



RESEARCH ARTICLE

**REVISED** Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance [version 2; peer review: 2 approved, 1 approved with reservations]

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**Abstract**

**Background**

Industry 4.0 is a significant technical revolution that combines big data analytics, the Internet of Things (IoT), and cyber-physical systems to improve manufacturing productivity. This study investigates the impact of digital trust and sustainable attitude on perceived value and the intention to adopt Industry 4.0 technologies. It also examines the moderating role of uncertainty avoidance in these relationships.

**Methods**

Data were collected from 189 employees of leading manufacturing companies in Indonesia that are recognized for their Industry 4.0 practices. The data were analyzed using Partial Least Squares (PLS) methodology with SmartPLS software to test the proposed hypotheses and explore the moderating effects.

**Results**

The findings reveal that both digital trust and sustainable attitude significantly influence perceived value. However, these factors do not directly affect the intention to adopt Industry 4.0 technologies. Uncertainty avoidance moderates the relationship between digital trust and adoption intention. Specifically, in environments with high uncertainty avoidance, digital trust becomes a critical factor

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influencing the decision to adopt Industry 4.0 technologies.

## Conclusions

The study provides valuable insights for organizations aiming to implement Industry 4.0 initiatives. It highlights the importance of fostering digital trust and considering cultural dimensions, such as uncertainty avoidance, in their technology adoption strategies.

## Keywords

digital trust, sustainable attitude, perceived value, intention to adopt industry 4.0, uncertainty avoidance

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**REVISED Amendments from Version 1**

In this revised version of our article, "Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance," we have made several key updates based on reviewer feedback. We updated the literature review to include more recent studies from the past five years, ensuring our work reflects the latest research. We also improved the data accessibility section, explaining how researchers can request access to our data while maintaining confidentiality. Additionally, we expanded the discussion to provide a deeper analysis of the non-significant findings, exploring why digital trust and sustainable attitudes didn't directly influence adoption intentions and suggesting future research directions. Lastly, we enhanced our analysis of cultural factors, particularly uncertainty avoidance, and how they impact technology adoption, comparing our findings with other cultural contexts. These changes have improved the clarity, depth, and overall value of our study.

**Any further responses from the reviewers can be found at the end of the article**

**1. Introduction**

Technology has played a pivotal role in human progress throughout history. Humans possess a natural inclination to innovate and create tools, which have been instrumental in shaping civilizations for millennia. Industry 4.0, hailed as a new industrial revolution, is driven by the evolving and diverse needs of society (Tsaramirsis et al., 2022). It marks a significant shift in the way businesses and industries function, holding the potential to redefine the global economy's trajectory (Müller et al., 2018; Qian & Wang, 2022). Industry 4.0 entails the integration of digital technology, artificial intelligence (AI), big data, the Internet of Things (IoT), machine learning, and cloud computing to establish a smart, interconnected, and automated manufacturing landscape (Ma et al., 2024; Javaid et al., 2022). Virmani et al. (2023) underscored the potential advantages of embracing Industry 4.0, such as enhancing operational efficiency and profitability through digital integration, elevating product quality, trimming production costs, and minimizing variations and defects, thereby bolstering overall operational efficacy.

According to a study conducted by Javaid et al. (2022), Industry 4.0 technology is recognized as playing a pivotal role in fostering innovation (Bécue et al., 2024) and driving future business growth. The implementation of Industry 4.0 has the potential to cultivate a sustainable environment (Bonilla et al., 2018; Javaid et al., 2022), in part due to its contribution to energy efficiency and sustainability (Valaskova et al., 2022) through the reduction of carbon emissions. Industry 4.0 offers principles, guidance, and technologies that facilitate the establishment of new factories and the enhancement of existing ones (Ghobakhloo, 2018). This enables consumers to opt for diverse production models based on their requirements (Saniuk et al., 2020), with scalability that can be augmented through the utilization of advanced robotics, information technology, and communication systems. Furthermore, the study by Javaid et al. (2022) identifies twenty key applications of Industry 4.0 aimed at fostering a sustainable environment and providing deeper insights into production environments, supply chains, delivery channels, and market outcomes.

Industry 4.0 has introduced a profound transformation in the world of business and industry. However, the transition towards more connected and automated production models does not come without challenges (Lubota et al., 2024). Organizations are faced with new complexities in managing more integrated systems, handling big data, and navigating rapidly changing environments (Selten & Klievink, 2024; Wang et al., 2018). These challenges often give rise to uncertainty (Larsen et al., 2023), which can influence strategic decisions regarding the adoption of Industry 4.0.

Additionally, the barriers to the implementation of Industry 4.0 include the scarcity of individuals with digital skills (Koerber et al., 2018; Raj et al., 2020; Obermayer et al., 2022), and the resistance of employees to the adoption of Industry 4.0. Non-technological factors or human factors are the main issues (Obermayer et al., 2022), because Industry 4.0, known for its complex interactions between machines and humans, requires compliance and solidarity among actors (Robert et al., 2022). On the other hand, human involvement in the production process is decreasing (Bag, 2024) as it is being replaced by machines (Sony & Naik, 2020).

Barriers or challenges to the intention to implement Industry 4.0 also occur widely across various parts of the world (America, Europe, Asia) and in many sectors (organizations, online delivery, automotive, plastics industry, manufacturing, electricity, and others). These barriers are related to issues of attitude (Cordero et al., 2023; Toni et al., 2021), social influence (Al-Riyami et al., 2023; Ngan & Khoi, 2022), familiarity (Tick et al., 2022), the TBL approach (Nara et al., 2021), optimism (Nabilah et al., 2020), consumer conformity (Princes, 2020), the moderation of technology usage levels (Saeedi et al., 2020), employee compliance and solidarity (Robert et al., 2022), market uncertainty (Prause, 2019), and communication problems (Atieh et al., 2023; Setiawan & Poerbosisworo, 2021).

Therefore, in the context of Industry 4.0 adoption, two important concepts that need to be considered are digital trust and sustainable attitudes. Digital trust refers to the belief that technology and information systems can be relied upon, secure, and well-integrated into business processes (Launer et al., 2022). On the other hand, sustainable attitude involves awareness of the environmental and social impacts of business activities (Chang et al., 2018), as well as a commitment to adopting environmentally responsible practices (Yaqub & Alsabban, 2023).

It is important to understand how uncertainty influences the relationship between key factors such as digital trust, sustainable attitude, and the intention to adopt industry 4.0. Additionally, previous research, conducted by Saeedi et al. (2020) and Toni et al. (2021), along with studies by Cordero et al. (2023) and Castillo-Vergara et al. (2022), has demonstrated the importance of measuring the level of Industry 4.0 adoption.

This study also uses perceived value as a mediating variable (Ahmetoglu et al., 2023). Perceived value can be described as the significant exchange of benefits received (e.g., volume, quality, and convenience) and the sacrifices made to obtain those benefits (e.g., money, time, and effort). In the workplace, employees expect higher utility value from the adoption of new technology for their job performance, and they strive to achieve maximum results by considering limited situations and resources (Walczuch et al., 2007).

Furthermore, supporting the transition towards Industry 4.0 is crucial, especially considering concerns about job loss (Shuttleworth et al., 2022) and apprehensions regarding uncertainty, which may hinder the ability to adapt to the pace of new work rhythms (Petcu et al., 2024) or uncertainty avoidance. Thus, there is still a need for a deeper understanding of the mechanisms and implications in the context of adopting Industry 4.0. Therefore, this research aims to explore the influence of digital trust and sustainable attitude on perceived value and continuous intention to adopt Industry 4.0, moderated by uncertainty avoidance.

## 2. Literature Review and Hypothesis Development

### 2.1 Theory of Reasoned Action

This research follows the Theory of Reasoned Action (TRA) to construct the theoretical framework. In general, an increase in attitude and subjective norms leads to a stronger intention to perform a behavior (Fishbein, 2008). Specifically, a favorable attitude towards the behavior and perceived social pressure to engage in it lead to stronger behavioral intentions. This theoretical framework is particularly relevant in understanding the adoption of Industry 4.0 technologies, where attitudes towards digital innovation and subjective norms regarding technological advancement play crucial roles in shaping individuals' intentions to adopt these advancements.

### 2.2 Digital Trust

Kozuch (2021) elucidates that digital trust, a cornerstone of effective communication in digital organizations, embodies trust in the digital era. Unlike traditional trust, digital trust is distinguished by its reliance on technology. Paliszkiwicz & Chen (2022) further assert that cultivating digital trust stands as a paramount duty of management. It represents an intangible asset and a leadership skill vital for fostering a culture of mutual trust in the workplace and ensuring the proper management of IT assets and data. This conducive environment, termed as a facilitating condition, serves as the bedrock for the successful implementation of digital trust.

Digital trust serves as a pivotal catalyst for seamless digital interactions, gauging the expectations of an entity and validating its authenticity and reliability in digital transactions. Consequently, it has emerged as a prominent area of inquiry, particularly in the context of Industry 4.0 implementation. Studies delve into the impact of digital trust on the acceptance and utilization of Industry 4.0 technology by both organizations and individuals. Digital trust amalgamates traditional trust, underscored by human interactions, with digital technology, profoundly influencing a company's credibility and growth trajectory.

The agility inherent in digital organizations underscores the critical role of human trust in conjunction with Industry 4.0, fostering organizational innovation performance—a facet closely aligned with the notion of digital trust (Mubarak & Petraite, 2020), pertinent to this study. Additionally, primary sources such as (Launer et al., 2022; Marcial & Launer, 2019; Saparudin et al., 2020; Abir et al., 2020; Arfi et al., 2021; Kim et al., 2021) offer invaluable insights into the multifaceted nature of digital trust.

### 2.3 Sustainable Attitude

The theory of attitudes discussed here focuses on attitudes towards sustainability, which encompasses environmental and economic aspects. Corporate sustainability, as described by Malek & Desai (2020), emphasizes meeting human resource needs while considering economic, social, and environmental factors. Elkington & Rowlands (1999) propose measuring

corporate sustainability based on the Triple Bottom Line (TBL), comprising economic, social, and environmental factors. Pro-environmental behavior, studied through the Theory of Planned Behavior (Ajzen, 1991), is influenced by sustainable attitudes and various situational factors (Trail & McCullough, 2021). Krystallis et al. (2012) highlight cultural influences on sustainable attitudes towards food production. Chen (2015) suggests that sustainable attitudes influence intentions for pro-environmental practices, while Braun & McEachern (2010) emphasize their role in promoting such behavior. Gericke et al. (2019) identify economic, environmental, social, and international cooperation factors shaping sustainable awareness.

The concept of “environmental stewardship” covers a wide range of actions, including creating protected areas, restoring degraded lands, limiting harmful activities, and promoting the use of sustainable products (Bennett et al., 2018). Despite the perception that individual actions might be inconsequential in the face of global environmental challenges, research has shown that local-level stewardship initiatives can play a pivotal role in addressing these issues (Bennett et al., 2018). While awareness of environmental issues is a necessary starting point, it alone is insufficient to drive the meaningful and lasting change required to address the global environmental crisis (Intishar et al., 2020).

