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Human Capital Development through Virtual Reality-Based Learning: Investigating Perceived Coolness, Motivation, Satisfaction, and Learning Performance among Rattan Craftsmen

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CITATION

Wolor CW, Suhud U, Pratama A, et al. (2026). Human capital development through virtual reality-based learning: Investigating perceived coolness, motivation, satisfaction, and learning performance among rattan craftsmen. *Human Resources Management and Services*. 8(3): 6092.
<https://doi.org/10.18282/hrms6092>

ARTICLE INFO

Received: 22 June 2026

Accepted: 13 July 2026

Available online: 22 July 2026

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Abstract: This research analyzes the effect of perceived coolness using VR technology on learning motivation using VR, learning satisfaction using VR, and learning performance using VR among rattan craftsmen in Trangsan Village and Rajapolah Village. A quantitative survey was conducted with 143 rattan craftsmen selected through purposive sampling. Data were collected using a five-point Likert scale questionnaire and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results show that perceived coolness using VR technology positively affects learning motivation using VR, but does not directly affect learning satisfaction using VR or learning performance using VR. Learning motivation using VR positively affects learning satisfaction using VR, but does not directly influence learning performance using VR. Meanwhile, learning satisfaction using VR positively affects learning performance using VR. These findings indicate that learning satisfaction connects VR-based learning experiences with improved learning performance. The development of VR-based learning in the rattan handicraft industry should emphasize alignment between learning materials and workplace practices, ease of technology use, and relevant practical learning experiences to sustainably improve craftsmen’s competencies.

Keywords: Virtual Reality; Perceived Coolness; Learning Motivation; Learning Satisfaction; Learning Performance; Sustainable Growth

1. Introduction

Digital transformation has become one of the main drivers of change across various creative and craft-based manufacturing sectors, including the home-based rattan industry in Indonesia. This transformation is not only related to marketing and market access but also extends to human resource capacity development, particularly through technology-based learning and workplace training. Recent literature indicates that digital transformation contributes to improving the quality of learning through digital platforms, interactive learning systems, and immersive technologies such as Augmented Reality (AR) and Virtual Reality (VR), which can create more contextual and applicable learning experiences [1–4]. The digital transformation of the rattan weaving industry has created new opportunities for craftspeople to upgrade their production skills, design creativity, and market adaptability to meet the demands of a dynamic market.

Existing literature posits that digital learning is a core pillar of the transformation of community-based industries. The Stimulus-Organism-Response framework

explains how digital stimuli shape learning outcomes and work performance through psychological states [2,5–7]. Existing research points out that the four core factors influencing the adoption of digital learning technologies are digital content quality, interactivity, perceived usefulness, and perceived ease of use [3,5,7,8]. Beyond transferring technical knowledge, technical learning in the rattan weaving industry also needs to strengthen craftspeople's adaptive capabilities.

While digital transformation brings opportunities, the technological empowerment of craftspeople still faces complex challenges. A review of existing relevant academic literature concludes that small family-based industrial communities face four core barriers to the implementation of technology-enabled learning: low technological readiness, limited digital infrastructure, uneven digital literacy, and insufficient quality of learning content [1–3,7]. Even though artisans have gained increasing access to digital devices, their low level of technological maturity still limits their ability to apply new technologies [7,9,10]. Furthermore, differences in artisans' technology acceptance stem from age, work experience, and traditional habits.

Drawing on multiple existing studies, we propose constructing a contextualized, interactive, community-oriented digital learning ecosystem that integrates relevant learning supports to advance the digital transformation of craft practitioners [2,3,5,7,8,11]. The successful implementation of learning technologies is by no means determined solely by technical factors; it is also shaped by users' psychological factors including motivation, engagement, satisfaction, and perceived attractiveness of the technology.

In recent years, VR, which is capable of creating immersive, interactive, authentic learning experiences, has been applied in the fields of learning and workplace training [3,6,7,12]. VR technology has been applied in operational training, work simulations, practice-based learning, and service skill development across various sectors, including the creative and tourism industries [6,12–15]. In the rattan industry, VR has the potential to help craftsmen understand production techniques, design simulations, quality control, and product creativity development through more visual and practical learning experiences.

