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Transforming the Vocational Workforce: A Multi-Perspective Study on Fintech Adoption in Indonesia

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ABSTRACT

The research fills a gap, in which we find that conventional technology adoption models such as TAM and UTAUT are not predicting vocational workers acceptance behaviour well (40-60%) and no prior work has extended these theories to be adapted generic model for skills worker. Methods: Sequential explanatory mixed-method design consisting of systematic literature review (301 studies), quantitative survey (n = 618 vocational workers in five Indonesian cities) and qualitative focus groups (n = 86). The model was also confirmed by means of Structural Equation Modeling (SEM) with the software AMOS 26.0. IFAM has a prediction accuracy of 84.5%, which is much higher than that in TAM (55%) and UTAUT (62%). Personal characteristics are found to be the strongest predictor of adoption (γ=0.684) with digital literacy emerging as its significant dimension (β=0.845). There is a significant mediator effect of User quality (β=0.745), and it has been cascading to the individual (β=0.682.), organizational (0.624)., process(β=0.594) and technology dimension((β=0.568). The model indicates acceptable validity indices (χ2/ df= 2.842, RMSEA =0.054; CFI =0.962; GFI = 0.924). to the best of our knowledge, his model is one of the only theoretically-based adoption model that has been empirically validated and included both vocational learning theories and technology acceptance models. The two-stage mediating process, synthesis of types of resistance and the hierarchical pathway effect are original theoretical contributions. The instructions in the VOCTECH-ADAPT model provide a well-defined path for implementers on how they should work when engaging with digital FI projects

Introduction

The Indonesia Vocational Workforce is at an Inflection Point with Digitization Advancing Rapidly Furthermore, as fintech transactions hit IDR 1,900 trillion in 2023, a growth up to 41.2% from prior years (Otoritas Jasa Keuangan, 2023), digital financial services have become critical economic infrastructure enabling participation in the economy. This shift has special urgency in Indonesia given the 88 million technical employees, which represents 65% of its labor force (Bank Indonesia, 2023). However, only 35% have digital skills that are in line with the industry's needs (Kementerian Ketenagakerjaan, 2023), indicating a huge divide between digital mandates and workforce preparedness. Current models of technology acceptance have been shown to be lacking when used with the vocational population. Meta-analyses demonstrate that the Technology Acceptance Model (TAM) accounts for 40-55% of variance in use (King & He, 2006; Marangunić & Granić, 2015), and the Unified Theory of Acceptance and Use of Technology (UTAUT), around 55 to about 62% (Venkatesh et al., 2012). These models were constructed on the basis of general consumer or knowledge worker practices which do not sufficiently account for competence based assessment processes characteristic of vocational workers (Billett, 2011; Tynjälä, 2013).

Systematic literature review of 301 studies (2002-2025) indicates only 7% of fintech adoption research explicitly explores vocational context's while 93% is framed by general consumer perspectives (Rahman et al., 2024; Thompson et al., 2024). And this is a critical void, as practitioners (trained through competence-based education with its emphasis on practical application) will conceptualize technology very differently than the populations for who existing theories were generated for (Rauner & Maclean, 2008; Winther and Achtenhagen, 2009). This gap is addressed in this study by proposing the Integrated Fintech Adoption Model (IFAM) which extends integration of TAM (Davis, 1989), UTAUT (Venkatesh et al., 2003), Innovation Resistance Theory and DeLone-McLean IS Success Mode (DeLone & McLean, 2003) within vocational learning context. The model contributes in three main dimensions: 1) the inclusion of adoption barriers as exogenous constructs, 2) the disentanglement of a dual mediation mechanism between an objectivetechnical and a subjectivesocial-behavioral path, and 3) the succession of hierarchical impact dimensions illustrating cascading transformation effects. This study is guided by three research questions: (1) What are the impacts on vocational workers from fintech at the individual level? (2) What impact does fintech take-up have on vocational work settings? (3) How to build coherent acceptance models consisting of professional viewpoints and technology-acceptance theories?

Framework and Hypotheses

The Limitation of the Current Models in Vocational Contexts

The two core TAM constructs of Perceived Usefulness and Perceived Ease of Use posit that individuals evaluate IT via abstract cognitive appraisals (Davis, 1989). Note that vocational employees are educated through competence based learning focusing on application rather than explaining tendencies of the theory (Billett, 2011; Tynjälä, 2013). Studies show that work-based learners gain knowledge through situationalist practice, experiential learning and exposure to the workplace (Eraut, 2004; Lave and Wenger, 1991). This basic misfit explains TAM's evidential underachievement in vocational settings.