In addition, Choi & Sirakaya (2005) develop the sustainable tourism attitude Scale to assess residents’ attitudes towards sustainable tourism, integrating various sustainability criteria. Michalos et al. (2012) stress the need for intensive education on sustainable development to improve knowledge and change attitudes and behaviors. Choi & Sirakaya (2005) measure sustainable attitudes using indicators such as environmental sustainability, social costs, and economic benefits, providing insights into promoting sustainable attitudes and behaviors.

#### 2.4 Uncertainty Avoidance

After discussing digital trust and sustainable attitude, another variable that moderates the intention to adopt Industry 4.0 is the cultural dimension introduced by Hofstede (1980), namely uncertainty avoidance (UA). UA is one of the most frequently used cultural dimensions in technology adoption research, especially in online purchase intentions, adoption of big data or cloud storage, digital currency, local government e-government (Elia, 2022), and mobile applications (Negara et al., 2020). UA reflects individuals’ comfort with consistency, predictability, and strict rules versus tolerance for ambiguity and openness to change. This dimension has been widely studied in technology adoption research, particularly in online purchases, big data or cloud storage adoption, digital currency, e-government initiatives, green product preferences, and mobile applications. Individuals with low UA levels are more likely to accept and use new technology (Negara et al., 2020). Despite its relevance, the moderation of UA towards Industry 4.0 adoption intentions remains underexplored, presenting a research gap in understanding its impact on technology adoption.

#### 2.5 Perceived Value

According to McDougall & Levesque (2000), perceived value is an important indicator that can enhance consumer satisfaction and behavioral intentions. The concept of perceived value also determines consumers’ purchase intentions and decisions (Zeithaml, 1988). Consumers typically weigh the benefits and drawbacks of a particular commodity within the constraints of their consumption capacity, purchase costs, and knowledge reserves, and then purchase the commodity with the greatest perceived value (Nguyen et al., 2023). Perceived value is the standard used by consumers to measure the value of a product, and it is a subjective and personal evaluation made by users of the quality of a product or service on an emotional level (Hapsari et al., 2016).

As companies navigate the transition towards this next phase of industrial evolution, a critical factor in determining the success of Industry 4.0 initiatives is the perceived value and subsequent intention of employees to adopt these technologies (Dalenogare et al., 2018; Ghouri & Mani, 2019). The perceived value of these technologies, including their potential to enhance productivity, efficiency, and decision-making, is a key driver of employee intention to embrace Industry 4.0 initiatives (Sjøbakk, 2018). The purpose of using the perceived value variable in this study is to test its role as a mediating variable between the independent variables digital trust and sustainable attitudes on behavioral information systems in the implementation of Industry 4.0, as a forefront of digital transformation programs (Baron & Kenny, 1986).

#### 2.6 Intention to Adopt Industry 4.0

The intention to adopt Industry 4.0 refers to an organization’s willingness and readiness to adopt (Çiğdem et al., 2023) and implement technologies and practices associated with Industry 4.0, such as cloud technology, Internet of Things (IoT), big data, simulation, autonomous robots, additive manufacturing, augmented reality, and business intelligence. This is a crucial factor in the adoption process as it reflects the organization’s commitment (Cotet et al., 2020) to technological advancement and changes in employee attitudes and leadership at strategic, tactical, and operational levels (Cordero et al., 2023).

In the context of Indonesia, a rapidly developing economy, the adoption of Industry 4.0 presents both significant opportunities and challenges. The fourth industrial revolution, characterized by the convergence of digital, physical, and biological technologies, is transforming industrial operations worldwide (Kurniawan et al., 2023; Aisyah et al., 2022). The Indonesian government has recognized the profound implications of this shift and has taken proactive measures to prepare both the workforce and industries for these changes (Kurniawan et al., 2023). The government's focus on developing a workforce equipped to handle these technological advancements is critical for the successful adoption of Industry 4.0 in Indonesia. The rapid development of digital technologies, particularly artificial intelligence, IoT, and cloud computing, is central to this transition, fostering a new era of data-driven, automated, and interconnected production systems (Aisyah et al., 2022).

Various studies have employed theoretical frameworks such as the Theory of Planned Behavior (TPB) and Ajzen's Theory of Planned Behavior to analyze the factors influencing the intention to adopt Industry 4.0 technology. Zaman et al. (2021) discovered that attitude, subjective norms, and perceived behavioral control positively impact the intention to adopt Industry 4.0 technology, particularly big data. Similarly, Perri et al. (2020) found that attitude, subjective norms, and perceived behavioral control positively affect the intention to adopt smart consumption and production behaviors. These studies offer valuable insights into the cognitive and affective beliefs that influence the intention to adopt Industry 4.0 technology.

### 2.7 Digital Trust, Sustainable Attitude, and Perceived Value

Digital trust, which is the users' confidence in the safety, privacy, security, reliability, and ethical handling of data by companies in the digital environment, correlates with the perceived value of the information conveyed. The concept of trust has been proven to be a crucial factor influencing individuals' perceptions of products, services, and technology. Various previous studies have indicated that trust in other contexts such as trust in online platforms (OPL) or trust in technology has a positive impact on perceived value (Jayashankar et al., 2018; Konuk, 2018). In this regard, digital trust is viewed as a factor that can enhance the perceived value of the information provided by companies in the digital environment. Therefore, the hypothesis depicts the assumption that the higher the level of user trust in companies regarding digital aspects, the higher the value they attribute to the information received, as reflected in perceived value (Mayer et al., 1995; Zhao & Chen, 2021).

In addition to digital trust, the hypothesis proposed is that there is a positive influence between sustainable attitudes and perceived value. Salehzadeh & Pool's (2017) study on the relationship between brand attitudes and perceived value in the context of purchasing luxury goods showed that brand attitudes have a direct and significant impact on perceived value, as well as other dimensions of perception such as social, personal, and functional perceptions. Similarly, Charton-Vachet et al.'s (2020) study in France on the relationship between attitudes and intentions mediated by perceived value showed that customers' attitudes toward purchasing intentions have a significant impact on perceived value. Both studies highlight the importance of perceived value in mediating the relationship between attitudes and purchase intentions. Therefore, based on a similar research framework, this hypothesis explores the possibility of a direct influence between sustainable attitudes and perceived value

*H1. Digital trust positively and significantly affects perceived value.*

*H2. Sustainable attitude positively and significantly affects perceived value.*

### 2.8 Digital Trust, Sustainable Attitude, and Intention to Adopt Industry 4.0

Saparudin et al. (2020) identified trust as the most influential factor affecting consumers' intention to continue using mobile banking. Abir et al. (2020) discovered that eWOM, brand image, and trust significantly positively impact the intention to make online purchases. Contrarily, Arfi et al. (2021) found that performance expectation did not influence the intention to use IoT for eHealth. These studies offer insights for enhancing the design of connected devices, improving patient communication, and targeting potential users more effectively. Despite these findings, there is a lack of direct research on the relationship between Digital Trust and the Intention to Adopt Industry 4.0.

Cordero et al. (2023) surveyed organizations across several Latin American countries to identify drivers and barriers to Industry 4.0 adoption. Their findings underscored the pivotal role of quality technology in enhancing competitiveness and fostering national progress. Similarly, Castillo-Vergara et al. (2022) explored the technological acceptance of Industry 4.0 among rural Chilean students, revealing that factors such as technological optimism and facilitating conditions shape attitudes and intentions towards technology adoption. In contrast, Toni et al. (2021) utilized the TPB framework to analyze factors influencing the use of innovative vehicles, highlighting the importance of perceived behavioral control and subjective norms in determining intention, while attitude had no direct effect.



Saeedi et al. (2020) investigated the adoption of Industry 4.0 technology among dairy companies in Malaysia, revealing that the TPB accounted for a significant portion of the variation in intention to use such technology. Notably, they found that the moderating effect of technology usage on the influence of attitude on intention varied depending on usage levels. Similarly, Wang et al. (2018) demonstrated in China that environmental concern indirectly impacts the intention to adopt hybrid electric vehicles through various factors, including attitude, subjective norms, and perceived behavioral control.

*H3. Digital trust positively and significantly affects intention to adopt.*

*H4. Sustainable attitude positively and significantly affects intention to adopt.*

## 2.9 Perceived Value and Intention to Adopt Industry 4.0

Based on information from several previous studies, it is known that perceived value significantly influences the intention to adopt specific technologies or products. For example, in Miao et al.'s (2022) study on the relationship between perceived value and purchase intention through e-commerce, it was found that perceived value has a positive influence, albeit with the moderation of online purchase experience. This finding indicates a research gap regarding the relationship between perceived value and intention to adopt, especially with moderation. Similar findings occurred in Zhao & Chen's (2021) study in China on the intention to purchase environmentally friendly homes, where higher perceived value led to a higher positive influence on purchase intention, with trust as a perceived value antecedent factor. Meanwhile, Yin & Qiu's (2021) study on perceived value and purchase intention based on experiences with artificial intelligence showed that perceived value influences purchase intention with increasing technology accuracy. On the other hand, Hsu & Lin's (2016) study on the Internet of Things (IoT) found that perceived value significantly influences users' intention to use IoT services. Therefore, there is a conclusion that antecedent factors and moderation need to be considered to understand more deeply the influence of perceived value on intention to adopt.

*H5. Perceived value positively and significantly affects intention to adopt.*

## 2.10 Uncertainty Avoidance as Moderator Variables

Based on the research provided, it can be hypothesized that uncertainty avoidance (UA) moderates the influence of digital trust and sustainable attitude on the intention to continue a relationship. Faqih (2022) found that uncertainty avoidance moderates the relationship between trust and behavioral intention in online shopping, particularly in cultures with high UA levels. Similarly, Ganguly & Nag (2021) highlighted the predictive role of UA in shaping trust and purchase intention in online shopping across different cultural values. Mosunmola et al. (2019) extended this by demonstrating that cultural dimensions, including UA, moderate the relationship between perceived value dimensions, trust, perceived risk, and purchase intention in online shopping. These insights emphasize the significant influence of UA in shaping trust and behavioral intention in online contexts. Therefore, drawing from these findings, it can be hypothesized that UA will moderate the relationship between digital trust and sustainable attitude and the intention to continue a relationship. However, direct research on this specific relationship in the context of Industry 4.0 adoption with the moderation of UA remains limited. Therefore, exploring this relationship would contribute to a deeper understanding of the interplay between cultural dimensions, digital trust, sustainable attitude, and intention to continue a relationship.