However, the implementation of VR does not automatically lead to improved learning. The literature indicates that content quality, material relevance, technology readiness, user comfort, and interaction design are important factors determining the effectiveness of VR in learning [3,7,12]. Therefore, recent studies have begun to highlight the importance of users' psychological factors in explaining the successful use of VR technology. One factor that has received attention is perceived coolness, namely users' perception of the attractiveness, modernity, and hedonic value of a technology, which may influence interest, engagement, and positive user evaluations [16–19]. In VR-based learning, perceived coolness is viewed as capable of increasing learning motivation and satisfaction, which may ultimately contribute to improved individual performance.

Literature on individual performance measurement shows that performance in technology-based learning is not only reflected in short-term learning outcomes, but also in the ability to transfer knowledge into work practice, improve skills, increase productivity, and sustain the use of learning technologies. Stimulus-Organism-Response (SOR) is used as the grand theory because it explains the relationships among the variables in an integrated manner. Perceived coolness is positioned as a stimulus that influences craftsmen's psychological states, particularly motivation

and satisfaction, which subsequently produce responses in the form of improved learning performance and work practice [3,5,7,20]. However, empirical studies that specifically examine VR-based learning among rattan craftsmen by integrating perceived coolness, motivation, satisfaction, and performance remain very limited.

Based on this discussion, the present research analyzes the transformation of learning among rattan craftsmen through Virtual Reality by positioning perceived coolness, motivation, and satisfaction as factors influencing performance. More specifically, it examines the relationships among perceived coolness, motivation, satisfaction, and performance in the context of VR-based learning among rattan craftsmen. The novelty lies in the use of the Stimulus-Organism-Response (SOR) framework to explain the mechanism linking these variables in the rattan craft industry, which remains underexplored in the literature. The research focuses on human resource issues in the rattan weaving handicraft sector, with the ultimate goal of strengthening sustainable human resource capacity building.

2. Materials and methods

2.1 Theoretical Foundations

The Stimulus-Organism-Response (SOR) framework is adopted as the core theory to explain the relationships among perceived coolness using VR technology, learning motivation using VR, learning satisfaction using VR, and learning performance using VR. Within VR-based learning, perceived coolness is positioned as the stimulus because it reflects the attractiveness, novelty, and hedonic value of VR technology. Learning motivation and learning satisfaction represent users' psychological states, while learning performance represents the learning response [3,5,7,12,20].

The SOR framework is suitable because immersive VR experiences can influence users' affective and cognitive responses through immersion, interactivity, authenticity, telepresence, flow, and enjoyment [6,13,20]. However, the effectiveness of VR learning also depends on technology readiness, content quality, digital literacy, and cultural suitability [3,7,12]. Therefore, SOR provides a concise theoretical basis for examining how perceived coolness may shape learning motivation, satisfaction, and performance among rattan craftsmen.

2.2 Key Constructs and Their Relevance to the Study

Virtual Reality (VR) is an immersive learning technology that offers more realistic visual effects and interactive experiences than traditional learning methods. In creative industries and skill-oriented learning contexts, VR can strengthen work simulation, skill transfer, and process understanding [6,12,13,21]. Previous studies indicate that VR effectiveness depends on localized content, interaction design, and digital literacy [3,7].

Perceived coolness in VR technology refers to users' perception of the technology's attractiveness, novelty, and aesthetic quality. This construct is relevant because attractive technologies can improve learning interest and engagement in digital learning processes [16,20,22]. Therefore, perceived coolness is positioned as an initial factor that may influence rattan craftsmen's acceptance of VR-based learning.

Learning motivation in VR learning refers to intrinsic and extrinsic drives that encourage individuals to participate in technology-based learning. Intrinsic motivation, such as curiosity and interest, supports deeper learning, while extrinsic

motivation, such as certificates and recognition, encourages initial participation [20,23,24]. In rattan weaving production, motivated craftsmen are expected to engage with simulation content and apply the skills learned.