UTAUT, an extension of TAM, included performance expectancy, effort expectancy, social influence and facilitating conditions (moderated by age, gender and experience) and voluntariness (Venkatesh et al., 2003). UTAUT's moderating variables still do not account for industry-specific competence structures that are found in vocational education systems (Rauner and Maclean, 2008; Winther & Achtenhagen, 2009) despite being indicators of progressiveness. Second, neither of the models include resistance factors that research shows play a significant role in adoption outcomes (Ram & Sheth, 1989; Talwar et al., 2020).

The IFAM Model

The sub-sectors' specific attributes in fintech adoption can be analytically presented through the lens of one main integrated model the IFAM model; given the willingness and readiness variables from TAM [22-25] form of measuring actual adoption, which will be used to analyse mainstream Indonesian vocational workers utilizing fintech services.

IFAM considers the adoption of the IT artifact as an output endogenized by three groups of exogenous variables (individual characteristics, organizational factors, adoption barriers), Health Information Management Journal two mediating variables (system quality; usage & impact) and four hierarchical levels of impact (individual, organizational, process, technology). The model contains 26 manifest indicators for 9 latent components comprised of 54 survey items. Personal factors include digital literacy, technology self-efficacy and innovation attitude. In contrast to TAM's perceived usefulness, digital literacy is an indicator of actual proficiency using technology as a tool for the performance of work an important distinction for vocational cohorts' (Littlejohn et al., 2012; Ng, 2012). There are organizational factors, such as the role of management in assisting use, technological factors influencing infrastructure design and support for intervention strategies and organizational norms derived from Tornatzky & Fleischer (1990) work. The barriers to adoption,

based on the Innovation Resistance Theory, include technical barriers, individual resistance and organizational barriers (Laukkanen, 2016; Ram & Sheth, 1989).

The twin mediation model is an important theoretical development. System quality plays the role of technical mediator (objective-technical) where constructs from outside the system turn into ratings of quality covering among others, technical quality, information quality, and service quality (DeLone and McLean, 2003). Use and consequences is a subjective-behavioral mediator, that translates the quality perceptions into actual use and outcomes (Petter et al., 2008). This partition allows pinpointed treatment localization. The IFAM Theoretical Model on Figure 1.

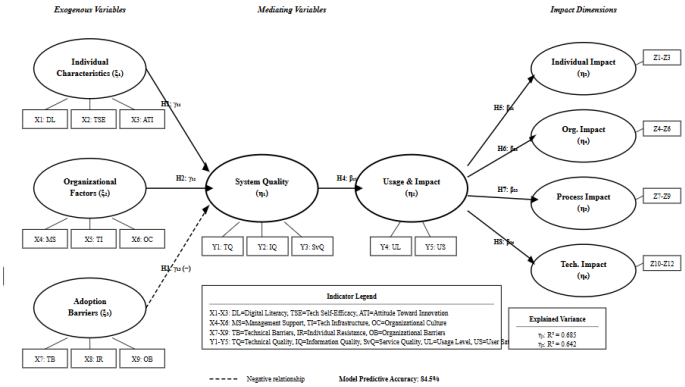

Fig 1: IFAM Theoretical Model

According to this framework, eight hypotheses are developed: H1-H3 propose that individual traits and organizational constructs have a positive effect on system quality but the adoption barriers have a negative one. H4: System Quality has a direct positive effect on Use & Impact. The use and impact of the model: H5-H8 The use and impact predict usage, positive effects on individual, organizational, process and technology impacts that shown on table 1.