*H6a. Uncertainty avoidance positively moderates the relationship among digital trust and intention to adopt.*

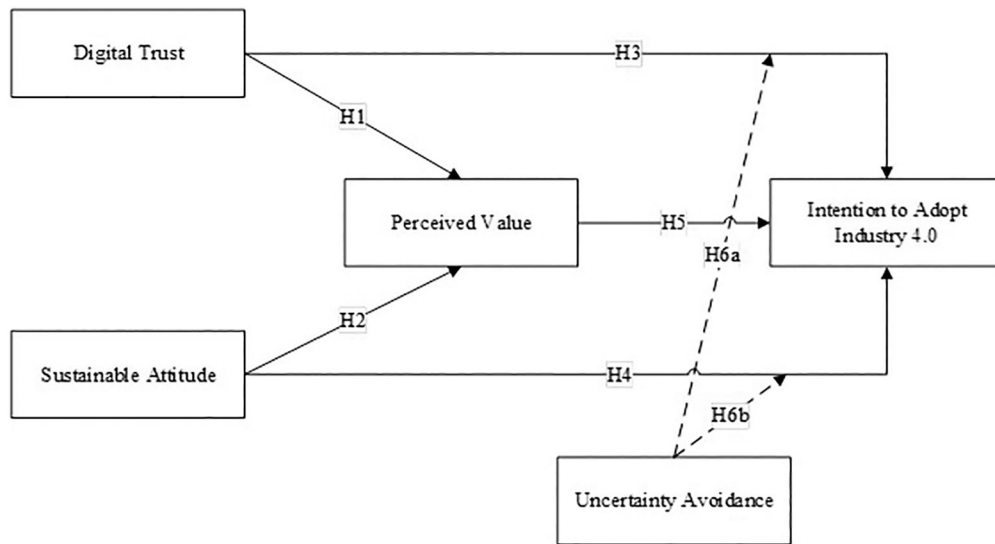
*H6b. Uncertainty avoidance positively moderates the relationship among digital trust and intention to adopt.*

Based on the empirical study and literature review, the research conceptual model can be formulated as follows:

The conceptual framework of this research is illustrated in Figure 1. This model hypothesizes to explain H1: the relationship between Digital Trust and Perceived Value, H2: the relationship between Sustainable Attitude and Perceived Value, H3: the relationship between Digital Trust and Intention to Adopt Industry 4.0, H4: the relationship between Sustainable Attitude on Intention to Adopt Industry 4.0, H5: relationship between Perceived Value and Intention to Adopt Industry 4.0, H6a: The moderating role of Uncertainty Avoidance on the relationship between Digital Trust and Intention to Adopt Industry 4.0. H6b: The moderating role of Uncertainty Avoidance on the relationship between Sustainable Attitude and Intention to Adopt Industry 4.0.

## 3. Methods

The study adopts a quantitative approach, utilizing statistical analysis to analyze numerical research data. Data collection was conducted through a survey method, employing a questionnaire distributed online via Google Forms to gather primary data from respondents. In analyzing the data, Structural Equation Modeling (SEM) was employed using SmartPLS 3.2.4 software (Ringle et al., 2014). This approach allows for a comprehensive examination of the relationships between variables, providing insights into the complex interplay of digital trust, sustainable attitudes, uncertainty avoidance, perceived value and intention to adopt industry 4.0 within the organizational context (Ubaidillah et al., 2022).



**Figure 1. Conceptual Model.** Source: author’s construct.

The research was conducted at PT Schneider Indonesia, headquartered at Cibis Nine Building, Jalan TB Simatupang No.2, South Jakarta. This location was chosen because, despite having factories in Batam and Cikarang, only the employees at the headquarters are allowed to interact directly with customers. The research took approximately two months, with one month dedicated to data collection and another month for data processing. The study was carried out from 9 January to 9 February 2024, using primary data gathered from the assessments or perceptions of respondents. Surveys were conducted by distributing questionnaires online using Google Forms. In order to reduce the possibility of bias, attention was taken to ensure that the questionnaire was honestly created and thoroughly tested before being distributed. Anonymity was guaranteed to respondents in order to promote truthful responses.

The research sample comprises individuals representing variables such as digital trust, sustainable attitudes, uncertainty avoidance, perceived value and intention to adopt industry 4.0. The sample was drawn from employees of a prominent manufacturing company in Indonesia, recognized as a Light House Industry 4.0 by the World Economic Forum in Japan since 2019. This Paris-based company has consistently ranked among the most sustainable companies globally, as per Corporate Knight’s rankings over the past decade.

The selection of a manufacturing company as the research sample aligns with the focus on Industry 4.0 technology implementation within this sector. The population included all commercial office employees in Indonesia meeting the specified criteria. Employing the Systematic Random Sampling technique and based on the Slovin formula with a precision of  $e=5%$ , a sample of 189 employees was obtained, all of whom provided complete responses with no missing data.

Digital trust measurement draws from the works of Mubarak & Petraite (2020), including trust, internet of things, and smart factory, emphasizing the importance of trust in open innovation management within Industry 4.0. Similarly, sustainable attitudes measurement references Gericke et al. (2019), focusing on attitudes as integral components of sustainability consciousness, namely social, economy, and environment. Perceived value is measured through four indicators, namely emotional value, social value, professionalism value, and quality value (Roig et al., 2006). Intention to adopt measurement references Khoa (2023) including continue using, alternative way, and stopping, while uncertainty avoidance is measured using Srite & Karahanna (2006) as the reference framework, namely regulations, order, job explanation, uncertain situation, and opportunity to innovate.

**4. Results**

Survey was conducted on 189 employees, all of whom met the specified criteria. All 189 data were collected and analyzed using IBM SPSS version 24 and SmartPLS 3.2.4, utilizing partial least squares structural equation modeling (PLS-SEM). Table 1 presents the results of the descriptive analysis of the research respondents.



**Table 1. Respondent Characteristics.**

Respondent Characteristics		Frequency	Percentage (%)
Age	24–33 years	37	19.58
	34–43 years	66	34.92
	44–53 years	71	37.57
	54–63 years	15	7.94
Gender	Male	132	69.84
	Female	57	30.16
Working period	1–6 years	15	7.94
	7–12 years	36	19.05
	13–18 years	73	38.62
	19–24 years	47	24.87
	25–30 years	18	9.52
Position	Supervisors	23	12.17
	Manager	62	32.80
	People Manager	22	11.64
	Staff	82	43.39
Education	High school	11	5.82
	Bachelors degree	164	86.77
	Masters degree	14	7.41
Program users	BFO	92	48.68
	SAP	60	31.75
	Others	37	19.58

Source: Field data (2024).

The characteristics of respondents are crucial to uncover because they depict employee profiles to understand their intention in adopting Industry 4.0. Analyzing respondent characteristics can serve as a basis for better strategic decision-making, enabling industries to allocate resources and efforts more effectively in implementing Industry 4.0 technology.

To investigate the influence of digital trust and sustainable attitude on the perceived value and continuous intention to adopt Industry 4.0, moderated by uncertainty avoidance, we employed the technique of Partial Least Squares Structural Equation Modeling (PLS-SEM). The PLS-SEM method was implemented using the SmartPLS 3.2.4 software.

#### 4.1 Measurement Model Analysis

The measurement model comprises digital trust, sustainable attitude, uncertainty avoidance, perceived value, and intention to adopt, all structured reflectively. Assessing the model's quality entails focusing solely on indicators with favorable and substantial factor loadings, while employing cronbach alpha, composite reliability, and average variance extracted (AVE) to evaluate the measurement model (Patalay et al., 2015; Hair et al., 2011; Iqbal et al., 2021).

To measure reliability, we used cronbach's alpha (CA) and composite reliability (CR). The results for CA and CR are presented in Table 2 for digital trust (0.904, 0.940), sustainable attitude (0.809, 0.888), uncertainty avoidance (0.809, 0.888), perceived value (0.892, 0.925), and intention to adopt (0.791, 0.918), where these values exceed 0.70, thus deemed acceptable and can proceed for further analysis (Hair et al., 2011). Additionally, we tested convergent validity using the AVE values, namely digital trust (0.840), sustainable attitude (0.727), uncertainty avoidance (0.619), perceived value (0.755), and intention to adopt (0.630), all of which exceed the threshold of 0.50 (Henseler et al., 2016). Furthermore, we assessed Fornell-Larcker for testing discriminant validity, as shown in Table 3.

Table 4 reveals that each variable demonstrates a stronger correlation with its respective construct compared to other constructs within the model. Consequently, it can be concluded that all variables exhibit discriminant validity, validating their suitability for subsequent analyses.

**Table 2. Measurement Model.**

Variable	Code	Indicators	Loading	p-value	Cronbach Alpha	Composite Reliability	AVE
Digital Trust	DT1	Trust	0.973	<0.001	0.904	0.940	0.840
	DT2	Internet of things	0.872	<0.001			
	DT3	Smart factory	0.901	<0.001			
Sustainable Attitude	SA1	Social	0.768	<0.001	0.809	0.888	0.727
	SA2	Economy	0.909	<0.001			
	SA3	Environment	0.875	<0.001			
Uncertainty Avoidance	UA1	Regulations	0.849	<0.001	0.769	0.785	0.619
	UA2	Order	0.884	<0.001			
	UA3	Job explanation	0.757	<0.001			
	UA4	Uncertain situation	0.729	<0.001			
	UA5	Opportunity to innovate	0.640	<0.001			
	UA6	Making changes	0.751	<0.001			
Perceived Value	PV1	Emotional value	0.856	<0.001	0.892	0.925	0.755
	PV2	Social value	0.890	<0.001			
	PV3	Professionalism value	0.861	<0.001			
	PV4	Quality value	0.869	<0.001			
Intention to Adopt	IA1	Continue using	0.947	<0.001	0.791	0.918	0.630
	IA2	Alternative way	0.933	<0.001			
	IA3	Stopping	0.850	<0.001			

Source: Field data (2024).

**Table 3. Discriminant Validity (Fornell-Larcker criteria).**

	DT	SA	UA	PV	IA
DT	0.916				
SA	0.392	0.853			
UA	0.583	0.612	0.690		
PV	0.672	0.455	0.676	0.869	
IA	0.521	0.448	0.647	0.615	0.794

Source: Field data (2024).

**Table 4. Hypothesis Testing of SmartPLS Analysis.**

Hypothesis	Relationship	Coefficients	p-value	Results
H1	DT → PV	0.583	<0.001**	Supported
H2	SA → PV	0.226	<0.001**	Supported
H3	DT → IA	0.081	0.244 <sup>ns</sup>	Not Supported
H4	SA → IA	0.019	0.855 <sup>ns</sup>	Not Supported
H5	PV → IA	0.224	0.008**	Supported
Moderating effects				
H6a	DT*UA → IA	0.141	0.029*	Supported
H6b	SA*UA → IA	0.002	0.976 <sup>ns</sup>	Not Supported

\*Significant at 5%.

\*\*Significant at 1%.

<sup>ns</sup>Not significant.