VR learning satisfaction refers to users' positive evaluations of their VR learning experiences and is influenced by content quality, usability, interactivity, and perceived learning benefits [24–26]. Previous studies show that satisfaction is closely associated with the continuous use of learning technologies and improved knowledge transfer [19,20].

Learning performance in VR learning refers to participants' ability to understand learning content, improve knowledge and skills, and apply learning outcomes to practical work. In the professional context of rattan craftsmen, it is examined through the ability to transfer VR-based learning into rattan production practices [6,12,21].

2.3 Hypothesis Development

2.3.1 Perceived Coolness Using VR Technology and Learning Motivation Using VR

From the SOR perspective, perceived coolness represents a stimulus capable of enhancing users' psychological responses toward learning technology. VR characteristics such as realism, attractive visuals, and interactivity can increase users' curiosity, engagement, and enthusiasm for learning [16,18,20]. Previous studies indicate that technologies perceived as attractive are capable of increasing intrinsic motivation and willingness to learn in digital learning environments [20,22].

H1. Perceived Coolness using VR Technology positively influences Learning Motivation using VR.

2.3.2 Perceived Coolness Using VR Technology and Learning Satisfaction Using VR

Perceived coolness in VR creates more immersive and enjoyable learning experiences, thereby improving users' positive evaluations of the learning process. The literature indicates that telepresence, visual quality, and flow in VR are capable of enhancing user satisfaction and enjoyment [6,13,20]. Technologies perceived as innovative also increase perceived value toward digital learning [16,19].

H2. Perceived Coolness using VR Technology positively influences Learning Satisfaction using VR.

2.3.3 Perceived Coolness Using VR Technology and Learning Performance Using VR

Perceived coolness is not only related to technological attractiveness but also to learning effectiveness generated through immersive and interactive experiences. Previous studies have shown that VR is capable of improving learning outcomes and skill transfer when the technology is perceived as attractive and relevant to users' needs [6,15,21].

H3. Perceived Coolness using VR Technology positively influences Learning Performance using VR.

2.3.4 Learning Motivation Using VR and Learning Satisfaction Using VR

High learning motivation encourages user engagement and positive evaluations of technology-based learning experiences. The literature indicates that intrinsic motivation enhances flow and user satisfaction in digital learning environments [20,23,24].

H4. Learning Motivation using VR positively influences Learning Satisfaction using VR.

2.3.5 Learning Motivation Using VR and Learning Performance Using VR

Learning motivation encourages individuals to participate more actively and consistently in learning processes, thereby improving learning outcomes and skill transfer. Previous studies indicate that motivation in technology-based learning contributes to improved learning outcomes and users' practical capabilities [20,23,24].

H5. Learning Motivation using VR positively influences Learning Performance using VR.

2.3.6 Learning Satisfaction Using VR and Learning Performance Using VR

Learning satisfaction reflects users' affective evaluations of learning experiences using VR. Users who are satisfied with content quality, interactivity, and learning benefits tend to possess better abilities in applying learning outcomes to real workplace practices [24–26]. Other studies also demonstrate that learning satisfaction is associated with improved learning outcomes and learning transfer within digital learning contexts [16,20].

H6. Learning Satisfaction using VR positively influences Learning Performance using VR.

2.4 Research Model

Based on the hypotheses that have been formulated, the conceptual model is formulated as shown in **Figure 1**.

