islamic Reward Management Practices; MKWAq = Muttaqin Knowledge Acquisition; MKWAp = Muttaqin Knowledge Application; HLP = Halal Logistics Performance.

Following the descriptive analysis, the empirical validation of the MKW scale was conducted in two phases, using EFA and CFA.

Exploratory Factor Analysis Results

Data Adequacy Assessment

Dataset suitability for factor analysis was rigorously evaluated. The KMO test yielded an overall measure of 0.951, substantially exceeding recommended thresholds (Hair et al., 2019). Bartlett's Test of Sphericity produces statistically significant results ($\chi^2 = 2522.678$, $df = 153$, $p < .001$), rejecting the null hypothesis of identity matrix correlation (Table 4).

Table 4. *Data Adequacy Test for Exploratory Factor Analysis*

Test	Value	Threshold
Overall KMO	0.951	> 0.70
Individual MSA Range	0.921 - 0.974	> 0.50
Bartlett's Test χ^2	2522.678***	Significant
Multivariate Skewness	3405.399***	Non-significant preferred
Multivariate Kurtosis	27.942***	Non-significant preferred
Note: ***p < .001		

(Source: JASP EFA Output, 2025)

Factor Structure and Extraction

EFA revealed a unidimensional factor structure for the 18-item MKW scale. Principal axis factoring extracted a single factor with eigenvalue 14.810, substantially surpassing Kaiser's criterion (Kaiser, 1974) and accounting for 81.3% of total variance, providing compelling evidence for construct unidimensionality and strong internal item cohesion.

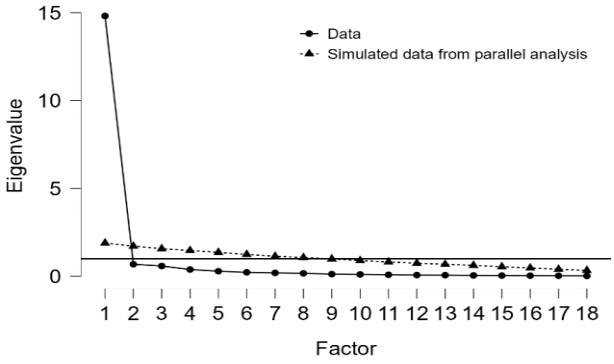


Figure 1. *Scree Plot*

Source: JASP EFA Output (2025)

Examination of the scree plot revealed a pronounced discontinuity after the first factor, with subsequent eigenvalues showing a gradual decline. This pattern, characteristic of common factor variance depletion, reinforced the decision to retain a single-factor solution (Figure 1). This finding aligns with both statistical criteria and theoretical expectations regarding the integrated nature of knowledge worker competencies in Islamic organizational contexts.

Table 5. *Factor Loadings and Items for Muttaqin Knowledge Worker Scale*

Item	Factor	Uniquene	Item Content
MKW.2	0.948	0.101	Quality and reliable halal logistics knowledge
MKW.1	0.946	0.104	Professional halal logistics standards
MKW.5	0.946	0.105	Integrity-based knowledge application
MKW.10	0.944	0.109	Decision-making with halal logistics
MKW.3	0.942	0.112	Continuous halal logistics knowledge
MKW.6	0.939	0.119	High-quality knowledge for halal product
MKW.18	0.933	0.130	Complex task management in halal logistics
MKW.17	0.929	0.137	Skilled competencies in halal logistics
MKW.7	0.923	0.148	Updated halal logistics knowledge
MKW.14	0.922	0.150	Challenge resolution in halal logistics
MKW.8	0.921	0.152	Independence in halal-compliant work
MKW.9	0.894	0.200	Performance motivation in halal logistics
MKW.11	0.875	0.235	Access to diverse halal logistics knowledge
MKW.16	0.872	0.240	Educational qualifications in halal logistics
MKW.15	0.871	0.242	Attachment to halal logistics knowledge
MKW.4	0.863	0.255	Practical experience in halal logistics
MKW.13	0.789	0.378	Teamwork in halal logistics processes
MKW.12	0.743	0.448	High motivation for new halal logistics

Source: JASP EFA Output (2025)

All factor loadings exceeded the 0.50 threshold, with 16 items (88.9%) surpassing the stringent 0.80 criterion, providing strong evidence of a relationship with the underlying latent construct (Table 5 and Figure 2).