## 4.2 Hypothesis Testing Results

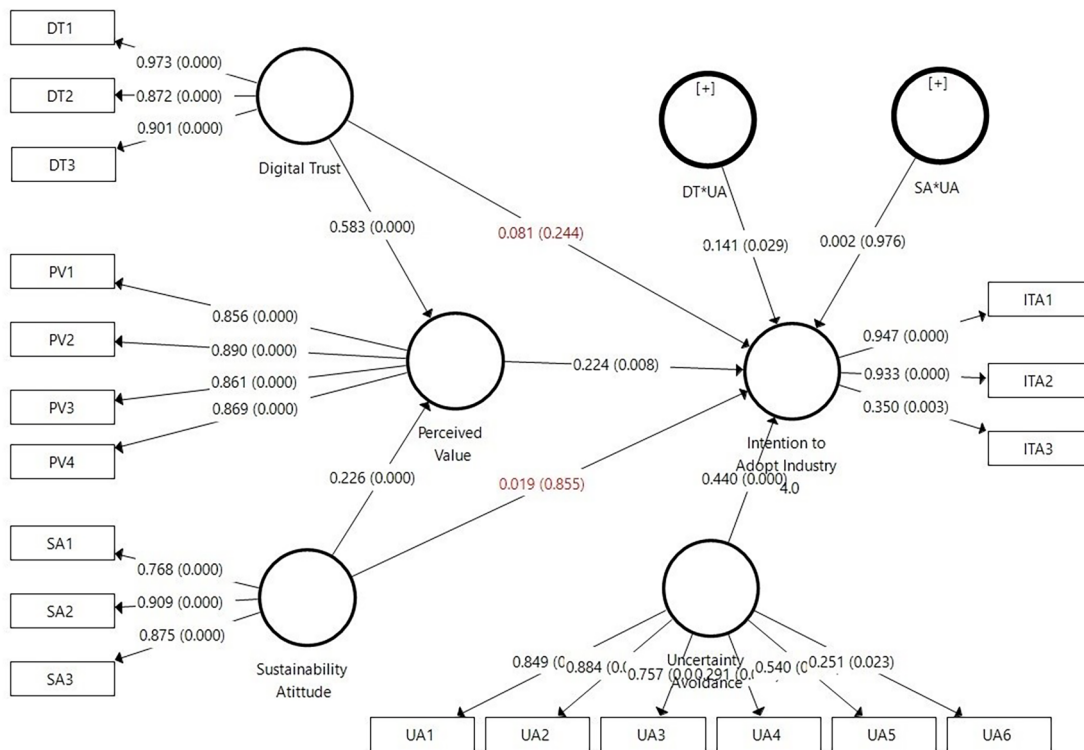
The hypothesis testing results using PLS-SEM with SmartPLS indicate that H1 is accepted, where digital trust has a positive and significant effect on the perceived value ( $\beta=0.583$ ,  $p\leq 0.001$ ). H2 of this study is also accepted, where sustainable attitude has a positive and significant effect on the perceived value ( $\beta=0.226$ ,  $p<0.001$ ). However, H3 ( $\beta=0.081$ ,  $p=0.224$ ) and H4 ( $\beta=0.019$ ,  $p=0.855$ ) of this study are rejected because their p-values are greater than 0.05, indicating that digital trust and sustainable attitude do not significantly influence the intention to adopt Industry 4.0. Furthermore, H5 of the study shows the expected results, where perceived value has a positive and significant effect on the intention to adopt Industry 4.0 ( $\beta=0.224$ ,  $p=0.008$ ). Regarding the moderating effects, H6a stating that uncertainty avoidance positively moderates the relationship between digital trust and intention to adopt Industry 4.0 ( $\beta=0.141$ ,  $p=0.029$ ), is accepted. However, H6b of this study is rejected because uncertainty avoidance positively and insignificantly moderates the relationship between sustainable attitude and intention to adopt Industry 4.0 ( $\beta=0.002$ ,  $p=0.976$ ). Clearly, the results of hypothesis testing can be seen in Table 4 and Figure 2.

## 5. Discussion

### 5.1 The Relationship Between Digital Trust, Sustainable Attitude, and Perceived Value

The hypothesis testing results indicate that digital trust has a positive and significant influence on perceived value. Digital trust in this context refers to individuals' level of trust in digital technology and platforms used. This finding is consistent with several previous studies, such as those conducted by Zhao & Chen (2021), Jayashankar et al. (2018), Konuk (2018), and Ponte et al. (2015), which also found a positive relationship between digital trust and perceived value. Strengthening digital trust can be key to enhancing the perceived value by customers, which in turn can increase customer loyalty and overall consumer satisfaction. Measures such as ensuring data security, transparency in technology use, and providing positive user experiences can help build and maintain strong digital trust (Shin, 2019).

Additionally, this study indicates that sustainable attitude also has a positive and significant influence on perceived value. This finding is consistent with previous research by Charton-Vachet et al. (2020) and Salehzadeh & Pool (2017), which similarly identified a relationship between attitudes and perceived value. This indicates that a positive attitude towards sustainability issues can influence individuals' perceived value of products or services. Consumers who have pro-sustainability attitudes tend to perceive the products or services as valuable because they consider the social and environmental impacts of their consumption (Luchs & Kumar, 2017; Paswan et al., 2017). These findings have important



**Figure 2. Structural Model Results Using SmartPLS.**

implications in product marketing and business strategy development. Including sustainability aspects in marketing strategies and communicating the company’s commitment to sustainability can help enhance the perceived value of products or services in the eyes of consumers.

### 5.2 The Relationship Between Digital Trust, Sustainable Attitude, and Intention to Adopt Industry 4.0

This study reveals surprising findings that digital trust and sustainable attitude do not have a significant influence on intention to adopt. Despite previous research indicating the significant influence of digital trust (Arfi et al., 2021; Kim et al., 2021; Saparudin et al., 2020; Rahman et al., 2020) and sustainable attitude (Cordero et al., 2023; Castillo-Vergara et al., 2022; Wang et al., 2018; Toni et al., 2021; Saedi et al., 2020) on intention to adopt in other contexts, these results indicate an interesting difference. The insignificance of the relationship between digital trust and sustainable attitude with intention to adopt suggests the complexity of factors influencing technology adoption. Although attitudes toward these solutions (in terms of social, economic, and environmental benefits) may be positive, these attitudes alone may not be sufficient to drive adoption intentions without considering subjective norms and perceived behavioral control. In the implementation of technology adoption, even though the company has decided on its Industry 4.0 sustainability strategy, it means that despite a positive attitude decision, emotional, social, professionalism, and quality value filters are still needed for this attitude decision to become a real action. The relationship between attitude and intention for sustainability is in line with Salas-Zapata et al.’s (2018) research.

The novelty of this research's intention to adopt Industry 4.0 is the moderation influence of uncertainty avoidance, accompanied by the simultaneous or comprehensive influence of digital trust and sustainable attitudes variables, which has never been done before. The occurrence of an insignificant relationship between digital trust and sustainable attitudes based on the research framework of Industry 4.0 adoption intention confirms the crucial role of perceived value mediation (Vishwakarma et al., 2020). This means that, in practice, adoption intention is influenced by several factors within the perceived value indicators.

The social value factor influences through others, such as senior colleagues (Setyohadi et al., 2017), which is an internal and organizational factor (Setyohadi & Purnawati, 2018). Even Jung et al. (2020) places this social factor as the primary determinant when it comes to decisions regarding sustainability. Social and situational factors such as the perception of understanding innovative solutions (Noerman et al., 2021) in Industry 4.0 can hinder or strengthen the intention to act or

influence the significance of this relationship (Toni et al., 2021). The positive emotional value factor, where positive feelings (Joshi et al., 2021) influence adoption intention due to perceiving support for its sustainability. Meanwhile, the quality and professionalism value factor can involve skill development oriented towards a culture and mindset of innovation as a form of employee professional performance (Rivera et al., 2020).

These results have implications for both researchers and practitioners in the field of technology adoption and sustainability. They underscore the importance of considering a comprehensive set of factors when studying adoption behaviors and designing interventions to promote the uptake of new technologies. Future research may benefit from exploring the interplay between different factors and contextual variables to better understand the dynamics of technology adoption processes.

### 5.3 The Relationship Between Perceived Value and Intention to Adopt Industry 4.0

This study found that perceived value has a significant influence on intention to adopt, which aligns with the findings of several previous studies, such as Hsu & Lin (2016), Yin & Qiu (2021), Zhao & Chen (2021), and Miao et al. (2022). These results underscore the importance of individuals' perceived value of a technology in determining their intention to adopt it. Most previous studies have emphasized the importance of perceived value in the context of technology adoption, particularly in terms of how the technology can provide benefits and added value to individuals or organizations. Therefore, these findings provide additional support to the previous conclusion that perceived value is a key factor influencing decisions to adopt new technology.

Additionally, this study also indicates that the relationship between perceived value and intention to adopt can be explained based on the concept of the TRA. This suggests that individuals' perceptions of the value of a technology influence their intention to adopt it, consistent with the theory that emphasizes the significant role of attitudes and subjective norms in shaping behavior.

### 5.4 The Moderating Role of Uncertainty Avoidance

Although in direct influence, digital trust does not significantly affect intention to adopt Industry 4.0, uncertainty avoidance may serve as a moderating variable on this influence. The concept of uncertainty avoidance refers to the level of comfort individuals or societies have in dealing with uncertain or ambiguous situations. In the context of technology adoption, uncertainty avoidance can influence how individuals interpret and respond to levels of trust in digital technology.

The findings of this study support previous research conducted by Faqih (2022), Mosunmola et al. (2019), and Ganguly & Nag (2021), which suggest that uncertainty avoidance can act as a moderating variable between digital trust and intention to adopt. High levels of uncertainty avoidance tend to make individuals more cautious and seek certainty before they are willing to take risks in adopting new technology. These findings provide important contributions to our understanding of the complex dynamics influencing individuals' intentions to adopt technology and can help design more effective strategies to encourage wider and faster technology adoption.

However, in the influence of sustainable attitude on intention to adopt, uncertainty avoidance did not significantly serve as a moderating variable. This study diverges from the findings of Sánchez-Franco et al. (2009), which illustrated a significant positive influence of attitudes on intention to adopt moderated by uncertainty avoidance. This difference can be attributed to cultural and psychological factors that influence how individuals respond to uncertainty in technology decision-making situations. When uncertainty avoidance is high, individuals tend to seek certainty and orderliness in decision-making. In terms of technology adoption, individuals' attitudes toward technology become more critical, and they may be more inclined to consider other factors such as clearer benefits or more pressing needs.

In the study on trust variables, there is a close relationship with the moderation of the uncertainty avoidance dimension (Shiu et al., 2015), as confirmed by Lisana (2021) in research conducted in Indonesia, which found that uncertainty avoidance is an important element in employees' trust in the use or non-use of technology. Furthermore, Shiu et al. (2015) concluded that individuals accustomed to using information and communication technology, similar to the respondents in this study, do not always express high trust or less positive attitudes toward perceived value. The non-significant moderation of uncertainty avoidance on the relationship between sustainable attitudes and adoption intention indicates that even though sustainability strategies constitute positive company decisions, they are seemingly not readily accepted by employees in this study for implementation.

Citing Bandura (2012) on triadic reciprocity, human attitudes and intentions are a function of the interactive influences of intrapersonal factors, the behaviors of the individuals involved, and the environmental forces that affect them.

Therefore, [Zhu et al. \(2017\)](#) explained that after the initial adoption takes place, employees' attitudes are still unable to enhance the perceived innovation of technology. In this research conducted in Indonesia, employees are expected to embrace an ethos of environmental awareness, resource efficiency, and social responsibility to align with sustainable practices. They must demonstrate a willingness to adapt to sustainable practices, actively seek ways to minimize environmental impact, and engage in initiatives that support the company's sustainability goals. Decision-making based on attitudes and forming intentions to implement are not seen by respondents as a singular process, but one that must involve other processes (approval from superiors, inter-divisional collaboration, the presence of formulated common goals) due to vertical organizational consequences, resulting in multiple employees in one workspace having different superiors, superiors in different countries, different targets, and also different virtual teams.

Therefore, in the application of research results related to the moderation of uncertainty avoidance, the proposal of rules ([Hong, 2020](#)) regarding agreed-upon procedures and processes is needed, such as focusing on improving repetitive processes, adopting an account management approach, shared dashboard accuracy, and creating a joint list of similar targets.