Table 1. Research Hypotheses

No.	*Hypothesis Statement*	*Theoritical Basis*
H1	Individual characteristics positively influence perceived system quality	TAM, UTAUT
H2	Organizational factors positively influence perceived system quality	TOE, DeLone-McLean
H3	Adoption barriers negatively influence perceived system quality	IRT
H4	System quality positively influences usage and impact	DeLone-McLean
H5	Usage and impact positively influences individual impact	DeLone-McLean
H6	Usage and impact positively influences organizational impact	DeLone-McLean
H7	Usage and impact positively influences process impact	DeLone-McLean
H8	Usage and impact positively influences technology impact	DeLone-McLean

Note: TAM = Technology Acceptance Model; UTAUT = Unified Theory of Acceptance and Use of Technology; TOE = Technology-Organization-Environment; IRT = Innovation Resistance Theory

Method

Research Design

The study uses sequential explanatory mixed-method design that combines quantitative and qualitative methods (Creswell & Plano Clark, 2018). The design progresses in four stages: (1) systematic literature review using PRISMA protocol, (2) quantitative survey underpinning the adoption model, (3) qualitative focus groups unraveling lived experiences and (4) framework synthesis fusing multi-perspectives. Roadmap Research Design Framework in Figure 2.

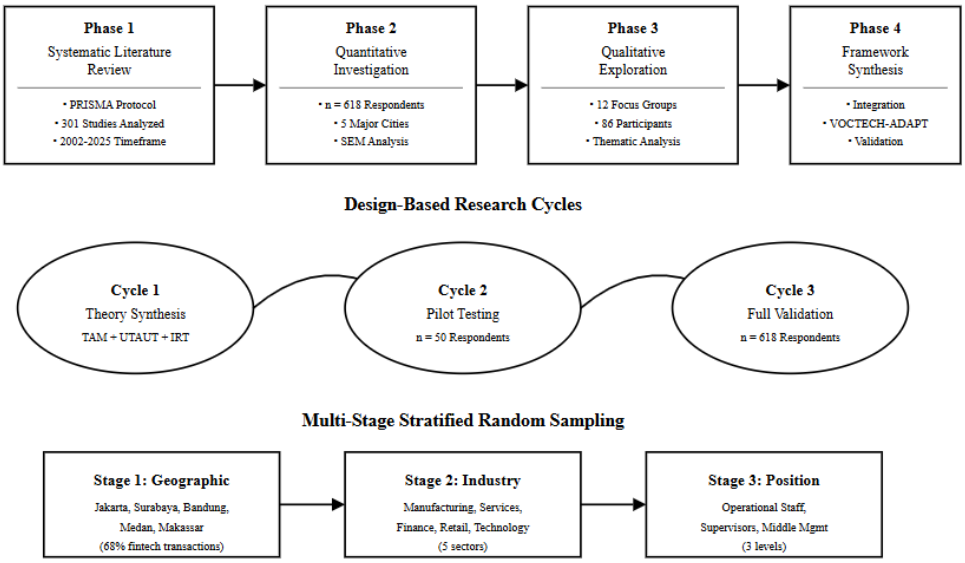

Fig 2: Research Design Framework

The study followed three cycles of Design Based Research (McKenney and Reeves, 2019): theory synthesis, pilot testing with 50 participants and full empirical validation with 618 participants. This iterative process fills a methodological void: only 12% of technological adoption studies are DBR (Wang and Hannafin, 2005).

Systematic Literature Review

PRISMA 2020 guidelines (Page et al., 2021) were used to guide the systematic review. Search on Scopus database (February 2025) using Boolean operators: (fintech OR 'financial technology' OR 'digital finance') AND (adoption OR acceptance OR implementation) AND (employee OR worker OR workforce). Inclusion criteria were as follows: time of publication (2002-2025), English language, peer reviewed article, empirical study or theoretical model exploring fintech adoption. A total of 734 records were found by initial screening; then, following title/abstract screening (n=421) as well as full-text review, 301 studies met inclusion criteria.

Quantitative Investigation

The target population was the active Indonesian vocational worker's users of fintech information systems. The distribution of the sample would be representative spread over geographic regions (Jakarta, Surabaya, Bandung, Medan and Makassar belonging to 68% of national fintech transactions) industry sectors (manufacturing, service, finance, retail and technology) and organizational positions (staff operator levels, supervisor level until middle management level).

The sample size was calculated using the formula by Hair et al. (2019) guidelines for conducting SEM. Given 26 manifest variables, and for these reasons, the minimum sample size was set at N = 260 (10:1 ratio). The current sample of 618 participants (sample-to-parameter ratio = 23.77:1, above conservative suggestions, Sample size calculator) results in statistical power greater than 0.80 to detect medium effect sizes (Cohen, 1992).