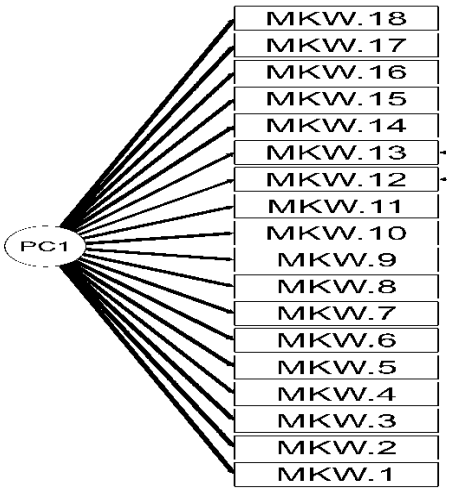


Figure 2. *EFA Path Diagram*
Source: JASP EFA Output (2025)

Confirmatory Factor Analysis Results

Sample Characteristics and Data Adequacy

Following the EFA, six items (MKW.1, MKW.7, MKW.13, MKW.14, MKW.15, and MKW.18) were excluded during the scale refinement process, resulting in a reduced 12-item scale for the subsequent CFA. These 12 retained items were subsequently evaluated using an independent sample of 200 respondents. The data adequacy assessment confirmed excellent conditions, with a KMO value of 0.973 and individual item MSAs ranging from 0.954 to 0.982. Bartlett's Test remained highly significant ($\chi^2 = 3553.284$, df = 66, $p < .001$).

Confirmatory Model Fit Assessment

CFA demonstrated substantially improved model fit. While chi-square remained significant ($\chi^2 = 132.539$, df = 54, $p < .001$), the comparative and incremental fit indices indicated excellent fit (Table 6).

Table 6. *Model fit indices for CFA*

Fit Index	Value	Threshold	Interpretation
χ^2 (df = 54)	132.539***	Non-significant preferred	Significant
CFI	0.978	> 0.95	Excellent
TLI	0.973	> 0.95	Excellent
NFI	0.964	> 0.90	Excellent
IFI	0.978	> 0.95	Excellent
RNI	0.978	> 0.95	Excellent
RMSEA	0.085	< 0.08	Marginal
RMSEA 90% CI	[0.067, 0.104]	-	-
SRMR	0.014	< 0.08	Excellent
GFI	0.988	> 0.90	Excellent

Note: ***p < .001
Source: JASP CFA Output (2025)

The Comparative Fit Index (CFI = 0.978) and Tucker-Lewis Index (TLI = 0.973) both exceeded the stringent 0.95 threshold. These values indicate that the hypothesized model substantially explained the observed covariances, outperforming the baseline independence model (Hu & Bentler, 1999). Similarly, the Normed Fit Index (NFI = 0.964), Incremental Fit Index (IFI = 0.978), and Relative Noncentrality Index (RNI = 0.978) all indicated excellent model fit. The Root Mean Square of Approximation (RMSEA = 0.085) was marginally above the strict 0.08 threshold but

still within acceptable limits. The Standardized Root Mean Square Residual (SRMR = 0.014) achieved excellent fit standards. Furthermore, the Goodness of Fit Index (GFI = 0.988) approached unity, providing strong evidence of the model's absolute fit adequacy.

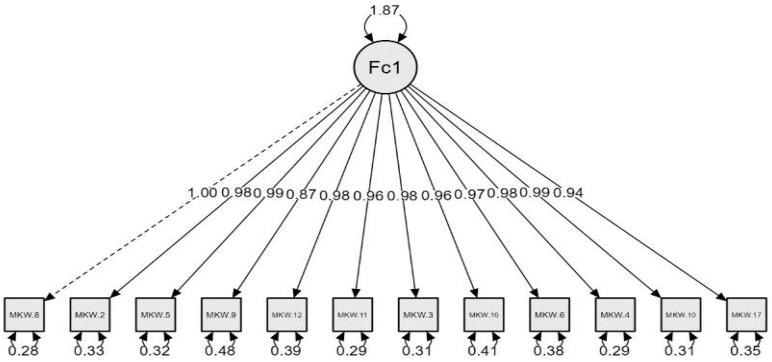


Figure 3. *Final CFA Model Structure*
Source: JASP CFA Output (2025)

Factor Loadings and Convergent Validity

All standardized factor loadings were statistically significant ($p < .001$) and ranged from 0.866 to 1.000. The pattern of loadings consistency showed a strong relationship between the observed indicators and the latent *Muttaqin* Knowledge Worker construct. The confidence interval for all parameters excluded zero, further supporting these relationships.

