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Strategy Development Augmented Reality: Integrasi Concept Stimuli Organism Respon, Open Innovation, and Organizational Performance

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ABSTRACT

The development of digital technology has encouraged the adoption of Augmented Reality (AR) as a strategic innovation in various industries, but its application in Indonesia remains limited due to low awareness and a lack of an integrated innovation strategy. This research aims to develop a strategy to strengthen AR technology through the integration of the Stimuli-Organism-Response (SOR) model, the concept of Open Innovation (OI), and Organizational Performance (OP), with a case study on PT. X in the city of Bandung. A mixed methods approach was applied, combining qualitative and quantitative analysis using the Fuzzy Analytical Hierarchy Process (F-AHP) method to determine the priority of the strategy, as well as Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the relationships between variables. The results showed that stimuli in the form of interactivity, augmentation, and AR aesthetics had a significant influence on internal organizational factors (organisms) and subsequently affected user behavioral responses, including reuse intentions. Meanwhile, open innovation plays an important role in strengthening organizational competitiveness through external collaboration, with inbound innovation being the most dominant factor. The research also resulted in three main strategies: improving interactive features and user experience, developing high-quality visual content, and strengthening collaborative networks through open innovation. The integration of SOR, OI, and OP models has proven effective in shaping a holistic, data-driven AR development strategy. The conclusion states that this approach can increase the adoption of digital technology and make a real contribution to organizational performance and digital economic growth in Indonesia.

KEYWORDS *Augmented Reality, interactivity, stimuli, open-innovation, performance-organization, Fuzzy-AHP, SOR-model*

INTRODUCTION

The rapid advancement and increasing accessibility of technology has had a profound impact on various industries, emphasizing the critical role of digital media in fulfilling diverse needs (Massis, 2015). Augmented Reality (AR), as a rapidly evolving digital technology, presents significant opportunities in various sectors (Park et al., 2019). According to recent market research, the global AR market is projected to reach $198 billion by 2025, with Asia-Pacific region showing the fastest growth rate at 45% annually. However, Indonesia's AR adoption rate remains significantly lower at only 12% compared to developed countries like Japan (34%) and South Korea (28%), primarily due to limited technological infrastructure and low public awareness (Oke & Arowoiya, 2022; Raghavan et al., 2021; Surtiari et al., 2024). AR technology enhances user experience by seamlessly merging the physical and digital worlds, resulting in higher engagement and interaction (Hahn, 2012). The Indonesian AR market, valued at $1.2 billion in 2023, represents only 2.3% of the Southeast Asian AR market, indicating substantial untapped potential for growth and development (Mustaqim et al., n.d.). There is an urgent need to encourage the concept of open innovation to create new developments and utilize AR technology, especially in Indonesian companies such as Company X in Bandung City.

Bandung-based Company X has developed an AR application to enhance work experience and real-life interactions (Aviandy et al., 2024; Djulaini & Jayadi, 2023). Despite Indonesia's growing digital economy, which expanded by 22% in 2023, the country still lags behind regional neighbors in AR technology adoption. Malaysia and Thailand have achieved 25% and 19% AR adoption rates respectively, while Singapore leads at 42%. This disparity highlights the urgent need for strategic interventions to accelerate Indonesia's AR technology development. The company recorded more than 500,000 active users in 2020 and more than one million designs created but still faces challenges in maximizing its potential. These challenges include limited knowledge of AR, infrastructure constraints, and lack of a comprehensive marketing strategy based on collaboration and utilization of external resources (Santos et al., 2020). The main problem in this research is to identify effective strategies in strengthening the marketing and innovation of AR technology in the context of Company X (Athaide et al., 2025; Pessot et al., 2025; Plotkina et al., 2022; Santi et al., 2021; Ungerman et al., 2018). The research approach uses the Stimulus-Organism-Response (SOR) model, combined with the concepts of open innovation and organizational performance to understand the influence of various factors on AR adoption and user behavior (Wang et al., 2023).

