Personality Traits and Innovativeness in Dynamic Environments: The Mediating Role of Technology Adoption

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Abstract

Entrepreneurship involves creating something new and valuable through the sacrifice of time, energy, and the acceptance of financial, physical, and social risks. Entrepreneurs focusing on establishing start-ups must demonstrate innovation and implement technology to create effective and efficient solutions in a dynamic environment. Nevertheless, many entrepreneurs still struggle to implement these principles. Therefore, this study aims to investigate whether the Big Five Personality is a characteristic of entrepreneurs who are capable of innovating and developing their businesses in a dynamic environment by integrating the Social Cognitive Theory (SCT). Data for this study was gathered through a questionnaire distributed among students at Ciputra University in Surabaya, employing Partial Least Squares Structural Equation Modelling (PLS-SEM) for analysis. The measurement instrument utilised a Likert scale to assess responses ranging from "strongly disagree" to "totally agree", with scores assigned to each level. The data collection yielded responses from 160 participants through a Google Form. The findings indicate that the Big Five personality influences technology adoption but does not have a direct impact on innovativeness, indicating a full mediation relationship. Additionally, the dynamic environment exerts a partial moderating effect on innovativeness.

Keywords: big five personality; dynamic environment; innovativeness; technology adoption.

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INTRODUCTION

Start-up companies have started to emerge and develop rapidly in Indonesia. Based on data summarized from iNews.id, Indonesia achieved the sixth largest position in the world in terms of the number of start-up companies. This position Indonesia occupies, boasting a total of 2,492 start-ups. This achievement even surpasses developed countries such as Germany and France. This statement was conveyed by the Minister for Maritime Affairs and Investment (Menko Marves), Luhut Binsar Pandjaitan, at the Road to Indonesia Start-Up Ecosystem Summit 2023, which was held virtually on Friday, August 11, 2023. Indonesia is only behind five countries, namely the United States, India, the UK, Canada, and Australia, in the number of start-ups. However, Indonesia's achievements remain higher than those of Germany and France, which are ranked seventh and eighth, respectively, in the world ranking list.

Entrepreneurship can be understood as a process of creating new and valuable products, services, or opportunities through the investment of time and effort while assuming financial, physical, and social risks. Selamat and Tunjungsari (2019) identify four fundamental dimensions of entrepreneurship: the creation of something new and valuable, the commitment of time and effort, the rewards derived from entrepreneurial activities, and the willingness to bear associated risks. Fauzi (2021) further emphasizes that entrepreneurship requires courage and the ability to solve problems effectively. Entrepreneurs, particularly those involved in start-up ventures, need to demonstrate creativity and adaptability in addressing challenges and developing practical solutions within a limited period. Furthermore, the sustainability of start-up businesses depends partly on entrepreneurs who are capable of working independently and establishing a strong organizational foundation. Becoming an entrepreneur also requires a combination of skills, training, practical experience, and comprehensive business planning. Therefore, entrepreneurial competence, including the ability to develop and implement an effective business plan, cannot be assumed to be possessed by everyone and generally requires appropriate preparation and development.

As time goes by, start-ups are often associated with start-up companies that focus on technology-based businesses. The era of society 5.0 is a concept for a new way of life in society and is defined as a technology-based concept (Nastiti & Abdu, 2020). In the era of society 5.0, the rapid spread of information has led to increased competition among communities, particularly in the economic sector, making it more difficult to find employment and contributing to a rise in poverty in the economic sector, which makes it difficult to get work and increases the poverty population in Indonesia (Hasbi & Mahmudah, 2020; Ramdani & Ihsan, 2021; Yamin *et al.*, 2023). This is also due to the rapid development of technology so that it can be adopted in everyday life. The convergence of innovative technologies with traditional business processes has given rise to what is commonly referred to as the digital era (Butt, 2020; Luo *et al*., 2018; Nijhawan & Dubas, 2007; Wamba *et al*., 2019). This era is characterized by the widespread influence of technologies such as artificial intelligence, data analytics, cloud computing, blockchain, and the Internet of Things, which have fundamentally reshaped business strategies and operations across industries (French *et al*., 2021; A. M. French *et al*., 2020; Khan & Manzoor, 2021). Many start-up companies increasingly use technology because they consider it very helpful for improving work effectiveness and efficiency. Start-ups are at the forefront of technology due to their agility, innovation, and tendency to break existing norms (Dees, 2008; Tchuta & Xie, 2017).