Table 7. *Standardized Factor Loadings and Reliability*

Item	Factor Loadings	Standard Error	z-value	R^2	Item Content
MKW.5	0.989	0.040	24.635***	0.851	Integrity-based knowledge application
MKW.10	0.986	0.040	24.704***	0.853	Decision-Making with halal information
MKW.3	0.981	0.040	24.648***	0.852	Continuous knowledge improvement
MKW.4	0.979	0.039	25.213***	0.862	Practical halal logistics experience
MKW.12	0.977	0.042	23.186***	0.822	High motivation for new knowledge
MKW.2	0.975	0.040	24.276***	0.844	Quality halal logistics knowledge
MKW.6	0.971	0.042	23.238***	0.823	High-quality knowledge for handling
MKW.11	0.965	0.039	24.996***	0.858	Access to knowledge sources
MKW.16	0.964	0.043	22.658***	0.810	Educational qualifications
MKW.17	0.938	0.040	23.239***	0.823	Skilled competencies
MKW.9	0.866	0.043	20.062***	0.747	Performance motivation

MKW.8	1.000*	-	-	0.871	Independence in work

Note: ***p < .001; *Fixed parameter for identification

Source: JASP CFA Output (2025)

The strongest factor loadings were observed for items measuring integrity-based knowledge application (MKW.5 = 0.989), decision-making capabilities (MKW.10 = 0.986), and continuous learning orientation (MKW.3 = 0.981), suggesting these competencies constitute core elements of the *Muttaqin* Knowledge Worker construct. The lowest loading, while remaining above acceptable thresholds, was observed for performance motivation (MKW.9 = 0.866).

Reliability and Validity Assessment

The confirmatory analysis provided strong evidence for both reliability and validity of the MKW scale. Internal consistency reliability achieved exceptional levels, with both Cronbach's alpha (α = 0.984) and McDonald's omega (ω = 0.984) substantially exceeding recommended thresholds and approaching theoretical upper bounds for reliability coefficients (Nunnally, 1978).

Table 8. *Reliability and Validity Measures*

Measure	Value	Threshold	Interpretation
Cronbach's α	0.984	> 0.70	Excellent reliability
McDonald's ω	0.984	> 0.70	Excellent reliability
Average Variance Extracted (AVE)	0.835	> 0.50	Excellent convergent validity
Factor Variance	1.867***	-	Significant construct variability

Note: ***p < .001

Source: JASP CFA Output (2025)

The model achieved strong convergent validity, as evidenced by an Average Extracted (AVE) of 0.835, exceeding the recommended threshold of 0.50. This indicates that the latent factor explained more than half of the variance in its indicators. Individual item factor loadings ranged from 0.747 to 0.871, all exceeding the 0.50 threshold, demonstrating that each indicator was estimated (1.867, SE = 0.213, z = 8.762, p < .001), indicating significant variability in Muttaqin Knowledge Worker competencies within the construct. Residual variances for the observed indicators ranged from 0.277 to 0.476, all statistically significant, confirming appropriate model specification even in the absence of perfect prediction.

Final Validated Scale

Based on the comprehensive psychometric evaluation, the final validated Muttaqin Knowledge Worker scale comprises 12 items and demonstrates excellent psychometric properties. The scale captures a unidimensional construct encompassing professional halal logistics knowledge, ethical integrity in applying knowledge, a continuous learning orientation, practical experience, and intrinsic motivation for excellence. The validated instrument provided a reliable and valid measure for assessing knowledge worker competencies within Islamic organizational contexts, particularly in halal logistics management. The empirical findings support the theoretical conceptualization of the Muttaqin Knowledge Worker as an integrated construct. In this construct, technical competence and coverage of Islamic ethical principles create distinctive professional capabilities. This validation contributes to the growing literature on Islamic human development in halal business contexts.