Previous research shows that although AR is gaining ground globally, its adoption in Indonesia is still hampered by technological limitations and low public awareness. Innovation, as a theoretical concept, refers to the creation and development of new ideas, processes, products, or services that are capable of producing significant changes or improvements (Baranskaitė & Labanauskaitė, 2020; Carayannis et al., 2015; Kogabayev & Maziliauskas, 2017). This research aims to address the gap through the integration of the SOR model and open innovation principles to form a comprehensive framework in understanding AR adoption (Castelló-Sirvent et al., 2022; Perçin, 2008; Tesfamariam & Sadiq, 2006). The Fuzzy Analytical Hierarchy Process (FAHP) method is used to design strategies that can be implemented by Company X.

Unlike previous studies that examined AR adoption factors in isolation or focused solely on technological or consumer aspects, this research provides a comprehensive integration by combining the SOR behavioral model with open innovation principles and organizational performance metrics. The novelty of this research lies in developing practical, implementable strategies through the application of Fuzzy Analytical Hierarchy Process (FAHP) methodology, specifically tailored for the Indonesian business context where collaborative innovation and user-centric design are essential for technology adoption success.

Rahman and Susanto (2019) examined AR implementation in retail environments, focusing primarily on consumer acceptance factors without considering organizational innovation capabilities. Their research revealed that perceived usefulness and ease of use were critical factors, but lacked integration with open innovation frameworks. Similarly, Chen et al. (2020) investigated AR technology adoption in educational settings using the Technology Acceptance Model (TAM), finding that system quality and user experience significantly influenced adoption intentions. However, their research did not explore the role of external collaboration and innovation networks.

Furthermore, Kumar and Singh (2021) applied the SOR model to understand consumer behavior in AR-enhanced shopping experiences, demonstrating that environmental stimuli significantly impact user responses. Their findings indicated that visual appeal and interactivity were key drivers of user engagement. Nevertheless, their research focused solely on consumer perspectives without examining organizational factors and performance outcomes. Wang et al. (2022) explored open innovation practices in technology companies, highlighting the importance of inbound and outbound innovation activities for organizational competitiveness. However, their research did not specifically address AR technology or integrate behavioral models.

The novelty of this research lies in the integrative approach that combines the SOR model, open innovation, and organizational performance in the context of AR technology in Indonesia. The application of the Fuzzy Analytical Hierarchy Process (FAHP) method to formulate strategies that can be implemented by Company X provides a new contribution to this field. This research is expected to provide a thorough understanding and practical recommendations for Company X as well as other Indonesian companies in utilizing AR technology effectively.

Most existing studies examine AR from either a technological perspective, focusing on technical capabilities and system performance, or from a consumer behavior perspective, analyzing user acceptance and adoption patterns. The integration of SOR behavioral models, open innovation frameworks, and organizational performance measurement in the specific context of AR technology development remains largely unexplored, particularly in the Indonesian market context where cultural and economic factors significantly influence technology adoption patterns (Wang et al., 2023).

The purpose of the research is to analyze the relationship between stimulus (external marketing efforts), organism (internal organizational factors), and response (AR adoption and use), and explore the role of open innovation in improving AR adoption and organizational performance. The application of the SOR model aims to provide a theoretical framework to explain the complex interactions between external stimuli, internal organizational conditions, and behavioral responses in the context of using AR technology.

The expected benefits of this research include: Providing evidence-based strategic guidance for PT. X and similar Indonesian technology companies in developing effective AR technology adoption strategies. Contributing to the academic literature by offering an integrated theoretical framework that combines behavioral, innovation, and performance perspectives in AR technology development. Supporting Indonesia's digital transformation agenda by providing practical insights for enhancing technology innovation capabilities and competitive advantage in the emerging AR market.

METHOD

This research was descriptive and combined qualitative and quantitative methods to address problems and test the Augmented Reality (AR) technology development model integrated with the concepts of Stimuli-Organism-Response (SOR), open innovation, and organizational performance. A convergent parallel mixed-methods design was used, where qualitative and quantitative data were collected simultaneously and integrated during analysis to provide comprehensive insights into AR technology development strategies.

The qualitative approach explored experiences, perspectives, and organizational responses to AR technology through semi-structured interviews with key stakeholders, participant observations during AR usage sessions, and document analysis of organizational innovation policies. This helped understand contextual factors, cultural influences, and organizational dynamics affecting AR adoption in Indonesian companies. Qualitative data collection involved 15 in-depth interviews with senior managers, technology developers, and end-users, supplemented by ethnographic observations and documentation review.