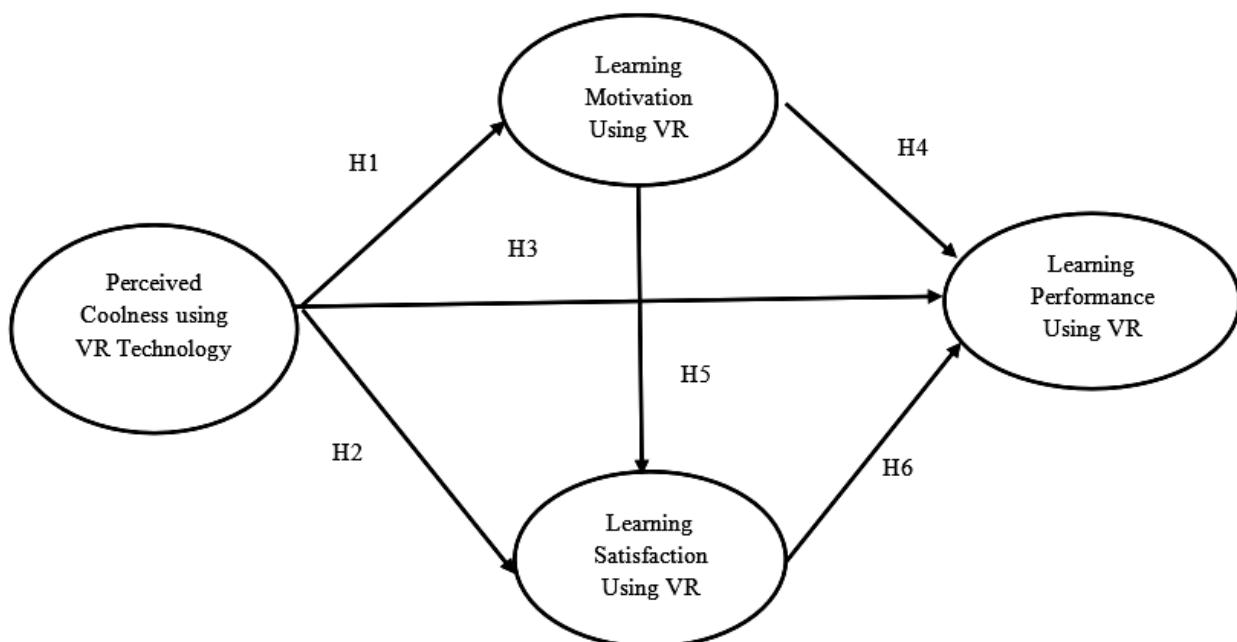


Figure 1. Research Model

2.5. Methodology

A quantitative survey method was employed to analyze the relationships among perceived coolness using VR technology, learning motivation using VR, learning satisfaction using VR, and learning performance using VR among rattan craftsmen. The research focused on craftsmen in Trangsan Village and Rajapolah Village, two Indonesian rattan handicraft centers that reflect the challenges of craft-based SMEs in adopting technology-based learning and strengthening competitiveness in the digital era [27,28]. The SOR framework served as the conceptual foundation for the research model, while the methodological procedure covered sampling, instrument adaptation,

data screening, and SEM-PLS analysis [5,7,16,20].

Purposive sampling was applied. Respondents were selected based on two inclusion criteria: active involvement in rattan production activities and prior experience in training or skill-based learning activities. These criteria ensured that respondents were relevant to the research objectives and able to evaluate VR-based learning from the perspective of craft-based work practices.

A total of 301 questionnaires were distributed to rattan craftsmen through Google Forms. Before analysis, all responses were screened to retain only eligible and usable questionnaires. Responses were excluded when participants did not meet the inclusion criteria, submitted incomplete questionnaires, provided duplicate responses, had missing values, or showed low response quality, such as patterned or inconsistent answers. After the screening process, 143 questionnaires were retained for further analysis. The final sample was considered adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM), which is suitable for predictive models involving several latent constructs and measurement indicators [29,30].

Potential non-response bias was considered by reviewing the demographic distribution of the retained respondents. The final dataset included male and female craftsmen, respondents with different marital statuses, and participants from varied educational backgrounds. This variation indicates that the usable responses were not concentrated in a single respondent category and still reflected the broader characteristics of rattan craftsmen in Trangsan Village and Rajapolah Village.

The research instrument consisted of 15 items developed from previously validated measurement scales. Because the original scales were derived from English-language sources and the respondents were Indonesian rattan craftsmen, the questionnaire was adapted into Indonesian to ensure linguistic clarity, contextual relevance, and conceptual equivalence. The adaptation process involved translation based on construct meaning, review of item clarity and contextual relevance, equivalence checking between the Indonesian and English versions, and readability checking before distribution.