DISCUSSION

Interpretation of the Empirical Findings

This study developed and evaluated an initial operationalization of the *MKW* construct in the context of halal logistics. The empirical results yielded a 12-item, one-factor structure representing a set of closely related professional capabilities, including knowledge of halal logistics, knowledge acquisition and application, work experience, decision-making, problem-solving, teamwork, motivation, qualifications, and professional responsibility. The findings, therefore, indicate that these capabilities are empirically perceived as a coherent domain among the respondents in this study.

The one-factor solution is noteworthy because the initial conceptualization of MKW was broader than the professional capabilities that the final scale captures. The theoretical concept of MKW was developed to connect knowledge-worker characteristics with an Islamic normative orientation, including the broader notion of *taqwa*. However, the empirical indicators retained in this study primarily focus on knowledge and professional capability in halal logistics. Consequently, the one-factor structure should not be interpreted as evidence that the broader MKW concept is inherently unidimensional. Rather, it indicates that the specific professional-competence indicators operationalized in this study constitute a common empirical dimension within the context under investigation.

This distinction is important for interpreting the factor structure. The high factor loadings suggest that knowledge acquisition, application, experience, decision-making, problem-solving, and related capabilities are strongly interconnected in halal logistics work. A knowledge worker in this setting may not experience these capabilities as isolated competencies. Knowledge of halal requirements, for example, becomes meaningful when it can be applied to operational decisions, problem-solving, and the management of complex logistics activities. Similarly, continuous learning is relevant because halal logistics involves context-specific standards and procedures that require workers to maintain and update their knowledge.

The findings also provide a more precise interpretation of the role of the halal context. The reference to the Halal Product Assurance System across the items situates professional competence within a specific regulatory and normative environment. It distinguishes the scale from a generic knowledge-worker competency measure because the knowledge, decisions, and problem-solving activities assessed are directed toward maintaining halal requirements in logistics operations. Nevertheless, the halal context should not be equated with a direct measurement of spirituality or *taqwa*. The current evidence supports contextualizing professional competence within halal requirements, rather than psychometrically measuring God-consciousness itself.

MKW in Relation to Knowledge-Based View and Human Capital Theory

The findings can be further understood through the complementary perspectives of the KBV and HCT. From a KBV perspective, the retained indicators reflect the acquisition, maintenance, application, and use of knowledge in organizational decision-making and problem-solving. The strong association among these indicators suggests that knowledge-worker capability in halal logistics is not limited to specialized knowledge alone. Its organizational relevance depends on the ability to continuously acquire knowledge, access relevant sources, interpret information, and translate knowledge into operational decisions.

The results are also consistent with the human-capital perspective, which emphasizes knowledge, skills, experience, qualifications, and individual capabilities as productive resources. Several retained indicators directly reflect these elements,

including practical experience, educational and skill qualifications, and the ability to manage complex tasks. The findings, therefore, provide empirical support for positioning MKW's professional-competence domain at the intersection of knowledge resources and individual capability.

The contribution of MKW at this level is therefore not that it replaces KBV or HCT, but that it contextualizes their treatment of knowledge and human capability within halal logistics. KBV helps explain why knowledge acquisition and application matter, while HCT explains why individual knowledge, skills, experience, and qualifications constitute valuable productive capabilities. MKW provides a contextual label for examining how these capabilities are enacted within an Islamic/halal organizational environment.

At the same time, the empirical results do not demonstrate that spiritual or religious attributes constitute an additional factor beyond professional competence. Because the final items do not directly assess *taqwa*, religious practice, God-consciousness, or explicit spiritual motivation, such dimensions cannot be inferred from the present factor solution. The theoretical contribution should therefore be understood as a refinement of the operational boundary of MKW rather than as empirical confirmation of all dimensions proposed in its broader conceptualization.

Distinguishing MKW from Islamic Work Ethic and Related Islamic Constructs

The findings also clarify the conceptual distinction between MKW and existing Islamic work ethic measures. Islamic Work Ethic (IWE) research generally focuses on normative beliefs and attitudes regarding work, such as the value placed on hard work, responsibility, justice, cooperation, and ethical conduct. Such measures are important for understanding the value orientation underlying workplace behavior. However, the current MKW scale addresses a different empirical domain: the professional capabilities required to acquire, apply, and manage knowledge in halal logistics.