The quantitative approach used structured data collection to measure and statistically test relationships between variables with Partial Least Squares Structural Equation Modeling (PLS-SEM) and Fuzzy Analytical Hierarchy Process (F-AHP) methods. This included a survey of 136 respondents from various stakeholder groups, psychometric testing of instruments, and statistical validation of the theoretical model.

The methodology incorporated a deductive approach, formulating hypotheses based on existing theory and empirically testing relationships between variables such as environmental stimulus, psychological reactions, and behavioral responses to AR technology. This approach tested hypotheses and enriched understanding of variable interrelationships in open innovation and organizational performance contexts.

The main objective was confirmatory: to test and validate the model of relationships between variables according to a theoretical framework developed from prior studies. The SOR model explained how stimuli from physical and virtual environments affected users' psychological conditions (e.g., engagement, emotions, perceptions), which then influenced user intentions and behaviors toward AR. This model has been widely applied in technology adoption and digital user experience research.

This research was correlational, aiming to measure the strength and direction of relationships between variables such as interactivity, augmentation, vividness, aesthetics, flow experience, and organizational performance in financial and non-financial terms. While not designed to establish cause and effect, this approach identified significant relationships to inform technology development strategies.

The unit of analysis was the organization, focusing on PT X, an AR technology development company in Bandung. This enabled understanding of internal dynamics, strategic decision-making, and organizational factors influencing new technology adoption, providing an in-depth view of the innovation process within the organization.

Data collection used purposive sampling, selecting participants based on specific characteristics such as location in Bandung, AR usage level, and direct AR experience. This method facilitated obtaining relevant and detailed data from individuals closely involved with PT X and AR technology.

The research used a cross-sectional design, collecting data at one point in time to analyze perceptions and behaviors efficiently without requiring long-term observation. This design suited the dynamic business and technology environment.

Variables were grouped into independent (SOR and Open Innovation constructs) and dependent (Organizational Performance) variables, operationalized using indicators adapted from prior literature. The SOR variable included seven indicators: interactivity, augmentation, vividness, aesthetics, spatial presence, flow experience, and behavior. Open innovation was measured by inbound, outbound, and networking dimensions, while organizational performance covered financial and non-financial aspects.

Quantitative data were collected via questionnaires using ordinal Likert scales. For Fuzzy AHP, a 1–9 scale measured importance levels, while a 4-point scale was used in PLS-SEM to avoid neutral responses and improve analysis validity. Questionnaires were distributed directly at PT X and among AR users, ensuring high relevance to the research context.

RESULTS AND DISCUSSION

This research focuses on PT. X, an AR-based technology company that has shown significant contributions to the spread of the technology, with achievements including 1 million AR creations, 500,000 active users, and technology deployment in more than 130 countries.

This confirms PT. X's position as a pioneer in the development of AR technology applicable to the education and industrial sectors.

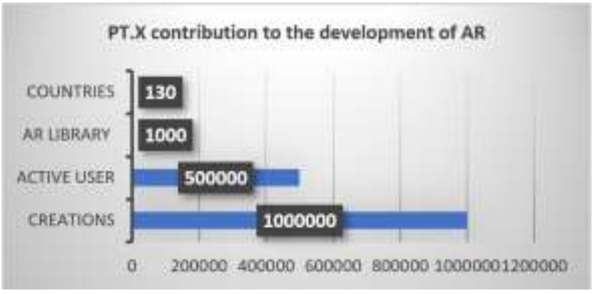

Fig 1 - Contribution PT. X Kota Bandung

Data collection in this research involved 136 respondents consisting of users and developers of Augmented Reality (AR) technology in Bandung City. Most respondents were between 21-25 years old (38.8%) and 16-20 years old (37.3%), indicating the dominance of the younger generation as the main users of AR technology. In terms of gender, 61.2% are male and 38.8% are female, indicating a relatively high interest from both genders in the use of AR.