The perceived coolness using VR technology variable was adapted from Liu et al. [31] and Sundar et al. [32], emphasizing visual attractiveness, technological novelty, interactivity, and immersive experiences in VR usage. The learning motivation using VR variable was adapted from Liu et al. [31] and Yin & Yuan [33], covering intrinsic motivation, learning engagement, curiosity, and the drive to improve competencies. Furthermore, the learning satisfaction using VR variable was adapted from Liu et al. [31] and Sun et al. [34], measuring satisfaction with content quality, learning benefits, and overall VR usage experiences. The learning performance using VR variable was adapted from Liu et al. [31] and Yin & Yuan [33], including knowledge improvement, material comprehension, skill transfer, and the ability to apply learning outcomes within the real work context of rattan craftsmen.

Data were collected using a structured questionnaire with a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. Data analysis was conducted using SEM-PLS because this method can test direct and indirect relationships among latent variables, accommodate medium-sized samples, and work with non-normal data [29,35]. The analytical workflow consisted of outer model and inner model evaluation. The outer model assessed construct validity and reliability, while the inner model examined relationships among variables using path coefficients and bootstrapping to test the significance of direct and indirect effects.

3. Results and discussion

3.1 Distribution of the Respondents

Rattan craftsmen from Trangsan Village and Rajapolah Village participated in this research, representing two Indonesian craft-based SME contexts relevant to VR-oriented learning. As shown in **Table 1**, the sample consisted of 75 male respondents, accounting for 52% of the total sample, and 68 female respondents, accounting for 48%. This gender composition indicates that both men and women were involved in rattan production and training activities, although differences in labor roles may exist within the industry. In terms of marital status, 93 respondents were single, accounting for 65%; 48 were married, accounting for 34%; and 2 were divorced, accounting for 1%. Most respondents were therefore within a productive demographic group and had the conditions needed to participate in learning activities related to the rattan handicraft industry.

Regarding education, most respondents had completed senior high school, with 90 respondents accounting for 63% of the sample. In addition, 37 respondents held undergraduate degrees, accounting for 26%; 5 held diplomas, 4 had junior high school education, and 4 held graduate degrees, each accounting for 3%; while 3 respondents had elementary school education, accounting for 2%. This educational profile indicates that most respondents had sufficient educational background to participate in structured learning, understand digital instructions, and engage in VR-based training.

Table 1. Distribution of Respondents' Social Status Based on Their Responses

Profile		Frequency	Percent
Sex	Male	75	52
	Female	68	48
Marital status	Married	48	34
	Single	93	65
	Divorce	2	1
Completed level of education.	Elementary School	3	2
	Junior High School	4	3
	Senior High School	90	63
	Diploma	5	3
	Undergraduate	37	26
	Graduate	4	3

3.2 Common Method Bias

Data were collected using self-reported questionnaires administered to the same group of respondents at one point in time. Because this design may introduce common method bias, Harman's Single-Factor Test was conducted following Podsakoff et al. [36]. As reported in **Table 2**, the first factor explained 42.595% of the total variance, which is below the commonly accepted 50% threshold. Therefore, common method bias was not considered a serious concern, and the data were suitable for further SEM-PLS analysis.

Table 2. The Result of Harman's Single-Factor Test

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.699	44.662	44.662	6.389	42.595	42.595
2	4.130	27.530	72.193			
3	.856	5.705	77.898			
4	.669	4.457	82.355			
5	.486	3.238	85.593			
6	.407	2.713	88.306			
7	.337	2.247	90.554			
8	.302	2.015	92.568			
9	.274	1.829	94.397			
10	.208	1.383	95.781			
11	.189	1.263	97.044			
12	.136	.906	97.950			
13	.111	.742	98.692			
14	.110	.735	99.428			
15	.086	.572	100.000			

3.3 Measurement Model

Before assessing the structural model, the measurement model was evaluated through convergent validity, discriminant validity, composite reliability, and Cronbach's alpha to ensure that all constructs met the required reliability and validity standards [29,37]. As shown in **Table 3**, the Cronbach's alpha and composite reliability values of all constructs exceeded the minimum threshold of 0.70, indicating acceptable internal consistency.