This distinction is particularly relevant because ethical orientation and professional capability may be related without being identical constructs. A worker may possess strong Islamic work values but differ in specialized halal logistics knowledge or operational experience. Conversely, a worker may demonstrate high professional competence, while a separate measure is needed to assess the depth of religious commitment or spiritual orientation underlying that competence. The present scale, therefore, should not be interpreted as an alternative measurement of Islamic Work Ethic. Rather, it represents a complementary professional-capability perspective that can potentially be examined alongside established Islamic work-ethic measures.

This distinction also helps position the present study's contribution. The novelty of MKW should not be claimed on the basis that no Islamic-oriented employee or work ethic scales exist. Instead, its potential contribution lies in connecting the knowledge-worker perspective with the specialized professional requirements of halal logistics and in providing an initial psychometrically evaluated measure of that professional competence domain. The psychometric results provide encouraging, though not unequivocal, support for the scale. The high factor loadings and strong internal consistency indicate substantial coherence among the retained indicators. The AVE also provides evidence of convergence among the items representing the latent factor.

However, the very high reliability coefficients ($\alpha = .984$; $\omega = .984$) and the uniformly high factor loadings should be interpreted in light of potential item redundancy. Several indicators address closely related aspects of knowledge acquisition, knowledge use, and professional capability. Consequently, a high

reliability coefficient does not necessarily indicate that the scale captures a broad construct. It may also reflect substantial similarity among items.

Similarly, the CFA results provide generally strong evidence for the proposed one-factor structure, but the evidence is not uniformly optimal across all fit statistics. The significant chi-square and RMSEA of .085 indicate some degree of model misfit despite strong comparative fit indices and a low SRMR. The results, therefore, support the adequacy of the 12-item structure for the present sample, while leaving room for further refinement and replication.

CONCLUSION

This study developed and empirically evaluated a 12-item measure representing the professional-competence domain of the *MKW* in halal logistics. Through an exploratory sequential scale-development process, an initial pool of 18 items was examined using EFA and subsequently evaluated through CFA with an independent sample. The findings supported a one-factor structure in which knowledge, learning, experience, decision-making, problem-solving, teamwork, motivation, qualifications, and professional responsibility were empirically related as a coherent domain of professional competence. The scale demonstrated high internal consistency and convergent validity, while the CFA results provided generally strong support for the proposed measurement structure, although the significant chi-square and RMSEA indicated that model fit was not uniformly optimal. These findings provide initial psychometric evidence for assessing professional capabilities of knowledge workers operating within the halal logistics context.

The study also clarifies the conceptual boundary of MKW. Although MKW is theoretically grounded in an Islamic normative framework that includes the broader notion of *taqwa*, the validated items in the present study predominantly capture professional competence within a halal logistics environment. Therefore, the 12-item scale should not be interpreted as a direct measure of *taqwa*, spirituality, or Islamic work ethic. Rather, it represents an empirically supported professional-competence domain that may constitute one component of the broader MKW conceptualization. Consequently, the study's contribution lies in providing a context-specific and empirically evaluated measure of knowledge-worker professional capability in halal logistics, while establishing a clearer basis for the further development of the broader MKW construct. Future research should examine whether explicitly Islamic dimensions, such as *taqwa*, moral consciousness, and spiritual motivation, constitute distinct yet related dimensions of MKW, and should establish criterion-related, predictive, and cross-cultural validity before the scale is applied to high-stakes human resource decisions.

Theoretical Implications

The theoretical implication of the study lies primarily in narrowing and empirically specifying the professional-competence domain of MKW. Rather than treating MKW as automatically equivalent to a combination of technical competence and spirituality, the findings suggest that its professional dimension can be operationalized through a coherent set of knowledge-based capabilities in halal logistics. This provides a more precise bridge between knowledge-worker theory and Islamic/halal organizational contexts. KBV explains the strategic importance of knowledge acquisition and application, while HCT explains the role of individual knowledge, skills, experience, and qualifications. The present study adds contextual specificity by examining these capabilities in work in which halal requirements are an integral part of professional practice.