Table 1 – Respondent Information

Information	Category	Amount	Percentage
Age	<16 Age	-	0%
	16 – 20 Age	50	37,3%
	21 – 25 Age	52	38,8%
	26 – 30 Age	11	8,2%
	31 – 35 Age	7	5,2%
	>36 Age	12	10,5%
Amount		136	100%
Gender	Male	83	61,2%
	Female	52	38,8%
Amount		136	100%

Testing Model SEM-PLS

Model testing was conducted in two stages. The first stage shows that most indicators have met the requirements of convergent validity and construct reliability. The outer loading test shows values above 0.7 for most indicators (Figure 2). In addition, Cronbach's Alpha and

Composite Reliability values were above 0.7 for all constructs, indicating excellent internal reliability (Table 2).

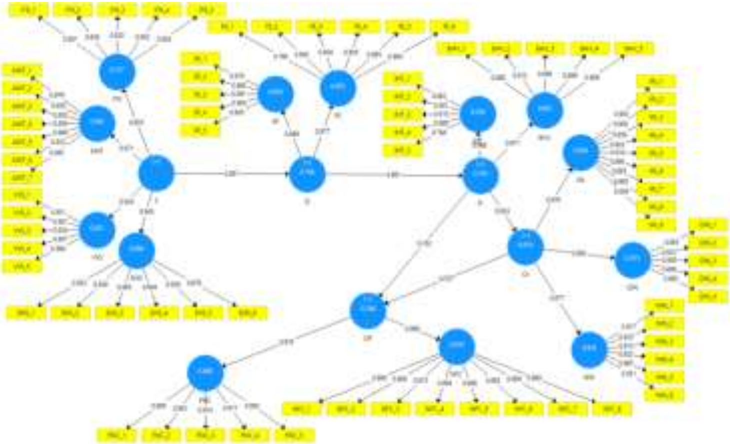

Fig 2 - Stage 1 Testing Outer Loading

Table 2 - Stage 1 Testing Cronbach's Alpha and Composite Reliability

	Cronbach's Alpha	***Composite Reliability* (rho_A)**	***Composite Reliability* (rho_C)**
AMT	0.941	0.941	0.952
BHV	0.940	0.940	0.954
EHS	0.949	0.951	0.960
FE	0.926	0.929	0.942
FNC	0.945	0.945	0.958
IIN	0.970	0.970	0.974
INT	0.923	0.925	0.942
ITR	0.904	0.904	0.929
NFC	0.962	0.962	0.968
NIN	0.962	0.962	0.969
O	0.955	0.959	0.962
OI	0.984	0.985	0.985
OIN	0.940	0.940	0.954
OP	0.976	0.976	0.978
R	0.960	0.961	0.966
S	0.975	0.976	0.977
SP	0.908	0.919	0.933
VVS	0.907	0.910	0.931

The Average Variance Extracted (AVE) value on all constructs also exceeds the threshold value of 0.5 (Table 3), which means that the constructs have good convergent validity. However, in the first stage, the Fornell-Lacker value for the correlation between variables has not met the requirement that the Fornell-Lacker criterion value of each variable must be greater than the correlation of that variable with other variables. The variables that have not met the requirements include augmentation variables (AMT), behavior (BHV), aesthetic (EHS), flow experience (FE), financial (FNC), inbound innovation (IIN), intention

(INT), non-financial (NFC), networking innovation (NIN), organism (O), open innovation (OI), response (R), and stimuli (S).

Table 3 - Stage 1 Testing Average Variance Extracted (AVE)

	Average Variance Extracted **(AVE)**
AMT	0.738
BHV	0.806
EHS	0.798
FE	0.731
FNC	0.820
IIN	0.806
INT	0.767
ITR	0.723
NFC	0.789
NIN	0.839
O	0.696
OI	0.772
OIN	0.807
OP	0.774
R	0.738
S	0.647
SP	0.738
VVS	0.729

To overcome these limitations, data improvement and retesting were carried out in the second stage. The results of the second stage of testing show that all indicators have met the outer loading requirements (> 0.7), with the exception of several items that are retained on the basis of overall model validity considerations (Table 4). The values of Cronbach's Alpha, Composite Reliability, and AVE also remain high and consistent, and discriminant validity through Fornell-Lacker has been thoroughly met (Table 5).