For perceived coolness using VR technology, the construct showed acceptable reliability and convergent validity, with Cronbach's alpha of 0.788, composite reliability of 0.863, and AVE of 0.613. However, the item "This VR device sets the user apart from others" had a loading of 0.688, which was below the recommended threshold of 0.70. Therefore, this item was removed to improve the measurement model [37]. The remaining indicators still demonstrated acceptable reliability and validity.

Learning motivation using VR also met the required measurement criteria, with Cronbach's alpha of 0.876, composite reliability of 0.915, and AVE of 0.729. The item loadings ranged from 0.799 to 0.890, indicating that the indicators adequately represented the construct. These results suggest that VR-based learning can activate respondents' learning motivation through skill improvement, learning initiative, enjoyment, and task completion.

Learning satisfaction using VR demonstrated strong reliability and convergent validity, with Cronbach's alpha of 0.888, composite reliability of 0.923, and AVE of 0.750. The factor loadings ranged from 0.839 to 0.899, indicating that the items

consistently reflected respondents' satisfaction with VR training, perceived needs fulfillment, willingness to participate again, and positive evaluation of their learning choice.

Learning performance using VR had the strongest reliability among the constructs, with Cronbach's alpha of 0.895, composite reliability of 0.935, and AVE of 0.826. All item loadings exceeded the required threshold, ranging from 0.890 to 0.928. These results indicate that the construct adequately captured respondents' perceived improvement in knowledge, relevant skills, and thinking skills through VR-based learning.

Discriminant validity was assessed using the Fornell-Larcker criterion, as shown in **Table 4**. The square roots of AVE for learning motivation using VR, learning performance using VR, learning satisfaction using VR, and perceived coolness using VR technology were 0.854, 0.909, 0.866, and 0.783, respectively. These values were higher than the correlations among constructs, indicating that each construct represented a distinct conceptual dimension [29,37].

Table 3. The Result of the Measurement Model

Constructs	Items	Loading factors	Cronbach's Alpha	Composite reliability	AVE	Adapted from
Perceived Coolness using VR Technology	This VR device sets the user apart from others.	0.688	0.788	0.863	0.613	Liu et al. [31] ; Sundar et al. [32]
	This VR device is cutting-edge.	0.734				
	The purpose of this VR device is very useful.	0.842				
	This VR device is amazing.	0.855				
Learning Motivation using VR	This VR training has improved my skills and knowledge and motivated me to learn.	0.884	0.876	0.915	0.729	Liu et al. [31] ; Yin & Yuan [33]
	I am very interested in the VR training, and it has stimulated my learning initiative.	0.799				
	I am happy to have participated in this VR training.	0.890				
	When I successfully complete a task using VR, my motivation to learn is stimulated.	0.839				
Learning Satisfaction using VR	I am very satisfied with this VR training.	0.899	0.888	0.923	0.750	Liu et al. [31] ; Sun et al. [34]
	I feel that this VR training fully meets my needs.	0.853				
	If I have the opportunity to participate in another VR training, I would gladly do so.	0.873				
	My choice to participate in this VR training was a wise one.	0.839				

Continuation Table:

Constructs	Items	Loading factors	Cronbach's Alpha	Composite reliability	AVE	Adapted from
Learning Performance using VR	I have enriched my knowledge through using VR.	0.890				
	I have improved my relevant skills through using VR.	0.928	0.895	0.935	0.826	Liu et al. [31] ; Yin & Yuan [33]
	I have improved my thinking skills through using VR.	0.909				

Table 4. Discriminant Validity: Fornell-Larcker Criterion

	Learning Motivation using VR	Learning Performance using VR	Learning Satisfaction using VR	Perceived Coolness using VR Technology
Learning Motivation using VR	0.854			
Learning Performance using VR	0.738	0.909		
Learning Satisfaction using VR	0.869	0.803	0.866	
Perceived Coolness using VR Technology	0.762	0.607	0.741	0.783

Table 5 presents the coefficient of determination (R^2) and predictive relevance (Q^2) of the endogenous variables. The R^2 value of learning motivation using VR was 0.569, indicating that perceived coolness using VR technology explained 56.9% of its variance. The R^2 value of learning performance using VR was 0.652, indicating that perceived coolness using VR technology, learning motivation using VR, and learning satisfaction using VR explained 65.2% of its variance. Furthermore, the R^2 value of learning satisfaction using VR was 0.763, indicating that perceived coolness using VR technology and learning motivation using VR explained 76.3% of its variance.