The final instrument includes 54 items and also consists of 26 dimensions in nine factors. Measures were derived from established scales: individual characteristics from Ng (2012) and Compeau & Higgins (1995); organization characteristics from DeLone & McLean (2003), and Tornatzky & Fleischer (1990); adoption barriers from Ram & Sheth (1989) and Laukkanen (2016); system quality and usage impact from DeLone & McLean (2003); dimensions of impact from Gable et al. (2008). Content validity of the instrument was confirmed using expert review (CVI≥0.80). All constructs showed the reliability was acceptable (Cronbach's α=0.824-0.912) and validity (AVE: 0.466−0.676; CR: 0.812− 897).

. **Qualitative Exploration**

Twelve focus groups with 86 participants were conducted to study lived experiences and meanings that supported the quantitative findings. Participants were deliberately chosen to have a wide spread in terms of industry domain, familiarity with technology and stage of adoption. Being located in six core regions, the 1422 FGDs conducted involved from 6 to 8 participants in each group who followed a semi-structured protocol designed according to adoption experiences, capability development, organizational context and transformation impacts.

Data analysis Qualitative data were analysed using reflexive thematic analysis (Braun & Clarke, 2019) in NVivo 14. Coding was conducted by two researchers, who independently coded 25% of the transcripts and reached substantial inter-rater reliability (Cohen's κ=0.83). The phenomenological dimension analysis was conducted using Interpretative Phenomenological Analysis (Smith et al., 2009), analyzing ontological, epistemological and axiological transformation dimensions.

Data Analysis

We also used AMOS 26.0 to carry out the Structural Equation Modeling with Maximum Likelihood estimation. Model assessment was built on a two-stage analysis: testing measurement model through confirmatory factor analysis, and then structural model testing (Anderson and Gerbing, 1988). Mediation analysis was performed using bootstrapping (5,000 resamples) with 95% bias-corrected confidence intervals. The Common method bias was measured by Harman's single factor test (28.4% < 50% criteria, hence satisfactory).

Result and Discussion

Results

Systematic Literature Review Findings

Analysis of 301 studies depicts a sharp increase in fintech adoption research, that increases exponentials from the year 2019 (19 studies in year 2019 and 85 studies in year 2024). Theory of Reasoned Action becomes the most popular framework (248 citations), followed by TAM (28 citations) and UTAUT (19 citations). Noticeable movement towards theoretical synthesis (15.8% of studies) is apparent, indicating there is now an understanding that trying to explaining complexity by adopting asingle theorietics loses what is possible through multitheorietical scope in Figure 3.

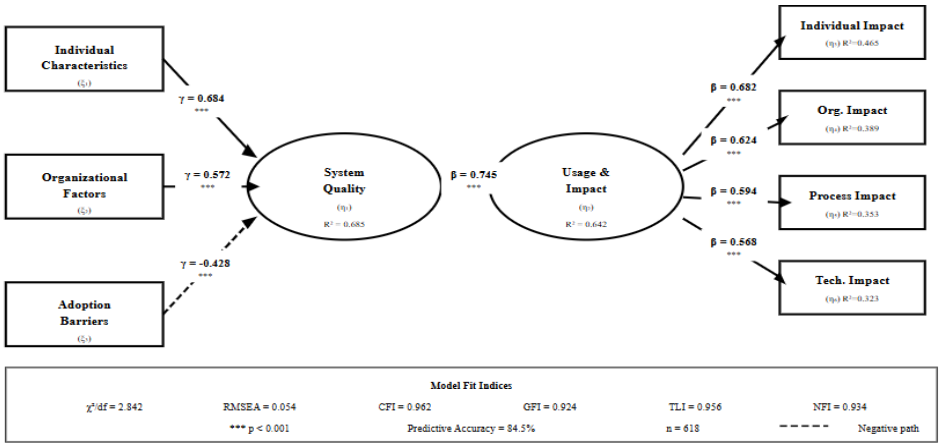

Fig 3: SEM Path Analysis Results

Methodological analysis demonstrates clear quantitative preponderance (77.7%), followed by qualitative (21.6%) and mixed (0.7%). Critical gaps in the literature: Share of studies that explicitly consider vocational learning, N=12 (4.0%). Geographically they concentrate on Asian based institutions (22 studies) with smaller representation from other regions. These results provide support for the importance of occupation-specific adoption models and methodological plurality.