Table 4 - Stage 2 Data Testing

Measurement Indicators	**Indicators**	***Outer Loading***	***Cronbach's Alpha***	**Rho_A**	***Composite Reliability***	**AVE**
AMT	AMT_2	0,855	0,929	0,930	0,944	0,739
	AMT_3	0,852				
	AMT_4	0,868				
	AMT_5	0,886				
	AMT_6	0,850				
	AMT_7	0,847				
BHV	BHV_1	0,880	0,940	0,940	0,954	0,806

Measurement Indicators	Indicators	*Outer Loading*	*Cronbach's Alpha*	Rho_A	*Composite Reliability*	AVE
	BHV_2	0,913				
	BHV_3	0,896				
	BHV_4	0,889				
	BHV_5	0,909				
EHS	EHS_2	0,901	0,864	0,865	0,917	0,787
	EHS_3	0,881				
	EHS_6	0,878				
FE	FE_1	0,852	0,859	0,866	0,914	0,780
	FE_2	0,927				
	FE_3	0,869				
FNC	FNC_1	0,909	0,945	0,945	0,958	0,820
	FNC_2	0,901				
	FNC_3	0,914				
	FNC_4	0,911				
	FNC_5	0,892				
IIN	IIN_1	0,901	0,970	0,970	0,974	0,806
	IIN_2	0,900				
	IIN_3	0,858				
	IIN_4	0,903				
	IIN_5	0,917				
	IIN_6	0,896				
	IIN_7	0,863				
	IIN_8	0,900				
	IIN_9	0,939				
INT	INT_1	0,896	0,893	0,897	0,926	0,759
	INT_2	0,899				
	INT_4	0,891				
	INT_5	0,794				
ITR	ITR_1	0,852	0,904	0,904	0,929	0,723
	ITR_2	0,836				
	ITR_3	0,832				
	ITR_4	0,902				
	ITR_5	0,828				
NFC	NFC_3	0,879	0,926	0,927	0,947	0,818
	NFC_6	0,914				
	NFC_7	0,926				
	NFC_8	0,898				
NIN	NIN_1	0,925	0,941	0,941	0,957	0,849
	NIN_2	0,926				
	NIN_4	0,934				
	NIN_5	0,899				
OIN	OIN_1	0,894	0,940	0,940	0,954	0,807

Measurement Indicators	Indicators	*Outer Loading*	*Cronbach's Alpha*	Rho_A	*Composite Reliability*	AVE
	OIN_2	0,923				
	OIN_3	0,900				
	OIN_4	0,889				
	OIN_5	0,884				
SP	SP_1	0,725	0,879	0,889	0,918	0,738
	SP_2	0,875				
	SP_4	0,914				
	SP_5	0,908				
VVS	VVS_1	0,851	0,907	0,910	0,931	0,729
	VVS_2	0,901				
	VVS_3	0,824				
	VVS_4	0,807				
	VVS_5	0,884				
S			0,975	0,976	0,977	0,647
O			0,926	0,931	0,941	0,695
R			0,960	0,961	0,966	0,738
OI			0,982	0,983	0,983	0,769
OP			0,963	0,963	0,968	0,771

Table 5 - Stage 2 Testing Fornell-Lacker

	AMT	BHV	EHS	FE	FNC	IIN	INT	ITR	NFC	NIN	O	OI	OIN	OP	R	S	SP	VVS
AMT	0.86																	
BHV	0.817	0.898																
EHS	0.856	0.831	0.887															
FE	0.753	0.784	0.706	0.883														
FNC	0.765	0.833	0.747	0.753	0.905													
IIN	0.843	0.915	0.854	0.779	0.854	0.898												
INT	0.83	0.889	0.845	0.759	0.817	0.887	0.871											
ITR	0.779	0.695	0.738	0.643	0.652	0.697	0.712	0.85										
NFC	0.761	0.788	0.78	0.743	0.881	0.793	0.772	0.567	0.904									
NIN	0.825	0.874	0.824	0.74	0.864	0.918	0.864	0.705	0.791	0.921								
O	0.834	0.841	0.822	0.946	0.818	0.849	0.862	0.696	0.808	0.814	0.834							
OI	0.849	0.912	0.864	0.779	0.877	0.981	0.897	0.713	0.809	0.967	0.857	0.877						
OIN	0.791	0.843	0.824	0.729	0.838	0.896	0.848	0.673	0.766	0.926	0.819	0.958	0.898					
OP	0.787	0.838	0.785	0.771	0.977	0.853	0.822	0.634	0.962	0.858	0.839	0.873	0.832	0.878				
R	0.842	0.971	0.861	0.8	0.851	0.926	0.97	0.722	0.805	0.891	0.883	0.931	0.877	0.857	0.859			
S	0.967	0.855	0.92	0.784	0.805	0.885	0.871	0.854	0.79	0.879	0.873	0.899	0.846	0.823	0.885	0.804		
SP	0.834	0.823	0.849	0.838	0.808	0.84	0.878	0.686	0.8	0.811	0.97	0.854	0.827	0.829	0.883	0.876	0.859	
VVS	0.889	0.797	0.802	0.77	0.782	0.839	0.796	0.695	0.758	0.846	0.837	0.856	0.805	0.795	0.814	0.923	0.827	0.854