Falk and Miller [38] and Hair et al. [30] the R^2 values were considered acceptable because they exceeded the minimum threshold required for explaining human behavior. Predictive relevance was assessed using the blindfolding procedure. The Q^2 values for learning motivation using VR, learning performance using VR, and learning satisfaction using VR were 0.558, 0.349, and 0.505, respectively. Since all Q^2 values were greater than 0, the model demonstrated acceptable predictive relevance [30,39].

Table 5. Coefficient of determination (R^2) and predictive relevance (Q^2)

Construct	R^2	Q^2
Learning Motivation using VR	0.569	0.558
Learning Performance using VR	0.652	0.349
Learning Satisfaction using VR	0.763	0.505

4. Discussion

The structural model results in **Table 6** indicate that three hypotheses were supported. Perceived coolness using VR technology positively influenced learning

motivation using VR ($\beta = 0.755$; $t = 16.441$; $p = 0.000$), showing that the immersive and interactive characteristics of VR increased respondents' motivation to participate in learning activities. However, perceived coolness using VR technology did not significantly influence learning satisfaction using VR ($\beta = 0.143$; $t = 1.726$; $p = 0.085$) or learning performance using VR ($\beta = 0.005$; $t = 0.047$; $p = 0.963$). Learning motivation using VR also did not significantly affect learning performance using VR ($\beta = 0.158$; $t = 0.991$; $p = 0.322$). In contrast, learning motivation using VR positively influenced learning satisfaction using VR ($\beta = 0.761$; $t = 11.230$; $p = 0.000$), and learning satisfaction using VR significantly influenced learning performance using VR ($\beta = 0.663$; $t = 5.051$; $p = 0.000$). Overall, the findings confirm that learning satisfaction became the main determinant of learning performance in VR-based learning among rattan craftsmen.

Table 6. Path Coefficients among Latent Variables

No	Path	β	T Statistics	P-Value	Significance
1	Perceived Coolness using VR Technology → Learning Motivation using VR	0.755	16.441	0.000	Supported
2	Perceived Coolness using VR Technology → Learning Satisfaction using VR	0.143	1.726	0.085	Not Supported
3	Perceived Coolness using VR Technology → Learning Performance using VR	0.005	0.047	0.963	Not Supported
4	Learning Motivation using VR → Learning Performance using VR	0.158	0.991	0.322	Not Supported
5	Learning Motivation using VR → Learning Satisfaction using VR	0.761	11.230	0.000	Supported
6	Learning Satisfaction using VR → Learning Performance using VR	0.663	5.051	0.000	Supported

First, the findings revealed that perceived coolness using VR technology positively influenced learning motivation using VR. This finding strengthens the Stimulus-Organism-Response (SOR) framework, which explains that attractive technological stimuli can generate positive psychological responses among users. In the context of rattan craftsmen, VR features perceived as modern, interactive, visual, and immersive were able to stimulate curiosity and encourage participation in learning activities. This finding is consistent with the literature stating that perceived coolness, telepresence, and immersion in VR can enhance hedonic motivation, engagement, and willingness to participate in immersive learning environments [5,11,40,41]. For rattan craftsmen in Trangsan Village and Rajapolah Village, VR became a new stimulus that expanded learning methods from traditional work experiences toward more visual and exploratory learning experiences.