The Big Five Personality Model, also referred to as the Five-Factor Model, provides a widely

recognized framework for examining individual personality and behavioral tendencies. The model comprises five dimensions: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (OCEAN). These personality dimensions can be particularly relevant to business owners who operate in dynamic and uncertain environments. Openness to Experience enables entrepreneurs to remain receptive to novel ideas, respond effectively to environmental changes, and pursue innovation, thereby supporting business adaptability and competitiveness. Conscientiousness reflects characteristics such as self-discipline, organization, responsibility, and goal-oriented behavior. Entrepreneurs with higher levels of conscientiousness tend to demonstrate greater ability to organize activities, establish priorities, and consistently execute planned actions, which can support business performance in changing environments. Meanwhile, Extraversion is characterized by sociability, assertiveness, and interpersonal engagement. These characteristics may facilitate entrepreneurs' ability to develop networks, maintain business relationships, and communicate effectively with customers, employees, and other stakeholders, which are important for business development and growth. Extraverted entrepreneurs may discover it easier to engage with clients, employees, and partners. Agreeableness signifies an individual's tendency to be cooperative, compassionate, and friendly. Business owners high in agreeableness are often better at fostering a positive workplace culture, maintaining good relationships with team members, and promoting collaboration, which can enhance productivity and innovation in a rapidly changing environment. Neuroticism relates to emotional stability and resilience. Entrepreneurs with lower levels of neuroticism are generally better at managing stress and facing challenges head-on. In dynamic markets, where uncertainty and pressure are prevalent, maintaining emotional balance can lead to more effective decision-making and problem-solving. The Big Five personality traits are vital for business owners in dynamic environments because they influence adaptability, organizational skills, communication, teamwork, and stress management. Understanding and developing these traits can lead to more effective leadership and a greater chance of business success in an ever-evolving landscape.

In Indonesia, there are many places to hone business skills from an early age, one of which is on campus. Ciputra University in Surabaya has a vision to become a leading entrepreneurial university in Indonesia that produces graduates who are innovative, ethical, and globally competitive. The university's mission is to provide quality education that integrates academic knowledge with practical experience, preparing students to succeed in a rapidly changing global economy. With a focus on entrepreneurship and innovation, Ciputra University aims to nurture the next generation of leaders who can drive sustainable development and social responsibility. In line with its vision and mission, Ciputra University has set several goals to achieve its objectives. These goals include fostering a culture of creativity and innovation among students, providing a dynamic learning environment that promotes critical thinking and problem-solving skills, and equipping graduates with the necessary knowledge and skills to succeed in their chosen fields. The university also aims to establish strong partnerships with industry and community stakeholders to enhance students' learning experiences and prepare them for the workforce.

CNBC Indonesia reports that 90 percent of startups in Indonesia have failed to develop successfully. President Jokowi pointed out that underlying reasons contribute to these failures. According to CB Insights, some of the key reasons for these failures include a lack of market demand (42%), running out of funds (29%), improper team composition (23%), losing out in competition (19%), unsustainable pricing or costs (18%), products that are not user-friendly (17%), products

without a viable business model (17%), ineffective marketing strategies (14%), neglecting customer needs (14%), launching products at inappropriate times (13%), losing focus (13%), disharmony within teams or with investors (13%), unsuccessful pivots (10%), loss of passion (9%), failed expansions (9%), a lack of funding or investor interest (8%), legal issues (8%), failure to leverage networks (8%), burnout (8%), and an inability to pivot (7%).