Path Coefficient Analysis and Statistical Significance

Analysis of path coefficients shows a positive and significant relationship between variables in the model. It is known that the Organism (O) construct has a very strong influence on Flow Experience (FE) with a coefficient value of 0.946 and on Spatial Presence (SP) of

0.970 (Table 6). Similarly, the Open Innovation (OI) construct contributes greatly to Inbound Innovation (IIN) with a value of 0.981, and to Networking Innovation (NIN) of 0.967.

Table 6 - Path Coefficients

	Path Coefficients
O -> FE	0,9466
O -> R	0,883
O -> SP	0,970
OI -> IIN	0,981
OI -> NIN	0,967
OI -> OIN	0,958
OI -> OP	0,569
OP -> FNC	0,977
OP -> NFC	0,962
R -> BHV	0,971
R -> INT	0,970
R -> OI	0,931
R -> OP	0,326
S -> AMT	0,967
S -> EHS	0,920
S -> ITR	0, 854
S -> O	0,873
S -> VVS	0,923

The statistical significance of the relationships between constructs is reinforced by the p-value results which are all below 0.05, indicating that the relationships between variables are significant at the 95% confidence level. The relationship between R Behaviour (BHV) and R Intention (INT) has a p-value of 0.000 and a very high t-statistic of 117.527 and 117.166 respectively.

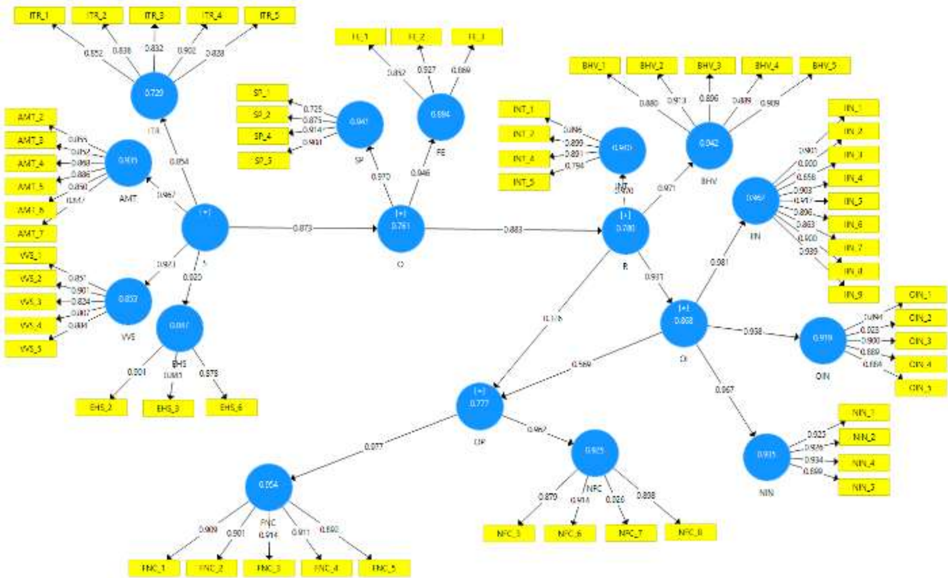

Fig 3 – Measurement Model After Validation

Structural Model Strength Evaluation

The R-Squared (R^2) values on the endogenous constructs indicate that this model has very good predictive power. Constructs such as Financial Performance (FNC) and Inbound Innovation (IIN) have R^2 of 0.954 and 0.962 respectively, indicating that more than 95% of the variance in these constructs can be explained by the exogenous constructs (Table 7). Furthermore, the effect size (f^2) analysis indicates that the largest influence is found in the SOR, OI relationship with an f^2 value of 6.554 which is categorized as a very large influence, followed by OI, OP at 0.192 (Table 8).