## 6. Conclusion, Implication, and Limitation

This study highlights the importance of perceived value in influencing the intention to adopt Industry 4.0 technologies, as evidenced by significant findings consistent with prior research. Moreover, the study underscores that both digital trust and sustainable attitude significantly influence perceived value, contributing to the understanding of the adoption process. However, it also reveals surprising results regarding the insignificant direct influence of digital trust and sustainable attitude on intention to adopt.

Decision-making based on attitudes and forming intentions to implement are not seen by respondents as a singular process, but one that must involve other processes (approval from superiors, inter-divisional collaboration, the presence of formulated common goals) due to vertical organizational consequences, resulting in multiple employees in one workspace having different superiors, superiors in different countries, different targets, and also different virtual teams.

This finding also confirms the full mediation of perceived value, it means that despite a positive attitude decision, emotional, social, professionalism, and quality value filters are still needed for this attitude decision to become a real action of technology adoption. The moderating role of uncertainty avoidance yields expected results on the relationship between digital trust and intention to adopt. However, not on the relationship between sustainable attitude and intention to adopt, shedding light on the complex dynamics of technology adoption. It will need agreed-upon procedures and processes, such as focusing on improving repetitive processes, adopting an account management approach, shared dashboard accuracy, and creating a joint list of similar targets.

Understanding the significance of perceived value in driving adoption intentions underscores the importance of emphasizing the benefits and value propositions of Industry 4.0 technologies. Building digital trust and fostering sustainable attitudes remain important endeavors, although their direct influence on adoption intentions may be less pronounced. Practitioners should consider incorporating strategies to mitigate uncertainty avoidance, such as providing clear information and reducing perceived risk.

One limitation of this study is its reliance on self-reported data, which may introduce response bias. Additionally, the study focused on a specific context and population, limiting the generalizability of the findings. Future research could address these limitations by employing diverse methodologies and examining different cultural contexts. Additionally, future research could explore additional moderators of the relationship between digital trust, sustainable attitude, and intention to adopt, considering factors such as cultural differences and organizational contexts. Longitudinal studies could provide insights into the dynamics of technology adoption over time.

### Ethical statement

I have adhered to the writing guidelines and ethics of the F1000Research journal. Based on letter number 455/UN10.F03/PP/2024 regarding the Research Permit Application, my institution granted permission for the research on January 8, 2024. Additionally, I have received a research permit letter from PT Schneider Indonesia to conduct research at the company.

Participants' consent for this study was obtained verbally, as approved by the Institutional Review Board at Brawijaya University. Verbal consent was chosen due to the practicalities of conducting the study remotely and ensuring timely participation. The ethics committee reviewed and approved this method to maintain participant confidentiality and streamline the data collection process.



## Author contributions

Conceptualization, Y.S., E.S.A., W.W. and T.N.; methodology, Y.S. and T.N.; software, Y.S.; validation, E.S.A., W.W. and T.N.; formal analysis, Y.S.; investigation, W.W.; resources, Y.S.; data curation, T.N.; writing—original draft preparation, Y.S.; writing—review and editing, Y.S.; visualization, Y.S.; supervision, E.S.A., W.W. and T.N.; project administration, Y.S.; funding acquisition, Y.S. All authors have read and agreed to the published version of the manuscript.

## Data availability statement

### Underlying data

The data presented in this study are confidential and cannot be publicly shared due to confidentiality agreements with the participants and restrictions imposed by the institution where the research was conducted. To protect participant privacy, data access is strictly controlled. Researchers who wish to access the data must submit a formal request to the corresponding author. This request should include the purpose of their research, the specific data needed, intended use, and measures to ensure data security and participant confidentiality. While data sharing is restricted, we are open to considering requests on a case-by-case basis. If feasible, we will provide anonymized data to minimize privacy concerns. All requests will be reviewed by our Institutional Review Board (IRB) to ensure compliance with ethical standards. To initiate a request or for further inquiries, please contact [yulisartono@student.ub.ac.id](mailto:yulisartono@student.ub.ac.id)/[sartonoyuli@gmail.com](mailto:sartonoyuli@gmail.com).

### Extended data

Figshare: Checklist for “Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance”, DOI: <https://doi.org/10.6084/m9.figshare.26302273.v2> (Sartono et al., 2024).

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/) (CC-BY 4.0)

### Reporting guidelines

STROBE checklist for “Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance”, <https://doi.org/10.6084/m9.figshare.26302273.v2> (Sartono et al., 2024).

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## References

- Abir T, Rahman MA, Yazdani DMN, et al.: **Electronic Word of Mouth (e-WOM) and consumers' purchase decisions: Evidences from Bangladesh.** *J. Xian Univ. Archit. Technol.* 2020; **12**: 367–382.
- Ahmetoglu S, Che Cob Z, Ali N: **Internet of Things Adoption in the Manufacturing Sector: A Conceptual Model from a Multi-Theoretical Perspective.** *Appl. Sci. (Switzerland).* 2023; **13**(6).  
[Publisher Full Text](#)
- Aisyah S, Ali Y, Saharja K, et al.: **Smart door lock system development prototype using rfid technology id-12.** *Jurnal Riset Informatika.* 2022; **4**(4): 379–384.  
[Publisher Full Text](#)
- Ajzen I: **The theory of planned behavior.** *Organ. Behav. Hum. Decis. Process.* 1991; **50**(2): 179–211.  
[Publisher Full Text](#)
- Al-Riyami T, Al-Maskari A, Al-Ghnimi S: **Faculties Behavioural Intention Toward the Use of the Fourth Industrial Revolution Related-Technologies in Higher Education Institutions.** *Int. J. Emerg. Technol. Learn.* 2023; **18**(7): 159–177.  
[Publisher Full Text](#)
- Arfi WB, Nasr IB, Kondrateva G, et al.: **The role of trust in intention to use the IoT in eHealth: Application of the modified UTAUT in a consumer context.** *Technol. Forecast. Soc. Chang.* 2021; **167**: 120688.  
[Publisher Full Text](#)
- Atieh AM, Cooke KO, Osiyevskyy O: **The role of intelligent manufacturing systems in the implementation of Industry 4.0 by small and medium enterprises in developing countries.** *Eng. Rep.* 2023; **5**(3): 1–21.  
[Publisher Full Text](#)
- Bécue A, Gama J, Brito PQ: **AI's effect on innovation capacity in the context of industry 5.0: a scoping review.** *Artif. Intell. Rev.* 2024; **57**(8): 1–29.  
[Publisher Full Text](#)
- Bag S: **From resources to sustainability: a practice-based view of net zero economy implementation in small and medium business-to-business firms.** *Benchmarking.* 2024; **31**(6): 1876–1894.  
[Publisher Full Text](#)
- Bandura A: **On the functional properties of perceived self-efficacy revisited.** *J. Manag.* 2012; **38**(1): 9–44.  
[Publisher Full Text](#)
- Baron RM, Kenny DA: **The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations.** *J. Pers. Soc. Psychol.* 1986; **51**(6): 1173–1182.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Bennett NJ, Whitty TS, Finkbeiner E, et al.: **Environmental stewardship: A conceptual review and analytical framework.** *Environ. Manage.* 2018; **61**: 597–614.  
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Bonilla SH, Silva HR, Terra da Silva M, et al.: **Industry 4.0 and sustainability implications: A scenario-based analysis of the impacts and challenges.** *Sustainability.* 2018; **10**(10): 3740.  
[Publisher Full Text](#)