Through this research, the investigator aims to investigate whether the Big Five Personality Traits are characteristics of entrepreneurs who are capable of innovating and developing their businesses in a dynamic environment. This understanding is expected to enable student-led enterprises at Ciputra University Surabaya to achieve long-term sustainability and successfully compete in the dynamic environment as they evolve. With their entrepreneurial spirit and ability to adapt, start-ups such as those at Ciputra University have been pioneers in embracing digital transformation to gain a competitive advantage (Klačmer Čalopa *et al*., 2014; Linina *et al*., 2021; Sharma & Goyal, 2020). Open technological innovation can further enhance these advantages by enabling businesses to collaborate and share knowledge with external partners (Shin & Ahn, 2016; Rukmana, 2017). It can be concluded that digital transformation can shift people's mindsets towards technology, producing efficiency, innovation, and a better customer experience (Shabri, 2022; Sulaiman *et al*., 2021). In the campus environment, students can also apply digital technologies such as social media, SEO, digital advertising, and other tools. However, implementing innovation takes time and involves facing various processes and challenges. The start-up ecosystem still faces unstable work systems and processes. An environment that can dynamically change the outcomes of applied innovation is necessary. Therefore, research is needed to demonstrate the effect of the Big Five personality traits on innovativeness, with technology adoption serving as a mediating variable and a dynamic environment acting as a moderating variable.

LITERATURE REVIEW

Based on the previous study titled "The Interplay of Entrepreneurial Personality and Startup Innovativeness – The Mediation Effect of Technology Adoption" by Felix *et al*. (2023), it was found that specific personality traits directly impact startup innovation. The research also indicates that the adoption of technology plays a significant role in driving startup innovativeness. Moreover, the study shows that technology adoption partially mediates these traits. This research gives helpful insights into how entrepreneurs' personalities and technology adoption influence startup innovativeness, emphasizing the importance of technology in this dynamic relationship. However, it should be noted that the authors utilized secondary data from startups in Germany, which may limit the generalizability of the findings to other geographic and cultural contexts. Therefore, in this study, the researcher used business owners at the University of Ciputra Surabaya campus as the research subjects. This limitation is because the characteristics of each business owner are different, resulting in different outcomes.

Dangmei *et al.* (2020), in their study entitled *Impacts of Big Five Personality Traits on Innovative Behavior Among Business Students: An Empirical Study*, examined the relationship between the Big Five personality traits and innovative behavior using measurement scales adapted from John and Srivastava (1999). The findings indicate that extraversion, conscientiousness, and openness are positively and significantly associated with innovative behavior, whereas agreeableness and neuroticism do not demonstrate significant relationships. Among the five personality

dimensions, conscientiousness was identified as the strongest predictor of innovative behavior among business students. These findings suggest that students with higher levels of extraversion, conscientiousness, and openness are more likely to demonstrate innovative tendencies. The study is particularly relevant to the present research because it examined business students enrolled in the Department of Business Management at Indira Gandhi National Tribal University and employed a simple random sampling technique. The similarity in the research context and variables provides a useful empirical reference for examining the relationship between personality traits and innovative behavior. Accordingly, the findings of Dangmei *et al.* (2020) provide a relevant theoretical and empirical basis for further investigation of how the Big Five personality traits may contribute to innovative behavior among business students.

The third study, conducted by Runst and Thoma (2021) examined the relationship between personality traits and innovation among small and medium-sized enterprises (SMEs) in Germany. Using comprehensive data from SMEs, the study provides empirical evidence that Big Five personality traits are positively associated with firms' innovation activities. The findings highlight the potential value of personality characteristics in supporting innovation within entrepreneurial settings. The authors further suggest that entrepreneurship education should incorporate psychological self-awareness to help business owners recognize the relevance of innovation and better understand their individual strengths and limitations. Although entrepreneurial success and innovation cannot be attributed solely to personality characteristics, greater awareness of personal capabilities and weaknesses may help entrepreneurs determine appropriate responsibilities and recognize areas requiring additional support.

The fourth study, conducted by Aldrin and Hastuti (2023) further demonstrates the relevance of personality in explaining employees' innovative work behavior. The findings indicate that personality characteristics significantly contribute to employees' ability to engage in innovative activities. Therefore, developing self-awareness of individual personality traits may help employees recognize factors that influence their capacity to generate and implement new ideas. The study also emphasizes the relevance of other internal factors, particularly motivation toward innovation, in shaping innovative behavior within organizations. Specifically, openness to experience accounted for the largest contribution (29.7%), followed by extraversion (19%), agreeableness (11.5%), conscientiousness (11.2%), and neuroticism (6%) in explaining employees' innovative work behavior.