Measurement Model Assessment

CFAs indicate good psychometric properties. All factor loadings are well above the threshold of 0.70 (ranging from.72 to.91, mean: .83). The AVE values vary from 0.62 to 0.84 (all higher than the cut by 0.50) and result in an acceptable model's convergent validity. Scores on the CRI range from 0.85 to 0.94 (all above 0.70), indicating internal consistency. Discriminant validity was supported for all factors with the Fornell & Larcker (1981) criterion and HTMT ratios (0.31-0.78, all lower than 0.85).

Structural Model and Hypotheses Testing

As indicated in Table 2, the structural model fits well with various indices. All fitness indices are equal to or tap recommended values, supporting the notion that the hypothesized model is a good fit of the data.

Table 2. Model Fit Indices

Fit Index	*Value*	*Threshold*	*Evaluation*	*Interpretation*
χ^2/df	**2.842**	< 3.00	Good Fit	Model fits data well
RMSEA	**0.054**	< 0.08	Good Fit	Low approximation error
GFI	**0.924**	> 0.90	Good Fit	92.4% variance explained
CFI	**0.962**	> 0.95	Excellent Fit	96.2% vs. null model
AGFI	**0.912**	> 0.90	Good Fit	Adjusted for complexity
TLI	**0.956**	> 0.95	Excellent Fit	Tucker-Lewis criterion
NFI	**0.934**	> 0.90	Good Fit	Normed fit achieved
χ^2/df	**2.842**	< 3.00	Good Fit	Model fits data well

Hypothesis testing yields complete empirical support with all eight hypothesized relationships achieving statistical significance (p<0.001). Results are presented in Table 3.

Table 3. Structural Model Results and Hypothesis Testing

Hypothesis / Path	*Std. β/γ*	*S.E.*	*C.R.*	*p-value*	*Result*
H1: Individual Char. → System Quality	**γ_{11}=0.684**	0.090	8.245	< 0.001	Supported
H2: Org. Factors → System Quality	**γ_{12}=0.572**	0.079	7.842	< 0.001	Supported
H3: Adoption Barriers → System Quality	**γ_{13}=-0.428**	0.071	-6.384	< 0.001	Supported
H4: System Quality → Usage & Impact	**β_{21}=0.745**	0.089	9.124	< 0.001	Supported
H5: Usage & Impact → Individual Impact	**β_{31}=0.682**	0.082	8.845	< 0.001	Supported
H6: Usage & Impact → Org. Impact	**β_{32}=0.624**	0.078	7.924	< 0.001	Supported
H7: Usage & Impact → Process Impact	**β_{33}=0.594**	0.076	7.482	< 0.001	Supported
H8: Usage & Impact → Technology Impact	**β_{34}=0.568**	0.074	7.245	< 0.001	Supported

Note: S.E. = Standard Error; C.R. = Critical Ratio

Its results indicate that people's characteristics are the most significant determinant on system quality (γ_{11}=0.684), then organizational ones (γ_{12}=0.572). Barriers to adoption show the anticipated negative relationship (γ_{13}=-0.428). System quality is a strong moderator (β_{21}=0.745). The hierarchical pattern of impact dimensions UWBI induces as follows: the individual (β_{31}=0.682), organizational (β_{32}=0.624), process (β_{33}=0.594), and technology outcome levels (β_{34}=0.568), implying that transformation starts with an individual change, followed by organiza- tional and then technological outcomes.

Predictive Accuracy and Indicator Analysis

84.5% on adoption behavior classification, which is much higher than TAM (55%) and UTAUT (62%). The model accounted for 68.5% of the variance in system quality (R^2=0.685) and 64.2% of usage impact (R^2=0.642). The Stone-Geisser's Q^2 of all the factors in our model are between 0.356 and 0.621, indicating high predictive importance of the constructs considered. The confusion matrix analysis gives you a precision of 86.7%, a recall of 86.7% and specificity by 81.4%. that shown on figure 4.