The findings also reveal an important theoretical boundary. The broader conceptualization of MKW includes Islamic moral and spiritual dimensions, but these

dimensions remain conceptually specified rather than empirically validated by the present scale. Future scale development should therefore examine whether professional competence and explicitly Islamic dimensions constitute separate but related factors, higher-order dimensions, or context-dependent manifestations of a broader MKW construct.

Practical Implications

From a practical perspective, the validated scale may be useful as a developmental and diagnostic instrument for identifying strengths in professional competence and areas for improvement among knowledge workers in halal logistics. Organizations may use the indicators to assess needs related to halal logistics knowledge, continuous learning, decision-making, problem-solving, and the management of complex logistics activities. Moreover, the scale can initially be incorporated into competency mapping, training needs analysis, individual development plans, and career and professional development programs for halal logistics personnel. Its results can be combined with existing indicators such as job performance, qualifications, training records, and supervisor assessments rather than replacing established HR measures. However, the current evidence does not justify using the scale as a definitive instrument for recruitment, promotion, or high-stakes performance evaluation. In particular, the scale should not be interpreted as a measure of an employee's level of *taqwa*, spirituality, or Islamic commitment. Such interpretations would extend beyond the content of the validated indicators.

For halal logistics organizations, the scale can initially support competency development, training-needs identification, and professional development. Its usefulness for selection or performance management should be established through subsequent studies that examine criterion-related, predictive, and incremental validity relative to relevant organizational outcomes. The findings suggest that competency frameworks for halal logistics could place greater emphasis on knowledge acquisition, knowledge application, continuous learning, decision making, professional responsibility, and relevant qualifications. Government agencies and halal certification-related institutions could consider these competencies when developing professional competency standards, training curricula, certification schemes, and continuing professional development requirements. However, we emphasize that the present scale is an assessment of professional competence and should not be treated as a direct certification of an individual's *taqwa*, spirituality, or Islamic work ethic.

LIMITATION

Several limitations should be considered when interpreting the findings. First, the study was conducted among Indonesian logistics managers and leaders and focused specifically on halal logistics. The factor structure may therefore reflect the professional and regulatory characteristics of this context and should not automatically be generalized to other Islamic industries or countries. Second, although the conceptualization of MKW includes Islamic normative and spiritual dimensions, the validated items in the present study predominantly represent professional competence. The absence of direct indicators of *taqwa*, God-consciousness, religious practice, or explicit spiritual motivation limits the extent to which the present scale can represent the broader MKW construct. This limitation should be addressed through subsequent qualitative and scale-development research rather than by reinterpreting the current items. Additionally, future research is needed to establish criterion-related and predictive validity against supervisor-rated performance and halal logistics outcomes; develop and validate explicit Islamic dimensions of the broader MKW construct, including *taqwa* and moral/spiritual

consciousness; establish norms, cutoff scores, measurement invariance, and cross-cultural validity across different halal logistics settings; and conduct longitudinal and multi-source studies to examine whether MKW-related capabilities predict professional development and organizational outcomes over time.

Third, the use of self-reported data may introduce common method and social desirability biases, particularly for items involving professional responsibility and compliance. These issues were not directly resolved through the current measurement model and should be examined in future research using multi-source assessments, supervisor ratings, or objective indicators. Fourth, the cross-sectional design provides evidence regarding the scale's internal structure and reliability but does not establish temporal stability or predictive validity. Future studies should examine whether MKW professional competence scores predict relevant outcomes, such as halal compliance performance, operational quality, problem-solving effectiveness, or other objectively assessed work outcomes. Finally, the purposive sampling approach limits the generalizability of the statistical results. Replication with larger, more diverse samples is required, including measurement invariance testing across organizational roles, regions, industries, and potentially different national contexts.

DECLARATIONS:

All authors declare that they have no conflicts of interest. This research involved human participants through a voluntary questionnaire survey. Informed consent was obtained from all participants prior to data collection. Participation was voluntary, anonymous, and free from any form of coercion. Participants were informed of their right to withdraw at any stage without penalty. All data were kept confidential and used solely for research purposes in accordance with accepted ethical research standards. AI-assisted language tools were used exclusively to improve grammar, language quality, and readability of the manuscript. No AI tools were used for data analysis, interpretation, scientific reasoning, or the generation of research findings. The authors take full responsibility for the content of this article.

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