Stock et al. (2014) serves as the basis for the recent research. Personality is closely linked to the success of individuals, and at various stages, individuals within specific domains must exhibit a positive attitude. Therefore, the identification of personality traits significantly influences the overall likelihood of success. This suggests that one can often evaluate an individual's capacity for innovation by examining their personality profile. In this context, the Big Five personality traits can greatly enhance success and provide competitive advantages. The study indicates that individuals who score higher on the Big Five personality trait of openness to experience are significantly more likely to generate new product ideas. Conversely, being introverted and conscientious is associated with the ability to transform these ideas into tangible product prototypes for personal use. Moreover, individuals with high levels of conscientiousness are more likely to successfully commercialize their innovations, although they tend to be less effective in peer-to-peer diffusion.

The sixth study, conducted by Hoogh et al. (2005) examined the relationships between the Big Five personality traits and charismatic and transactional leadership behaviors, while also

considering the moderating role of a dynamic work environment. Using the Big Five Personality framework, the study found that, consistent with Trait Activation Theory, a dynamic work environment moderates the relationships between four of the five personality dimensions and both charismatic and transactional leadership behaviors. The findings further indicate that charismatic leadership is positively related to perceived leadership effectiveness; however, this relationship becomes significant specifically in dynamic work environments. These results highlight the importance of contextual conditions in determining how personality traits are expressed through leadership behavior and perceived effectiveness.

The Big Five Personality

Start-ups offer large profit potential so that the number of competitors continues to increase until now. Start-ups can quickly generate significant profits. Start-ups are considered quite innovative and move faster than other companies. However, as the driving force, an entrepreneur at Ciputra University needs to have an attitude of openness to experience. Start-up companies need to have transparency to build trust with stakeholders. Various internal and external factors influence the potential success of a start-up. Internally, one can envision the development of a start-up through its entrepreneurial awareness. Given the significant risks and opportunities involved, entrepreneurs must be aware of all aspects, including those related to their work environment. An entrepreneur needs extraversion in business to communicate, network, and work over time. In a business context, extraversion can help in building relationships with customers, establishing partnerships with other parties, and leading teams effectively. The trait of extraversion can also help in promoting company products or services, facing challenges with optimism, and creating a dynamic and enthusiastic work atmosphere. An entrepreneur needs to have agreeableness and neuroticism as dimensions in the Big Five Personality. Understanding and learning about the Big Five personality traits is crucial in relation to innovativeness because it helps us to better understand ourselves and others, which in turn allows us to leverage our individual strengths and weaknesses in the innovation process. This knowledge is also taught when students attend lectures at Ciputra University. By being aware of our personality traits, such as openness to experience and conscientiousness, we can tailor our approach to problem-solving and creativity in a way that aligns with our natural tendencies. Additionally, understanding the Big Five personality traits can help us collaborate effectively with others who may have different personality profiles, thus fostering a more diverse and innovative team dynamic. In essence, exploring the realm of personality psychology can provide valuable insights into how we can maximize our creativity and innovative potential.

H1: The Big Five personality affects technology adoption.

H3: The Big Five personality affects innovativeness.

Technology Adoption

Among the various attributes of information technology, IT managerial skills have been identified as the only attribute that can provide sustainability in terms of competitive advantage (Mata *et al*., 1995; Sudirjo *et al*., 2023). When individuals who are starting up businesses adopt technology, their companies will be able to maintain long-term competitiveness. From an early age, students are familiar with technology. As time goes by, increasingly sophisticated technology becomes available. Students' daily life has also depended on the existence of technology. Technology helps all human activities become more effective and efficient, even when applied in the business

world. In the ever-growing digital era, technology has become an integral part of almost all aspects of life and business. By adopting technology, business start-ups can gain various benefits, such as automation of business processes, more efficient data management, increased accessibility and connectivity, and utilization of analytical data for better decision-making. Apart from that, technology can also help business start-ups expand market reach, increase interactions with customers, and create better experiences for consumers. This is also an important competitive advantage when a business adopts technology.

H2: Technology adoption affects innovativeness.

H5: Technology adoption mediates the relationship between the Big Five personality and innovativeness.