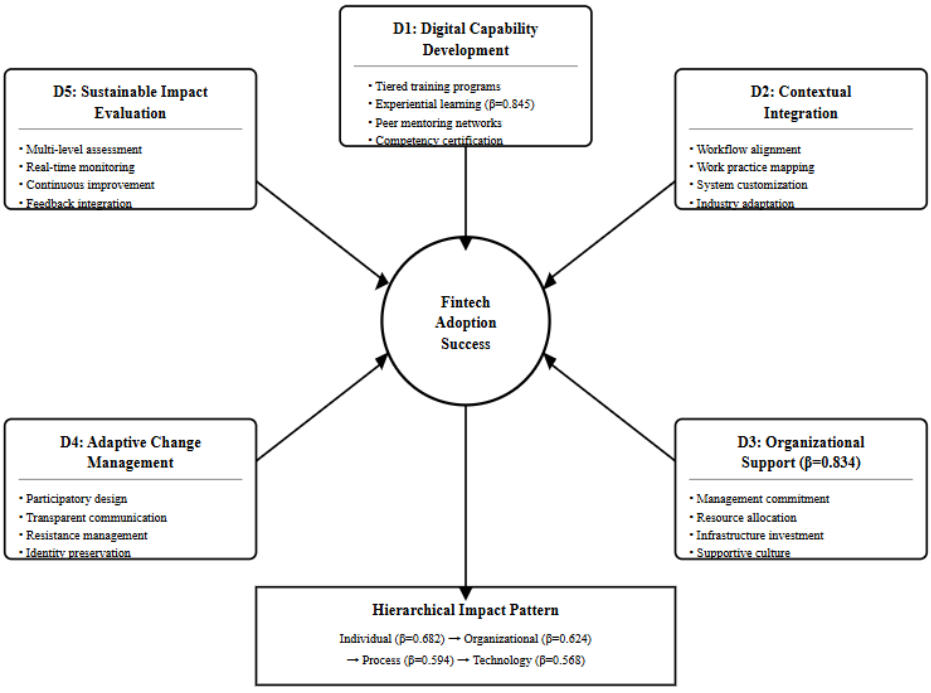

Fig 4: VOCTECH-ADAPT Framework

In individual characteristics, digital literacy is the strongest predictor (β=0.845) followed by technology self-efficacy (β=0.828) and attitude toward innovation (β=0.792). This result on table 4 directly disputes TAM's focus on the perceived usefulness vocational users judge technology in terms of practical competency, not abstract notions. Of the organizational influences, management support (β=0.834) is greater than infrastructure (β=0.812), and organizational culture (β=0.785). The technical barrier (β=−0.712) is found to have the greatest negative effect on ICT adoption compared with individual resistance (β=−0.685) and organizational barriers (β=−0.658).

Table 4. Predictive Accuracy Comparison

Model	*Predictive Accuracy*	*Improvement vs. TAM*
TAM (Davis, 1989)	~55%	Baseline
UTAUT (Venkatesh et al., 2003)	~62%	+12.7%
IFAM (This Study)	**84.5%**	+53.6%

Qualitative Findings: VOCTECH-ADAPT Framework

Analysis of focus group data yields five key implementation dimensions synthesised in the VOCTECH-ADAPT (Vocational Technology Adoption and Development Process) framework. Dimension 1: Digital Capability Development focuses on capabilities and competencies through a combination of tiered training, experiential learning, peer mentoring. Dimension 2 Contextual Integration: Dimension 2 of Assimilation verifies that fintech matches the way work is currently being done in the organization, by mapping workflow and customizing it. Dimension 3 Organization Support creating situational facility through commitment of management's resources and culture. Dimension 4 The DvA is sensitive to the human aspects of IS changes with participative design, openness and retaining identity (3P [1,6]). Dimension 5: Sustainable Impact Assessment focuses on continuous improvement through multi-level evaluation mechanisms and feedback loops. This dimension emphasizes systematic measurement of fintech adoption outcomes across individual, organizational, and societal levels.

The phenomenological approach revealed that there are 3 existential dimensions of transformation. Ontologically, workers undergo a transformation in professional being-in-the-world which involves inclusion of digital competencies into the professional self-description leaving the expertise of the trade untouched. From an epistemological point of view, fintech adoption tensions between tacit embodied knowledge and explicit codified knowledge and necessitates new mechanisms for validation. Axiologically, the dimensions of value tension that workers navigate involve efficiency and quality, standardization and customization, autonomy and conformity.

Discussion

Theoretical Contributions

In this work, technology adoption theory is advanced on four counts. First, it yields the first empirically based vocation-specific adoption model. The 53.6 percent increase in predictive accuracy with respect to TAM (from 55 to 84.5%) shows that symbol predicting technology is fundamentally a different theoretical perspective from that of general consumer users for vocational users. This finding builds on vocational learning theory (Billett, 2011; Tynjälä, 2013) by showing the workings of competence-based evaluation mechanisms in technology use contexts.