Table 7 – R-Squared

	R Square	Adjusted R Square
AMT	0.935	0.934
BHV	0.942	0.942
EHS	0.847	0.846
FE	0.894	0.894
FNC	0.954	0.954
IIN	0.962	0.961
INT	0.940	0.940
ITR	0.729	0.726
NFC	0.925	0.924
NIN	0.935	0.934
O	0.761	0.760
OI	0.868	0.867
OIN	0.919	0.918
OP	0.777	0.773
R	0.780	0.778
SP	0.941	0.940
VVS	0.853	0.852

Table 8 - F-Squared

	F-Square
SOR -> OI	6,554
SOR -> OP	0,063
OI -> OP	0,192

FAHP Method Result

The determination of the development strategy was conducted through hierarchical modeling with the Fuzzy Analytical Hierarchy Process (FAHP) approach. Thirteen main criteria were defined based on the SEM-PLS validation results, including Augmentation, Behavioral, and Innovation Dimensions (Inbound, Outbound, Networking). The criteria were then assessed by five experts from industry and academia. The assessment was conducted through pairwise comparisons converted into Triangular Fuzzy Numbers (TFN) (Saaty, 1977).

The results of aggregating the fuzzy values of the five respondents show the weight priority of each criterion. The defuzzification process produces a weight ranking of AR technology development criteria. The criteria with the highest weight is Interactivity (ITR) with a defuzzification score of 0.107, followed by Augmentation (AMT) with 0.103, and Behavioral (BHV) with 0.101. Other criteria that also ranked high were Flow Experience (FE) and Intention (INT), with scores of 0.098 and 0.095, respectively. Criteria related to organizational innovation such as Inbound Innovation (IIN) and Outbound Innovation (OIN) get a moderate weight, namely 0.082 and 0.079. Meanwhile, Networking Innovation (NIN) and Organizational Performance (FNC and NFC) dimensions ranked last with a cumulative weight lower than 0.07. These results show that the development of interactive features, strong visual aspects, and the ability of AR technology to influence user behavior and experience are top priorities according to experts.

Development of Alternative AR Development strategies

Based on the results of FAHP processing, alternative AR technology development strategies are formulated by referring to the criteria that have the highest weight. Strategies are formulated with an integrative approach between expert preferences, hierarchical structure of criteria, and SEM-PLS analysis results. The three main strategies produced are:

a. ***Strengthening User Interactivity***
   This strategy focuses on improving interactive features in AR applications, such as responsive navigation, real-time feedback, and personalization controls. It aims to increase user engagement and strengthen re-use intention.
b. ***Development of More Engaging Augmented Reality Content***
   Based on the high weight on augmentation and vividness criteria, this strategy includes enhancing visual realism, integration of dynamic 3D elements, and cross-device compatibility. The strategy aims to increase consumer appeal especially in the education and marketing sectors.
c. ***Collaboration with Innovation Ecosystems to Accelerate Deployment***
   Despite its medium weight, open innovation-based strategies remain important. These include inbound and outbound innovation initiatives with external parties such as educational institutions, technology partners, and user communities to expand the scope of adoption and increase business value.

Discussion

The results of this research indicate that the integration of the concepts of Stimuli-Organism-Response (SOR), Open Innovation (OI), and Organizational Performance (OP) has a significant role in developing Augmented Reality (AR) technology, especially at PT.X, Bandung City. The findings provide insights into how factors in the three variables interact with each other and have an impact on AR development strategies in the context of learning and technological innovation.