Dynamic Environment

As a microcosm of a global phenomenon, the dynamic start-up environment in Indonesia is proof of the potential of technology to drive business revolution and economic progress (Fkun *et al*., 2023; Purbasari *et al*., 2020). On campus, students frequently face uncertain external challenges and problems. Even though the environment in the start-up ecosystem continues to change, a smart entrepreneur will look for suitable strategies to implement in his company. Start-up companies are considered new businesses in their field, so many things continue to evolve and be improved during the course of the business process. This has an impact on a dynamic work environment. The work environment can be assessed as one of the advantages or disadvantages of start-up companies. As a start-up company, companies generally have a dynamic and innovative work environment that requires their employees to continue learning and be able to adapt to various situations. Various challenges confront business start-ups. To face a dynamic business environment, start-up businesses need to have uniqueness, adaptability, and the ability to innovate continuously. There are several strategies that can help business start-ups face a dynamic business environment, including having a flexible business plan, building effective communication between internal teams and business partners, continuing to encourage innovation in products, services and business processes and continuing to bring together markets and competitors. This strategy includes understanding industry trends, customer needs, and strategic competitors.

H4: Dynamic environment affects innovativeness.

H6: Dynamic environment moderates the relationship between technology adoption and innovativeness.

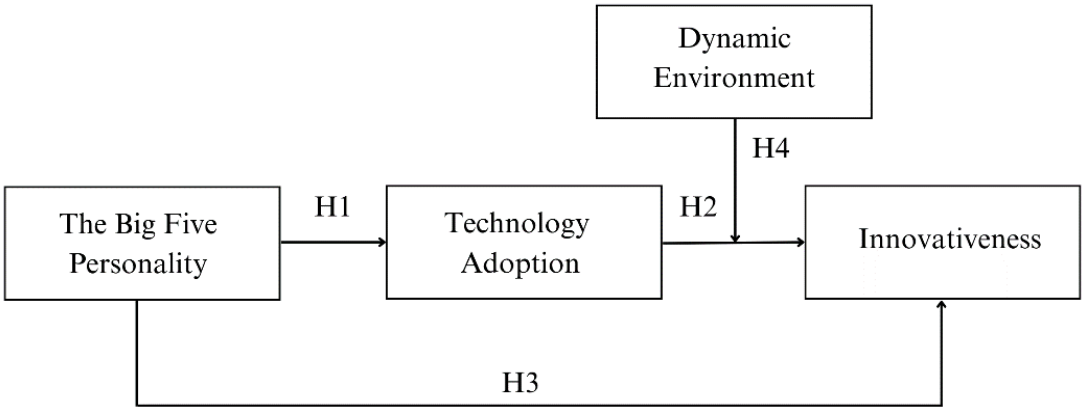


Figure 1. Conceptual Model

Innovativeness

To remain competitive and sustainable in the era of Society 5.0, business start-ups need to continuously foster innovation. Business innovation refers to the ability to generate novel ideas and develop creative solutions to address various challenges encountered by organizations. By embracing innovation, start-ups can strengthen their competitive advantage and improve their ability to respond effectively to changes in the business environment (Radianto, 2016). There is a considerable amount of material on innovation taught in universities. However, not every innovation can be successful when implemented. This situation is where challenges arise for businesses attempting to introduce innovation. With innovation, companies can update products, services, processes, and strategies to stay relevant and competitive in an ever-changing market. Innovation can also help companies to increase efficiency, productivity, and competitive advantage. An open innovation culture that encourages mutual trust, collaboration, and learning can improve the efficiency of knowledge management practices, leading to increased innovation capabilities (Lam *et al*., 2021). Coupling this approach with technology adoption will accelerate its effects both nationally and internationally. Students should innovate their business in the early stages because it allows them to differentiate themselves in a crowded market, adapt to changing consumer trends, and stay ahead of competitors. By innovating early on, students can identify and address potential challenges before they become major roadblocks. Additionally, innovation can lead to improved efficiency, increased revenue, and enhanced customer satisfaction. It also allows students to build a strong reputation and brand identity from the beginning, setting them up for long-term success in the business world. Ultimately, early-stage innovation can help students establish a competitive edge and create a sustainable business model that will continue to thrive in the future.