- Braun P, McEachern S: **Climate change and regional communities: Towards sustainable community behaviour in Ballarat.** *Aust. J. Reg. Stud.* 2010; **16**(1): 3–22.
- Castillo-Vergara M, Álvarez-Marín A, Villavicencio Pinto E, et al.: **Technological acceptance of industry 4.0 by students from rural areas.** *Electronics.* 2022; **11**(14): 2109.  
[Publisher Full Text](#)
- Chang RD, Zuo J, Zhao ZY, et al.: **Sustainability attitude and performance of construction enterprises: A China study.** *J. Clean. Prod.* 2018; **172**: 1440–1451.  
[Publisher Full Text](#)
- Charton-Vachet F, Lombart C, Louis D: **Impact of attitude towards a region on purchase intention of regional products: the mediating effects of perceived value and preference.** *Int. J. Retail Distrib. Manag.* 2020; **48**(7): 707–725.  
[Publisher Full Text](#)
- Chen JS: **Tourism stakeholders attitudes toward sustainable development: A case in the Arctic.** *J. Retail. Consum. Serv.* 2015; **22**: 225–230.  
[Publisher Full Text](#)
- Choi HSC, Sirakaya E: **Measuring residents' attitude toward sustainable tourism: Development of sustainable tourism attitude scale.** *J. Travel Res.* 2005; **43**(4): 380–394.  
[Publisher Full Text](#)
- Çiğdem Ş, Meidute-Kavaliauskiene I, Yıldız B: **Industry 4.0 and Industrial Robots: A Study from the Perspective of Manufacturing Company Employees.** *Logistics.* 2023; **7**(1).  
[Publisher Full Text](#)
- Cordero D, Altamirano KL, Parra JO, et al.: **Intention to adopt industry 4.0 by organizations in Colombia, Ecuador, Mexico, Panama, and Peru.** *IEEE Access.* 2023; **11**: 8362–8386.  
[Publisher Full Text](#)
- Cotet GB, Carutasu NL, Chiscop F: **Education sciences Educational Perspective.** *Educ. Sci.* 2020; **10**.
- Dalenogare LS, Benitez GB, Ayala NF, et al.: **The expected contribution of Industry 4.0 technologies for industrial performance.** *Int. J. Prod. Econ.* 2018; **204**: 383–394.  
[Publisher Full Text](#)
- Elia A: **Interactive effects of citizen trust and cultural values on pro-environmental behaviors: A time-lag study from Indonesia.** *Heliyon.* 2022; **8**(3).
- Elkington J, Rowlands IH: **Cannibals with forks: The triple bottom line of 21st century business.** *Altern. J.* 1999; **25**(4): 42.
- Faqih KM: **Internet shopping in the Covid-19 era: Investigating the role of perceived risk, anxiety, gender, culture, and trust in the consumers' purchasing behavior from a developing country context.** *Technol. Soc.* 2022; **70**: 101992.
- Fishbein M: **A reasoned action approach to health promotion.** *Med. Decis. Mak.* 2008; **28**(6): 834–844.  
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Ganguly B, Nag T: **Does Culture Influence the Website Design of Schools? A Cross-cultural Comparative Study in the Indian, Chinese and American Context.** *Glob. Bus. Rev.* 2021; 097215092198961.  
[Publisher Full Text](#)
- Gericke N, Boeve-de Pauw J, Berglund T, et al.: **The Sustainability Consciousness Questionnaire: The theoretical development and empirical validation of an evaluation instrument for stakeholders working with sustainable development.** *Sustain. Dev.* 2019; **27**(1): 35–49.  
[Publisher Full Text](#)
- Ghobakhloo M: **The future of manufacturing industry: a strategic roadmap toward Industry 4.0.** *J. Manuf. Technol. Manag.* 2018; **29**(6): 910–936.  
[Publisher Full Text](#)
- Ghouri AM, Mani V: **Role of real-time information-sharing through SaaS: An industry 4.0 perspective.** *Int. J. Inf. Manag.* 2019; **49**: 301–315.  
[Publisher Full Text](#)
- Hair JF, Ringle CM, Sarstedt M: **PLS-SEM: Indeed a silver bullet.** *J. Mark. Theory Pract.* 2011; **19**(2): 139–152.  
[Publisher Full Text](#)
- Hapsari R, Clemes M, Dean D: **The mediating role of perceived value on the relationship between service quality and customer satisfaction: Evidence from Indonesian airline passengers.** *Procedia Economics and Finance.* 2016; **35**: 388–395.  
[Publisher Full Text](#)
- Henseler J, Hubona G, Ray PA: **Using PLS path modeling in new technology research: updated guidelines.** *Ind. Manag. Data Syst.* 2016; **116**(1): 2–20.  
[Publisher Full Text](#)
- Hofstede G: **Motivation, leadership, and organization: do American theories apply abroad?** *Organ. Dyn.* 1980; **9**(1): 42–63.  
[Publisher Full Text](#)
- Hong SC: **Presumed effects of “fake news” on the global warming discussion in a cross-cultural context.** *Sustainability.* 2020; **12**(5): 2123.  
[Publisher Full Text](#)
- Hsu CL, Lin JCC: **Effect of perceived value and social influences on mobile app stickiness and in-app purchase intention.** *Technol. Forecast. Soc. Chang.* 2016; **108**: 42–53.  
[Publisher Full Text](#)
- Intishar S, Azzahro FZ, Aris IH, et al.: **Implementation of Environmental Care Education from Early Age.** *SEJ (Science Education Journal).* 2020; **4**(1): 19–25.  
[Publisher Full Text](#)
- Iqbal S, Moleiro Martins J, Nuno Mata M, et al.: **Linking entrepreneurial orientation with innovation performance in SMEs; the role of organizational commitment and transformational leadership using smart PLS-SEM.** *Sustainability.* 2021; **13**(8): 4361.  
[Publisher Full Text](#)
- Javaid M, Haleem A, Singh RP, et al.: **Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability.** *Sustainable Operations and Computers.* 2022; **3**: 203–217.  
[Publisher Full Text](#)
- Jayashankar P, Nilakanta S, Johnston WJ, et al.: **IoT adoption in agriculture: the role of trust, perceived value and risk.** *J. Bus. Ind. Mark.* 2018; **33**(6): 804–821.  
[Publisher Full Text](#)
- Joshi Y, Uniyal DP, Sangroya D: **Investigating consumers' green purchase intention: Examining the role of economic value, emotional value and perceived marketplace influence.** *J. Clean. Prod.* 2021; **328**(November): 129638.  
[Publisher Full Text](#)
- Jung HJ, Choi YJ, Oh KW: **Influencing factors of chinese consumers' purchase intention to sustainable apparel products: Exploring consumer “attitude-behavioral intention” gap.** *Sustainability (Switzerland).* 2020; **12**(5): 1–14.  
[Publisher Full Text](#)
- Khoa BT: **The role of self-efficacy and firm size in the online advertising services continuous adoption intention: Theory of planned behavior approach.** *J. Open Innov.: Technol. Mark. Complex.* 2023; **9**(1): 100025.  
[Publisher Full Text](#)
- Kim S, Park H, Kim B: **Impacts of Perceived Value and Trust on Intention to Continue Use of Individuals' Cloud Computing: The Perception of Value-based Adoption Model.** *J. Digit. Converg.* 2021; **19**(1): 77–88.
- Koźuch B: **The dimensions of trust in the digital era.** *Trust, Organizations and the Digital Economy.* Routledge; 2021; pp. 15–26.
- Koerber B, Freund H, Kasah T, et al.: **Leveraging industrial software stack advancement for digital transformation.** *Digit. McKinsey.* 2018; **15**: 1–50.
- Konuk FA: **The role of store image, perceived quality, trust and perceived value in predicting consumers' purchase intentions towards organic private label food.** *J. Retail. Consum. Serv.* 2018; **43**: 304–310.  
[Publisher Full Text](#)
- Krystallis A, Grunert KG, de Barcellos MD, et al.: **Consumer attitudes towards sustainability aspects of food production: Insights from three continents.** *J. Mark. Manag.* 2012; **28**(3-4): 334–372.  
[Publisher Full Text](#)
- Kurniawan I, Rahadyan A, Halimatussa'diah H: **Socialisation Of Internet Use And Utilization Ethics To Women Of Family Welfare Development.** *JMM (Jurnal Masyarakat Mandiri).* 2023; **7**(3): 2787–2794.  
[Publisher Full Text](#)
- Larsen MSS, Lassen AH, Schou C: **Manufacturing Innovation: A Heuristic Model of Innovation Processes for Industry 4.0.** *Appl. Syst. Innov.* 2023; **6**(6).  
[Publisher Full Text](#)
- Launer M, Çetin F, Paliszkievicz J: **Digital trust in the workplace: Testing a new instrument on a multicultural sample.** *Forum Scientiae Oeconomia.* 2022, March; **10**(1): 30–47.
- Lisana L: **Factors influencing the adoption of mobile payment systems in Indonesia.** *Int. J. Web Inf. Syst.* 2021; **17**(3): 0–10.  
[Publisher Full Text](#)
- Lubota PB, Kabini SK, Mwangi JW, et al.: **Development of An IoT-Based Smart Billing System for A Multipurpose Machine.** *SSRG Int. J. Electr. Electron. Commun. Eng.* 2024; **11**(5): 277–290.  
[Publisher Full Text](#)
- Luchs MG, Kumar M: **“Yes, but this other one looks better/works better”: How do consumers respond to trade-offs between sustainability and other valued attributes?** *J. Bus. Ethics.* 2017; **140**: 567–584.  
[Publisher Full Text](#)
- Müller JM, Kiel D, Voigt KI: **What drives the implementation of Industry 4.0? The role of opportunities and challenges in the context of sustainability.** *Sustainability.* 2018; **10**(1): 247.  
[Publisher Full Text](#)

- Ma L, Hu W, Liang R: **The Impact of the Industrial Internet on the Innovation and Development Level of China's Manufacturing Industry: Under the Perspective of Government Incentives.** *Sustainability.* 2024; **16**(10): 3935.  
[Publisher Full Text](#)
- Malek J, Desai TN: **A systematic literature review to map literature focus of sustainable manufacturing.** *J. Clean. Prod.* 2020; **256**: 120345.  
[Publisher Full Text](#)
- Marcial DE, Launer MA: **Towards the measurement of digital trust in the workplace: A proposed framework.** *Int. J. Eng. Sci. Technol.* 2019; **3**(12): 1–7.
- Mayer RC, Davis JH, Schoorman FD: **An integrative model of organizational trust.** *Acad. Manag. Rev.* 1995; **20**(3): 709–734.  
[Publisher Full Text](#)
- McDougall GH, Levesque T: **Customer satisfaction with services: putting perceived value into the equation.** *J. Serv. Mark.* 2000; **14**(5): 392–410.  
[Publisher Full Text](#)
- Miao M, Jalees T, Zaman SI, et al.: **The influence of e-customer satisfaction, e-trust and perceived value on consumer's repurchase intention in B2C e-commerce segment.** *Asia Pac. J. Mark. Logist.* 2022; **34**(10): 2184–2206.  
[Publisher Full Text](#)
- Michalos AC, Creech H, Swayze N, et al.: **Measuring knowledge, attitudes and behaviours concerning sustainable development among tenth grade students in Manitoba.** *Soc. Indic. Res.* 2012; **106**: 213–238.  
[Publisher Full Text](#)
- Mosunmola A, Adegbuyi O, Kehinde O, et al.: **Perceived value dimensions on online shopping intention: The role of trust and culture.** *Acad. Strateg. Manag. J.* 2019; **18**(1): 1–20.
- Mubarak MF, Petraite M: **Industry 4.0 technologies, digital trust and technological orientation: What matters in open innovation?** *Technol. Forecast. Soc. Chang.* 2020; **161**: 120332.
- Nabilah AZ, Loretta JM, Moch BN, et al.: **Strategy to Increase the Intention of Using Industry 4.0 Technology, Manufacture Production Monitoring System-Web Based Case Study: Automotive Manufacturing Industry Company.** *Proceedings of the 6th International Conference on Industrial and Business Engineering.* 2020, September; pp. 25–31.
- Nara EOB, da Costa MB, Baieler IC, et al.: **Expected impact of industry 4.0 technologies on sustainable development: A study in the context of Brazil's plastic industry.** *Sustain. Prod. Consum.* 2021; **25**: 102–122.  
[Publisher Full Text](#)
- Negara JGP, Setyohadi DB, et al.: **Uncertainty avoidance and individualism collectivism on acceptance of smart city mobile applications.** *2020 4th International Conference on Informatics and Computational Sciences (ICICoS).* IEEE; 2020, November; pp. 1–6.
- Ngan NT, Khoi BH: **Using Intention of Online Food Delivery Services in Industry 4.0: Evidence from Vietnam.** *International Conference on Hybrid Intelligent Systems.* Cham: Springer Nature Switzerland; 2022, December; pp. 142–151.
- Nguyen HT, Phan AC, Nguyen PH: **How e-service quality influence post-purchase behaviour: the mediating role of perceived value and the moderating of perceived risk.** *Int. J. Electron. Mark. Retail.* 2023; **14**(3): 257–274.  
[Publisher Full Text](#)
- Noerman T, Erlando A, Riyanto FD: **Factors Determining Intention to Continue Using E-HRM.** *Journal of Asian Finance, Economics and Business.* 2021; **8**(2): 1079–1089.  
[Publisher Full Text](#)
- Obermayer N, Csizmadia T, Hargitai DM: **Influence of Industry 4.0 technologies on corporate operation and performance management from human aspects.** *Meditari Account. Res.* 2022; **30**(4): 1027–1049.  
[Publisher Full Text](#)
- Paliszkievicz J, Chen K: **Building digital trust in business.** *Trust and Digital Business.* Routledge; 2022; pp. 3–11.
- Paswan A, Guzmán F, Lewin J: **Attitudinal determinants of environmentally sustainable behavior.** *J. Consum. Mark.* 2017; **34**(5): 414–426.  
[Publisher Full Text](#)
- Patalay P, Fonagy P, Deighton J, et al.: **A general psychopathology factor in early adolescence.** *Br. J. Psychiatry.* 2015; **207**(1): 15–22.  
[Publisher Full Text](#)
- Perri C, Giglio C, Corvello V: **Smart users for smart technologies: Investigating the intention to adopt smart energy consumption behaviors.** *Technol. Forecast. Soc. Chang.* 2020; **155**: 119991.  
[Publisher Full Text](#)
- Petcu MA, Sobolevschi-David M-I, Curea SC: **Integrating Digital Technologies in Sustainability Accounting and Reporting: Perceptions of Professional Cloud Computing Users.** *Electronics.* 2024; **13**(14): 2684.  
[Publisher Full Text](#)
- Ponte EB, Carvajal-Trujillo E, Escobar-Rodríguez T: **Influence of trust and perceived value on the intention to purchase travel online: Integrating the effects of assurance on trust antecedents.** *Tour. Manag.* 2015; **47**: 286–302.  
[Publisher Full Text](#)
- Prause M: **Challenges of industry 4.0 technology adoption for SMEs: the case of Japan.** *Sustainability.* 2019; **11**(20): 5807.  
[Publisher Full Text](#)
- Princes E: **Integrating ambidexterity into the modern manufacturing era of industry 4.0.** *Int. J. Supply Chain Manag.* 2020; **9**(4): 58–64.
- Qian W, Wang Y: **How do rising labor costs affect green total factor productivity? based on the industrial intelligence perspective.** *Sustainability.* 2022; **14**(20): 13653.  
[Publisher Full Text](#)
- Rahman MA, Abir T, Yazdani DMN, et al.: **Brand image, eWOM, trust and online purchase intention of digital products among Malaysian consumers.** *J. Xian Univ. Archit. Technol.* 2020; **12**(3): 4935–4946.
- Raj A, Dwivedi G, Sharma A, et al.: **Barriers to the adoption of industry 4.0 technologies in the manufacturing sector: An inter-country comparative perspective.** *Int. J. Prod. Econ.* 2020; **224**: 107546.
- Ringle C, Da Silva D, Bido D: **Structural Equation Modeling with the SmartPLS.** *Braz. J. Mark.* 2014; **13**(2).
- Rivera FM, Hermosilla P, Delgadillo J, et al.: **The sustainable development goals (SDGs) as a basis for innovation skills for engineers in the industry 4.0 context.** *Sustainability (Switzerland).* 2020; **12**(16): 0–14.  
[Publisher Full Text](#)
- Robert M, Giuliani P, Gurau C: **Implementing industry 4.0 real-time performance management systems: the case of Schneider Electric.** *Prod. Plan. Control.* 2022; **33**(2-3): 244–260.  
[Publisher Full Text](#)
- Roig JCF, Garcia JS, Tena MAM, et al.: **Customer perceived value in banking services.** *Int. J. Bank Mark.* 2006; **24**(5): 266–283.  
[Publisher Full Text](#)
- Sánchez-Franco MJ, Martínez-López FJ, Martín-Velicia FA: **Exploring the impact of individualism and uncertainty avoidance in Web-based electronic learning: An empirical analysis in European higher education.** *Comput. Educ.* 2009; **52**(3): 588–598.  
[Publisher Full Text](#)
- Saeedi SAW, Sharifuddin J, Seng KWK: **Intention on Adoption of Industry 4.0 Technology Among small and medium enterprises.** *Int. J. Sci. Technol. Res.* 2020; **9**(2): 4472–4478.
- Salas-Zapata WA, Ríos-Osorio LA, Cardona-Arias JA: **Knowledge, attitudes and practices of sustainability: Systematic review 1990–2016.** *Journal of Teacher Education for Sustainability.* 2018; **20**(1): 46–63.  
[Publisher Full Text](#)
- Salehzadeh R, Pool JK: **Brand attitude and perceived value and purchase intention toward global luxury brands.** *J. Int. Consum. Mark.* 2017; **29**(2): 74–82.  
[Publisher Full Text](#)
- Saniuk S, Grabowska S, Gajdzik B: **Social Expectations and Market Changes in the Context of Developing the Industry 4.0 Concept.** *Sustainability.* 2020; **12**(4): 1362.  
[Publisher Full Text](#)
- Saparudin M, Rahayu A, Hurriyati R, et al.: **Exploring the role of trust in mobile-banking use by Indonesian customer using unified theory of acceptance and usage technology.** *Int. J. Finance Res.* 2020; **11**(2): 51–60.  
[Publisher Full Text](#)
- Sartono Y, Astuti ES, Wilopo W, et al.: **STROBE\_checklist\_cross-sectional.** docx. figshare. [Dataset]. 2024.  
[Publisher Full Text](#)
- Selten F, Klievink B: **Organizing public sector AI adoption: Navigating between separation and integration.** *Gov. Inf. Q.* 2024; **41**(1): 101885.  
[Publisher Full Text](#)
- Setiawan S, Poerbosisworo IR: **Opportunities for using technology industry 4.0 to overcome the negative effect of the covid-19 pandemi.** *Pekommnas.* 2021; **6**(The): 55–65.  
[Publisher Full Text](#)
- Setyohadi DB, Aristian M, Sinaga BL, et al.: **Social critical factors affecting intentions and behaviours to use E-Learning: An empirical investigation using technology acceptance model.** *Asian J. Sci. Res.* 2017; **10**(4): 271–280.  
[Publisher Full Text](#)
- Setyohadi DB, Purnawati NW: **An investigation of external factors for technological acceptance model of nurses in Indonesia.** *IOP Conf. Ser. Mater. Sci. Eng.* 2018; **403**(1).  
[Publisher Full Text](#)
- Shin DD: **Blockchain: The emerging technology of digital trust.** *Telematics Inform.* 2019; **45**: 101278.  
[Publisher Full Text](#)
- Shiu E, Walsh G, Hassan LM, et al.: **The direct and moderating influences of individual-level cultural values within web engagement: A multi-**