Relationship Between Stimuli-Organism-Response (SOR) and Organizational Performance (OP)

Based on SEM-PLS analysis, the relationship between SOR and OP was found to have statistical significance but a small value, with an effect of 0.063, and a path coefficient of 0.326, which is classified as negative and does not meet the threshold of a strong relationship between variables (Hair et al., 2019). This finding rejects Hypothesis 1 (H1) and suggests that while SOR may facilitate user interaction with technology, over-reliance on external stimuli may reduce the firm's internal innovation autonomy, thereby negatively impacting organizational performance. The complexity of SOR management also poses a challenge for PT.X in terms of operational efficiency, given that the company's internal innovation management system has not been optimized.

Relationship Between Open Innovation (OI) and Organizational Performance (OP)

In contrast, the relationship between OI and OP shows a significant positive correlation with a value of 0.192, exceeding the significance threshold of >0.15 (Hair et al., 2019). This supports Hypothesis 2 (H2) and reinforces previous findings that the application of inbound and outbound innovation, as well as networking innovation, contributes significantly to improving organizational performance. Inbound innovation, with a correlation of 0.981, is the most influential and strategic component. This indicates that PT.X ability to absorb outside knowledge can accelerate the innovation process, production efficiency, and strengthen long-term competitiveness.

a. **Relationship Between SOR and OI**
   Analysis of the relationship between SOR and OI shows a significant correlation with an effect of 6.554. This supports Hypothesis 3 (H3), which states that user experience of AR technology (through interactivity, augmentation, vividness, etc.) has a positive impact on an organization's propensity to open innovation pathways. The behavior variable recorded the highest correlation value (0.971), indicating that understanding user behavior and experience can improve effective OI strategies, especially in the process of technology adoption by end users. This shows that SOR can be a strong trigger in creating a dynamic open innovation climate (Wang & Ji, 2022).
b. **AR Technology Development Strategy with FAHP Method**
   In an effort to determine the right strategy for AR development, this research implements the Fuzzy Analytical Hierarchy Process (FAHP) method which produces 10 main criteria based on SEM-PLS test results. These criteria include aspects of SOR (such as interactivity, behavior, intention) and OI (inbound and outbound innovation), as well as organizational performance (financial and non-financial performance). These results reflect that the success of AR development strategies is determined by the optimal combination of user experience, opening innovation paths, and measures of organizational performance success (Ishizaka, 2014).
c. **Selection of The Best Strategy Alternative**
   The FAHP analysis resulted in 21 alternative strategies that were prioritized based on a combination of strategic factors. The top five strategies show that the integration between inbound innovation (IIN) and non-financial performance (NFC) is the most effective strategy, as it allows PT.X to develop AR features at low cost while increasing user retention. Other strategies that stand out are the combination of IIN & NIN, NIN & NFC, and IIN & ITR. These strategies represent a systematic approach in efficiently managing internal and external innovations to support the development of AR technology in the education sector.

d. Theoretical Implications

Theoretically, this research extends the understanding of the relationship between SOR, OI, and OP in AR development. The findings enrich the literature with a new conceptual model that combines a user cognitive-behavioral approach with an open innovation strategy to improve organizational performance (Kim et al., 2020; Hlee et al., 2023). In addition, the FAHP approach proved effective in prioritizing strategic variables and can be adapted to similar studies in other digital technology sectors.

e. Managerial Implications

From the practical side, the results of this research offer a data-driven framework for PT.X management in designing AR development strategies that are in accordance with the resources and capacity of the organization. Findings such as the dominance of behavioral roles and inbound innovation can be the focus of policy development, employee training, and user interaction design. The FAHP approach also allows management to assess the long-term impact of each strategic decision, strengthening structured decision-making in a complex innovation ecosystem.

CONCLUSION

This research concluded that integrating the Stimuli-Organism-Response (SOR), Open Innovation (OI), and Organizational Performance (OP) models effectively guided Augmented Reality (AR) technology development strategies within Indonesian technology organizations, particularly PT. X in Bandung. By addressing limitations in AR innovation and marketing strategies through SEM-PLS and Fuzzy AHP methods, the study provided empirical validation and prioritized strategies based on user experience, open innovation, and organizational performance. Future research could extend this integrative model to other industries and explore its application in developing sustainable digital innovation policies. Additionally, further development could incorporate emerging technologies such as AI-AR convergence and metaverse platforms, enhancing business and educational strategies in Indonesia.

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