The hypotheses were empirically tested using data collected from students at Universitas Ciputra Surabaya, an institution with a strong emphasis on developing world-class entrepreneurs. A quantitative survey design was employed to examine the relationships among the variables specified in the research model. Data were collected through a Google Forms questionnaire distributed to students enrolled in the International Business Management program who had established start-up businesses with a minimum operating period of one year. The respondents were students taking entrepreneurship-related elective courses in Indonesia. The study employed purposive sampling to select respondents who met predetermined characteristics relevant to the research objectives, combined with random sampling to provide eligible members of the population with an opportunity to participate (Hair et al., 2017). The questionnaire consisted of two main sections. The first section collected information regarding respondents' demographic and business profiles, while the second section measured the indicators associated with the variables included in the research model. The proposed research model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is suitable for assessing relationships among constructs while maximizing the explained variance of the endogenous variables (Hair et al., 2017). The analysis included evaluations of the relationships among the constructs and the robustness of the proposed model. All data processing and statistical analyses were conducted using SmartPLS.

METHODS

This study employed a quantitative approach using Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the relationships among the constructs specified in the

research model. Quantitative research is characterized by clearly defined objectives, research subjects, sampling procedures, research stages, and data sources, with data analysis conducted after the required information has been collected (Wahidmurni, 2017). Primary data were obtained through a questionnaire administered electronically to students at Universitas Ciputra Surabaya. A seven-point Likert scale was used to measure respondents' perceptions of the research constructs. The Likert scale is commonly applied to assess individuals' attitudes, opinions, and perceptions regarding social phenomena (Sutrisno et al., 2019). Respondents were asked to indicate their level of agreement with each statement, ranging from 1 (strongly disagree) to 7 (strongly agree), with intermediate response categories representing varying degrees of agreement and neutrality. The questionnaire was distributed electronically, resulting in 160 valid responses from students at Universitas Ciputra Surabaya. The research model consisted of Big Five personality traits as the independent variable and innovation as the dependent variable, while technology adoption was positioned as a mediating variable and environmental dynamics as a moderating variable. Technology adoption was considered a contextual mechanism through which technology

Ciputra University offers a diverse and comprehensive curriculum that covers a wide range of disciplines, including business, management, hospitality, information technology, etc. The university has a diverse student body with individuals from various backgrounds and nationalities, creating a vibrant and inclusive learning environment. Located in Surabaya, Indonesia's second-largest city, Ciputra University provides students with access to a bustling urban center and a range of cultural and recreational activities. With its focus on entrepreneurship and innovation, Ciputra University is shaping the future leaders of Indonesia and the global economy. Students at this campus are the ideal target respondents for research, thanks to the many successful entrepreneurial graduates from Ciputra University. This campus instills an entrepreneurial spirit through every course taken. One of them is the E project. This course teaches students how to identify business ideas, create appropriate added value, and innovate for long-term survival. This course is presented from semester 1 to semester 6. This amount of time makes it easier for students to gain real business experience and face the current market situation in Indonesia.

Social Cognitive Theory (SCT) provides a useful way to understand how different variables interact in this research. People learn and change their behavior by watching others and believing in their own abilities. For example, traits like openness to experience, which involve curiosity and a willingness to try new ideas, can boost a person's confidence in adopting new technologies. This increased confidence can lead to more technology adoption, which helps individuals be more innovative as they use new tools and approaches to tackle problems or develop new products. In a dynamic environment, the effect of the Big Five Personality on technology adoption and innovation may be stronger, as adaptable and resilient people are better able to meet new challenges. SCT highlights how personal traits, behaviors, and the surrounding environment influence each other. In a supportive and dynamic environment, individuals can observe and imitate innovative behaviors from others, which encourages their technology use and creativity. This relationship shows how both personality traits and environmental factors work together to enhance a person’s ability to innovate through technology adoption. To determine the appropriate sample size, the study applied Slovin’s formula to estimate the number of respondents required to obtain reliable research results. The formula is presented as follows:

N = 170 business teams

e = 2%

n = 170 / (1+ (170 x (0.02)2
n = 170 / 1,068
n = 159,1
n = 160

Based on the calculation above, the required sample size was determined to be 160 respondents, using a 2% margin of error. In this calculation, *n* denotes the required sample size, *N* represents the total population, and *e* refers to the margin of error, which was set at 2%. The data analysis was conducted in several stages, beginning with descriptive statistical analysis of the 160 respondents who participated in this study.