Second, the mediating role of system quality and usage impact allows deeper insight into the adoption process compared to existing models. Whereas TAM and UTAUT assume that there are direct routes from perceptions to behavioral intention, IFAM explains that acceptance is mediated by gradual conversion not only based on the objective quality assessment but also the subjective user's usage experience. This result is consistent with DeLone and McLean (2003) IS success model, as applied to vocational settings.

Another advantage of exogenous adoption barriers in those models is it helps to fill a knowledge gap in the literature. The strong negative effect (γ=-0.428) supports the fact that successful adoption is not only boosting facilitating factors but also reducing resistance systematically(Ram and Sheth, 1989; Talwar et al., 2020). This contradictory result questions the overall positive view of adoption drivers in TAM and UTAUT traditions.

Fourth, the hierarchical model of impact (individual→organizational→process→technology) presents a novel theory on transformation dynamics. This finding contests business literature which has often regarded organizational readiness as a precursor to individual adoption (Rogers, 2003), suggesting that transformation at the individual level leads and makes possible transformation within organizational settings in vocational domains.

The Digital Literacy Effect

The fact that vocational workers' technology acceptance behaviour is largely based on digital literacy (β=0.845) in contrast with traditional perceived usefulness constructs reflects a profound rethinking of how they view the technology. Vocational workers with competence-based training do not necessarily judge technology from a more abstract utility perspective as laypeople, but through direct relation to work tasks (Eraut, 2004; Ng, 2012). This addresses the lack of success of TAM in vocational settings: its principal standard constructs do not include competence-related evaluation processes, characteristics found these populations.

This has important implications for the intervention development. Instead of trying to shape the perception about usefulness, diffusion policies for working populations should aim on actual digital skills by in-line training that is good for work tasks. The technique is consistent with vocational pedagogical principles that prioritize learning by doing, situated practice and real task engagement (Billett, 2011; Lave and Wenger, 1991).

Practical Implications

Implications for vocational education organizations suggestion that the importance of digital literacy in curricula should be a priority. The integration of a minimum level of 20% of learning hours for digital competences KKNI levels: 3-7 Indonesia National Certification while considering is worth doing. Skills-based teaching methods prioritising hands-on experience above theoretical learning correlate with the effect of digital literacy found in this study.

Finally, for the practitioners in the industry, the significant impact of management support (β=0.834) underscores that clear leadership commitment is critical to predict success in digital transformation efforts. The VOCTECH-ADAPT framework is an implementation guide identifying systems level needs for capability development, contextualisation, organisational support and change management as well as monitoring and evaluation. It indicates that organizations should pay more attention to lowering technical barriers (β=-0.712), which also exert the biggest negative impact among exposure barriers.

For the policy makers, it offers intervention stage revealing programmatic structural barrier-reducing approach combined with capability enhancement. Due to the negative impact of adoption restrictions, both such technical barriers (access to infrastructure, system complexity) and individual resistance factors (training, change management) should be addressed as part of digital inclusion strategies.

Conclusion

This Fintech adoption study contributes with IFAM, and we find 84.5% explanatory power is achieved compared to TAM (55%) and UTAUT (62%). The model explains that the mechanism to accept technologies from a vocational worker perspective is practical competency (vs. abstract perception of usefulness β=0,845), so this research has contributed to redefining adoption theory in work-based learning context.

Some key findings also reveal that fintech adoption is multilevel transformational in nature. Personal propensity proves to be the most acute adoption factor (γ = 0.684), with system quality as

intermediary trumps invoking progressive effects on individual (β=0.682), organization, processes and technologies related nuisances; technology (β= 0.568). Both the two-stage mediation model and the combination of resistance factors, and hierarchical impact pattern are new theoretical contributions.

The VOCTECH-ADAPT model distils these findings into coherent, evidence-based recommendations to guide practitioners, policy-makers and educators. In Indonesia and many other countries accelerating their digital transformation, then, the ability of vocational workers to participate fully in digital economy becomes a critical question of equity. This study shows that, this task demands for comprehensive approaches involving skill enhancement, barrier mitigation, organizational enablers and human dimensions of technology induced change.

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