**country analysis of a public information website.** *J. Bus. Res.* 2015; **68**(3): 534–541.

[Publisher Full Text](#)

Shuttleworth L, Schmitz S, Beier G: **Impacts of Industry 4.0 on industrial employment in Germany: A comparison of industrial workers' expectations and experiences from two surveys in 2014 and 2020.** *Prod. Manuf. Res.* 2022; **10**(1): 583–605.

[Publisher Full Text](#)

Sjøbakk B: **The strategic landscape of Industry 4.0.** In *Advances in Production Management Systems. Smart Manufacturing for Industry 4.0: IFIP WG 5.7 International Conference, APMS 2018, Seoul, Korea, August 26-30, 2018, Proceedings, Part II.* Springer International Publishing; 2018; pp. 122–127.

Sony M, Naik S: **Key ingredients for evaluating Industry 4.0 readiness for organizations: a literature review.** *BIJ.* 2020; **27**(7): 2213–2232.

Srite M, Karahanna E: **The role of espoused national cultural values in technology acceptance.** *MIS Q.* 2006; **30**: 679–704.

[Publisher Full Text](#)

Tick A, Saáry R, Kárpáti-Daróczi J: **Conscious or indifferent—concerns on digitalisation and sustainability among SMEs in Industry 4.0.** *Serb. J. Manag.* 2022; **17**(1): 145–160.

[Publisher Full Text](#)

Toni M, Renzi MF, Pasca MG, et al.: **Industry 4.0 an empirical analysis of users' intention in the automotive sector.** *Int. J. Qual. Serv. Sci.* 2021; **13**(4): 563–584.

[Publisher Full Text](#)

Trail GT, McCullough BP: **A longitudinal study of sustainability attitudes, intentions, and behaviors.** *Sustain. Sci.* 2021; **16**(5): 1503–1518.

[Publisher Full Text](#)

Tsaramirsis G, Kantaros A, Al-Darraji I, et al.: **A modern approach towards an industry 4.0 model: From driving technologies to management.** *J Sens.* 2022; **2022**: 1–18.

[Publisher Full Text](#)

Ubaidillah F, Fernandes AAR, Iriany A, et al.: **Truncated Spline Path Analysis Modeling on in Company X with the Government's Role as a Mediation Variable.** *J. Stat. Appl. Probab.* 2022; **11**(3): 781–794.

[Publisher Full Text](#)

Valaskova K, Nagy M, Zabožnik S, et al.: **Industry 4.0 Wireless Networks and Cyber-Physical Smart Manufacturing Systems as Accelerators of**

**Value-Added Growth in Slovak Exports.** *Mathematics.* 2022; **10**(14).

[Publisher Full Text](#)

Virmani N, Sharma S, Kumar A, et al.: **Adoption of industry 4.0 evidence in emerging economy: Behavioral reasoning theory perspective.** *Technol. Forecast. Soc. Chang.* 2023; **188**: 122317.

[Publisher Full Text](#)

Vishwakarma P, Mukherjee S, Datta B: **Travelers' intention to adopt virtual reality: A consumer value perspective.** *Journal of Destination Marketing and Management.* 2020; **17**(June): 100456.

[Publisher Full Text](#)

Walczuch R, Lemmink J, Streukens S: **The effect of service employees' technology readiness on technology acceptance.** *Inf. Manag.* 2007; **44**(2): 206–215.

[Publisher Full Text](#)

Wang Y, Kung L, Byrd TA: **Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations.** *Technol. Forecast. Soc. Chang.* 2018; **126**: 3–13.

[Publisher Full Text](#)

Yaqub MZ, Alsabban A: **Industry-4.0-Enabled Digital Transformation: Prospects, Instruments, Challenges, and Implications for Business Strategies.** *Sustainability (Switzerland).* 2023; **15**(11).

[Publisher Full Text](#)

Yin J, Qiu X: **AI technology and online purchase intention: Structural equation model based on perceived value.** *Sustainability.* 2021; **13**(10): 5671.

[Publisher Full Text](#)

Zaman U, Zahid H, Habibullah MS, et al.: **Adoption of big data analytics (BDA) technologies in disaster management: A decomposed theory of planned behavior (DTPB) approach.** *Cogent Bus. Manag.* 2021; **8**(1): 1880253.

[Publisher Full Text](#)

Zeithaml VA: **Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence.** *J. Mark.* 1988; **52**(3): 2–22.

[Publisher Full Text](#)

Zhao S, Chen L: **Exploring residents' purchase intention of green housings in China: an extended perspective of perceived value.** *Int. J. Environ. Res. Public Health.* 2021; **18**(8): 4074.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Zhu G, So KKF, Hudson S: **Inside the sharing economy: Understanding consumer motivations behind the adoption of mobile applications.** *Int. J. Contemp. Hosp. Manag.* 2017; **29**(9): 2218–2239.

[Publisher Full Text](#)

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## Version 2

Reviewer Report 16 September 2024

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**Djoko Budiyanto Setyohadi**

Atmajaya University, Yogyakarta, Indonesia

I agree with authors revision.

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Socio informatics, information system, and user interface user experience

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Reviewer Report 14 September 2024

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**Muhammad Faraz Mubarak**

Dalhousie University, Halifax, Nova Scotia, Canada

.No further comments

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** innovation management > digital transformation-->collaborative innovation

**I confirm that I have read this submission and believe that I have an appropriate level of**

expertise to confirm that it is of an acceptable scientific standard.

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**Version 1**

Reviewer Report 02 September 2024

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**Djoko Budiyanto Setyohadi**

Atmajaya University, Yogyakarta, Indonesia

The paper entitled "Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance" investigates the mechanisms and implications of adopting Industry 4.0. It examines how digital trust and a sustainable attitude influence perceived value and the ongoing intention to adopt Industry 4.0. The paper addresses an engaging topic and presents a well-executed experiment, supported by a solid theoretical foundation. This makes it a valuable resource for both practitioners and academics. However, there are points that require improvement before the paper can be accepted for indexing.

- The claim that "there is still a need for a deeper understanding of the mechanisms and implications in the context of adopting Industry 4.0" is intriguing but lacks clear elaboration. The paper should better clarify the relationships among the variables in the proposed model.
- The literature review is well-structured but could benefit from additional context, especially in relation to the area of the study. It would be beneficial to include more sources that address similar technological acceptance issues, particularly in the Indonesian context.
- The conclusion should be expanded to reflect the key claims made by the author.