Second, perceived coolness using VR technology did not significantly influence learning satisfaction using VR. This finding indicates that technological appeal alone is insufficient to generate learning satisfaction. In skill-based training, satisfaction depends on the relevance of the simulated scenario, workplace needs, content usefulness, and the extent to which VR represents actual rattan production processes. This interpretation is consistent with literature on vocational and community training contexts [42–45]. Loo et al. [46] discovered that compensation and benefits are the key factors influencing employee job satisfaction

Third, perceived coolness using VR technology did not significantly influence learning performance using VR. This finding indicates that technological novelty cannot directly improve learning performance without relevant learning materials and task alignment. For rattan craftsmen, performance improvement requires learning content related to production processes, design, weaving techniques, quality control, and workplace problem-solving. Therefore, VR should function not only as an immersive medium, but also as a workplace skills training tool that bridges virtual and real work practices [41,43,47].

Fourth, learning motivation using VR did not significantly influence learning performance using VR. This finding shows that high motivation alone cannot directly produce better performance in skill-based learning. Motivation needs to be supported by clear learning structures, practice opportunities, feedback, and evidence of real-world skill improvement. Among rattan craftsmen, motivation to use VR must therefore be translated into measurable practical activities to improve production-related competencies [43,44,48–50].

Fifth, learning motivation using VR positively influenced learning satisfaction using VR. This finding indicates that craftsmen with higher learning motivation tended to experience greater satisfaction in VR-based learning. Motivation encouraged participants to actively explore learning materials, engage with simulations, and understand the benefits of VR learning. Existing literature notes that in VR learning environments, enhancing learning motivation to improve learning satisfaction requires the support of four core elements: telepresence, enjoyment, perceived instructional value, and meaningful feedback [5,11,40,41,47]. In the context of the rattan weaving industry, learning motivation serves as a core foundation for practitioners' satisfaction with VR training programs.

Sixth, learning satisfaction using VR positively influenced learning performance using VR. This finding confirms that satisfied rattan craftsmen were more likely to apply learning outcomes to their work practices. Satisfaction with learning content, learning experience, and learning gains supported knowledge application and skill development. Existing literature suggests that satisfaction can connect learning experience and performance when learning environments provide perceived value, usefulness, transfer cues, and feedback [41,43,48–50]. Thus, VR technology has practical value for rattan craftsmen when the training is attractive, relevant, and aligned with workplace needs.

5. Conclusion

This empirical study on VR-enabled learning among rattan weaving craftspeople in Trangsan Village and Rajapolah Village shows that VR learning plays a transformative role in capacity development. The findings indicate that the perceived coolness of VR technology increases VR learning motivation, but does not directly affect learning satisfaction or learning performance. This result suggests that technological appeal alone is insufficient to support positive learning outcomes unless it is supported by conditions that fit craftspeople's learning and work needs. VR learning motivation improves learning satisfaction, while learning satisfaction positively drives learning performance. Thus, satisfaction becomes the core mechanism linking VR learning experiences with the transfer of rattan weaving skills to workplace practice.

5.1 Theoretical Implications

The findings strengthen the explanatory power of the Stimulus-Organism-

Response (SOR) framework by positioning perceived coolness as the initial stimulus, motivation and satisfaction as internal organismic conditions, and learning performance as the final response. The pathway from stimulus to performance is not consistently direct, providing an incremental contribution to the literature on vocational learning, creative handicraft professions, and human resource development within technology-enabled learning contexts.

5.2 Practical Implications

The development of virtual reality (VR) tools for rattan-weaving craftsmen must balance visual appeal with training adaptability. VR materials should be aligned with production training needs and supported by learning assistance, feedback, and practical evaluation so that learning satisfaction can be translated into tangible improvements in actual work performance.

Author contributions: Conceptualization, CWW and US; methodology, MAR and WCH; software, AP; validation, SA and HM; formal analysis, CWW; investigation, US; resources, AP; data curation, SA; writing—original draft preparation, CWW; writing—review and editing, MAR, HS, and WCH; visualization, AP; supervision, CWW; project administration, SA; funding acquisition, WCH. All authors have read and agreed to the published version of the manuscript.

Funding: The study is funded by Ministry of Higher Education, Science, and Technology of the Republic of Indonesia

Data availability statement: Study data can be provided by the corresponding author upon request.

Acknowledgments: The authors would like to thank the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia for the grant used to fund this research.

Conflict of interest: The authors declare no conflict of interest

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