In summary, the paper is interesting and useful for the reader related to adopting Industry 4.0. It requires further development and extension. It could be considered for indexing once revisions addressing the above points are made.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

No

**Are sufficient details of methods and analysis provided to allow replication by others?**

No

**If applicable, is the statistical analysis and its interpretation appropriate?**



Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Socio informatics, information system, and user interface user experience

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Author Response 03 Sep 2024

**Yuli Sartono**

Thank you for your thoughtful and constructive feedback on our research paper titled "Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance." We are pleased to hear that you find the topic engaging and the study valuable for both practitioners and academics. We appreciate your detailed comments, which have guided us in improving the quality of our paper. Below, we address each of your points:

1. Clarification of the Need for Deeper Understanding: We have now elaborated on the statement regarding the need for a deeper understanding of the mechanisms and implications in adopting Industry 4.0. In the revised paper, we have clarified how the existing literature gaps relate to our study's objectives. We provide a more detailed explanation of the specific mechanisms, highlighting the importance of understanding these relationships to advance Industry 4.0 adoption.
2. Enhancing the Literature Review with Additional Context: In response to your suggestion, we have enriched the literature review by including more recent studies that address similar technological acceptance issues, particularly within the Indonesian context. These additions provide a broader understanding of how local cultural factors impact the adoption of Industry 4.0 technologies, ensuring that the review reflects the most current and relevant research in this area.
3. Expansion of the Conclusion: We have expanded the conclusion to better reflect the key claims made throughout the paper. The revised conclusion now offers a comprehensive summary of our findings and ties them back to the original research questions and hypotheses. This ensures that the significance of our findings is clearly articulated and underscores the contributions of our study to the field of Industry 4.0 and digital transformation.

We are committed to enhancing the clarity, depth, and rigor of our paper. Your feedback has been instrumental in guiding us to make the necessary revisions that improve the quality and impact of our study. We believe that by addressing these points, our paper now offers a more robust and valuable contribution to the academic community and industry

practitioners.

Thank you once again for your insightful comments and suggestions.

Sincerely,

Authors

**Competing Interests:** No competing interests were disclosed.

Reviewer Report 29 August 2024

<https://doi.org/10.5256/f1000research.166963.r306607>

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**Muhammad Faraz Mubarak**

Dalhousie University, Halifax, Nova Scotia, Canada

The study provides interesting insights where role of digital trust and sustainable attitude is tested towards perceived value, that is further assumed towards intention to adopt i4.0. The study is based on reasonable theoretical background, as well as hypothesis development is considerable. The methodology applied is also suitable, and the context is acceptable tool. Further, results are based on robust analysis to support and reject respective hypothesis. Having said that, the overall study looks good, however, authors are suggested to highlight the originality and novelty of study, though it has solid foundations and USPs such as digital trust and sustainable attitude towards perceived value and then intention (with a moderator of course). I wish all the best to all co-authors and grateful for providing me an opportunity to quickly read this very interesting piece of research.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Partly

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** innovation management > digital transformation-->collaborative innovation

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Author Response 03 Sep 2024

**Yuli Sartono**

Dear Reviewer,

Thank you for your thorough review of our manuscript titled "Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance." We greatly appreciate your positive feedback on our study's theoretical background, hypothesis development, methodology, and robust analysis. We are pleased that you found our research interesting and valuable.

We acknowledge your suggestion to further highlight the originality and novelty of our study, particularly concerning the unique aspects of digital trust and sustainable attitude in relation to perceived value and intention to adopt Industry 4.0 technologies. In response, we will enhance the discussion section to better emphasize these points and clarify how our research contributes to the existing body of knowledge in this field.

Regarding the availability of source data, we understand the importance of data accessibility for reproducibility. As mentioned, our data is subject to confidentiality agreements, but we will outline a clear process for requesting access and consider anonymizing the data wherever possible. This should facilitate replication while protecting participant confidentiality.

Once again, we appreciate your insightful comments and suggestions, which have guided us in improving the quality of our manuscript. We are committed to addressing your feedback and ensuring that our study provides a meaningful contribution to the field of digital transformation and Industry 4.0 adoption.

Thank you for your time and expertise in reviewing our work. We look forward to your continued feedback and suggestions.

Sincerely,  
Authors

**Competing Interests:** No competing interests were disclosed.

Reviewer Report 25 July 2024

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**Mohamad Zreik** 

Sun Yat-sen University, Zhuhai, China

### Summary of the Article

The research article titled "*Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance*" explores the relationships between digital trust, sustainable attitude, perceived value, and the intention to adopt Industry 4.0 technologies. The study also examines how uncertainty avoidance moderates these relationships. Data were collected from 189 employees at leading manufacturing companies in Indonesia recognized for their Industry 4.0 practices. The findings reveal that digital trust and sustainable attitude significantly influence perceived value, but do not directly affect the intention to adopt Industry 4.0 technologies. Uncertainty avoidance moderates the relationship between digital trust and adoption intention.

Detailed Analysis

#### 1. Presentation and Citation of Current Literature

##### ○ Partly

- The work is clearly presented and provides a comprehensive analysis. However, some references are outdated. Incorporating more recent studies would strengthen the paper's relevance and ensure it reflects the latest developments in Industry 4.0 and digital transformation.
- **Recommendation:** Update the literature review to include more recent sources from the past five years to ensure the study is grounded in the latest research.

#### 2. Study Design Appropriateness and Technical Soundness

##### ○ Yes

- The study design is appropriate for the research questions posed. The use of Partial Least Squares (PLS) methodology with SmartPLS software is suitable for testing the proposed hypotheses and exploring moderating effects. The sample selection and data collection methods are clearly described, and the statistical analysis is robust, providing valid and reliable results.

#### 3. Details of Methods and Analysis for Replication

##### ○ Yes

- The study provides sufficient details of the methods and analysis to allow replication. It describes the data collection process, sample selection, survey methodology, and the use of SmartPLS software for PLS-SEM. The measurement of variables, hypothesis testing, and statistical analysis procedures are detailed adequately for replication.

#### 4. Statistical Analysis and Interpretation

##### ○ Yes

- The statistical analysis and its interpretation are appropriate. The use of PLS-SEM is well-suited for the study's objectives, and the analysis includes reliability and validity assessments, hypothesis testing, and the examination of moderating effects. The interpretation of results is consistent with the data and supports the study's conclusions.

#### 5. Availability of Source Data

- **Partly**
  - While the study mentions that data are available on request from the corresponding author due to confidentiality agreements, this does not ensure full reproducibility. Ideally, the source data should be openly accessible or provided in a manner that allows independent verification and replication of the results without additional barriers.
  - **Recommendation:** Provide a more detailed data availability statement and consider anonymizing the data to make it fully accessible. If confidentiality agreements are a constraint, clearly outline the process for requesting data access.

#### 6. Conclusions Supported by Results

- **Yes**
  - The conclusions drawn are adequately supported by the results. The findings align with the hypotheses and statistical analysis, and the discussion appropriately interprets the results in the context of the research questions. The conclusions are based on the data presented and provide valuable insights into the impact of digital trust, sustainable attitude, and uncertainty avoidance on the adoption of Industry 4.0 technologies.

#### Constructive Feedback for Improvement

##### 1. Update Literature Review

- Incorporate more recent studies (from the past five years) to ensure the research is current and reflects the latest developments in Industry 4.0 and digital transformation.

##### 2. Enhance Data Accessibility

- Provide a more detailed data availability statement. Consider anonymizing the data to make it fully accessible. If confidentiality is an issue, outline a clear process for requesting data access, ensuring that the steps are not overly cumbersome for researchers wishing to replicate the study.

##### 3. Expand Discussion on Non-significant Findings

- Provide a deeper exploration of why digital trust and sustainable attitude did not directly affect the intention to adopt Industry 4.0 technologies. Discuss potential reasons for these findings and suggest areas for future research to explore these relationships further.

##### 4. Address Cultural Dimensions More Thoroughly

- Given the significant role of uncertainty avoidance, consider a more detailed discussion of cultural dimensions and their impact on technology adoption. This could include a comparison with findings from different cultural contexts to provide a broader understanding of the role of cultural factors.

By addressing these points, the authors can enhance the scientific soundness and impact of their study, making it more robust and valuable to the academic community and practitioners in the field of Industry 4.0 and digital transformation.

**Is the work clearly and accurately presented and does it cite the current literature?**

Partly

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Partly

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** -

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.**

Author Response 03 Sep 2024

**Yuli Sartono**

Dear Reviewer,

Thank you for your detailed and constructive feedback on our research article titled "Sustainable Digital Transformation: Its Impact on Perceived Value and Adoption Intention of Industry 4.0 in Moderating Effects of Uncertainty Avoidance." We appreciate the time and effort you have taken to review our work and provide insightful comments to enhance its quality. Below, we address each of your points:

- 1. Updating the Literature Review:** We appreciate your suggestion to include more recent studies in the literature review. We have now updated this section to incorporate studies from the past five years, ensuring that our literature review reflects the latest developments in Industry 4.0 and digital transformation. This revision helps in grounding our work in the most current research and provides a comprehensive overview of relevant literature.
- 2. Enhancing Data Accessibility:** We understand the importance of data accessibility for reproducibility and transparency. However, our data are subject to confidentiality agreements with the participants and restrictions imposed by the institution where the research was conducted. To address this concern, we will revise our data availability statement to outline a clear and streamlined process for requesting data



access. While we may not be able to make the data fully accessible due to confidentiality issues, we will consider anonymizing the data wherever possible. We will ensure that the process for requesting data access is straightforward and not overly cumbersome, enabling other researchers to replicate our study while maintaining the confidentiality of our participants.

- 3. Expanding the Discussion on Non-significant Findings:** We have revised the discussion section to provide a deeper exploration of the non-significant findings, specifically why digital trust and sustainable attitude did not directly affect the intention to adopt Industry 4.0 technologies. The revised discussion now includes potential explanations and contextual factors that might have influenced these results. We have also suggested future research directions to further investigate these relationships.
- 4. Addressing Cultural Dimensions More Thoroughly:** In response to your feedback, we have expanded our discussion on cultural dimensions, particularly the role of uncertainty avoidance, in shaping technology adoption behaviors. We have included a more detailed analysis of how cultural factors influence the adoption of Industry 4.0 technologies. Additionally, we have compared our findings with studies conducted in different cultural contexts to provide a broader understanding of the impact of cultural dimensions on technology adoption.

We are committed to improving the scientific rigor and impact of our study, and we believe that incorporating your feedback will significantly enhance its value to the academic community and practitioners in the field of Industry 4.0 and digital transformation. We appreciate your constructive suggestions and will make the necessary revisions to address them.

Thank you once again for your valuable feedback.

Sincerely,  
Authors

**Competing Interests:** No competing interests were disclosed.

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## Comments on this article

### Version 1

Reader Comment 22 Jul 2024

**Farid Ubaidillah**, Statistic, Brawijaya University, Malang, Indonesia

This journal has the latest research, where it is still difficult to find research that conducts research on employee attitudes in an organization to increase intentions to adopt 4.0. Apart from that, this research has a good level of neatness starting from writing sentences, compiling research tables and explaining research pictures.

Moreover, I hope that this journal can be published on F1000, because it has novelty and good quality.

Several aspects that explain this research are very feasible, namely:

1. It is still difficult to research attitudes in a company,
2. Has a very relevant novelty,
3. The grammar of the sentences is quite good,
4. The references used are very precise.
5. The results of the research have benefits for companies, governments and consumers

**Competing Interests:** No competing interests were disclosed.

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