RESULTS

Table 1. Characteristics of Respondents.

Construct / item	Number of Respondents	Percentage
Year of establishment		
2018	21	13,1%
2019	2	1,25%
2020	7	4,3%
2021	47	29,3%
2022	**55**	**34,3%**
2023	22	13,7%
2024	6	3,75%
Job position		
CEO	**59**	**36,8%**
COO	36	22,5%
CMO	35	21,8%
CFO	27	16,8%
CTO	3	1,87%
Business Category		
Food and Beverage	**86**	**53,7%**
Fashion	25	15,6%
Creative Industry	15	9,3%
Service Industry	18	11,2%
Others	16	10%

Source: Author's Calculation

According to Table 1, the profile of respondents consists of 160 individuals. The respondents who completed the questionnaire are business owners who established their businesses between the years 2018 and 2024. Among them, 55 respondents, accounting for 34.4%, started their businesses in 2022, while 2 respondents, representing 1.25%, founded their companies in 2019. In

terms of their current job positions, the majority of respondents hold the title of CEO, with 59 individuals, or 36.8%, occupying this role. Conversely, a minority of respondents serve as CTOs, totaling 3 individuals or 1.87%. The majority of these companies operate in the food and beverage sector, comprising 86 businesses, which is 53.7% of the total. Conversely, 15 businesses, or 9.3%, are involved in the creative industry.

The characteristics of the research respondents indicate that companies in the food and beverage sector tend to thrive and adapt in a dynamic environment. This resilience can be attributed to the high level of competition within the food and beverage industry, necessitating agility and sensitivity to the latest trends to remain a preferred choice among consumers. Moreover, the study reveals that the majority of respondents hold the position of CEO. This suggests that these CEOs effectively embody the traits associated with the Big Five personality model, which positively influences innovation and the adoption of technology within their organizations. The CEOs lead their companies with a positive demeanor, successfully implementing effective innovations. Additionally, the CEOs surveyed in this research have demonstrated a strong understanding of technology, which they integrate into their companies.

Reporting Research Results

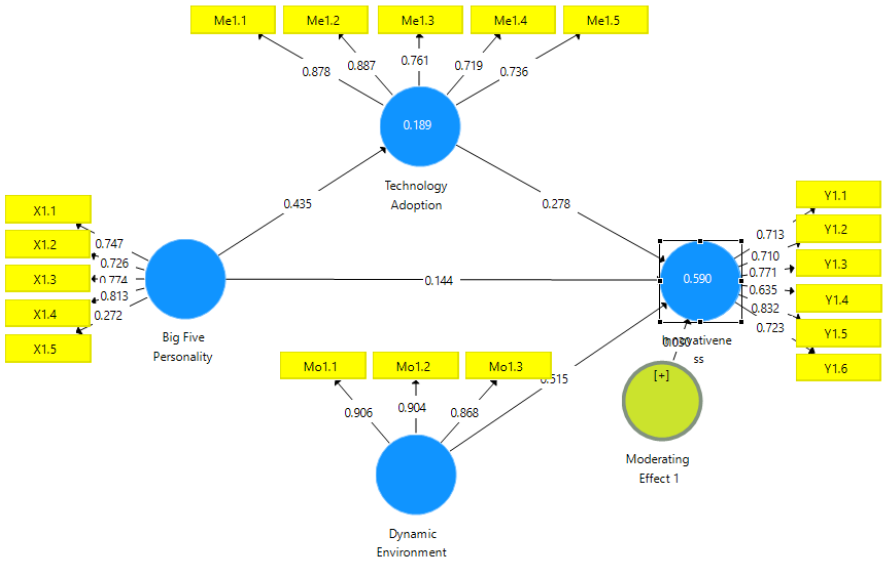


Figure 2. Path Diagram of The Effect of Big Five Personality on Innovativeness with Technology Adoption as Mediating Variable and Dynamic Environment as Moderating Variable

The validity of the measurement model was evaluated using the PLS algorithm to examine whether each measurement item satisfied the established validity criteria. As shown in Figure 2, all indicators achieved outer loading values exceeding the recommended threshold of 0.70, except for X1.5 and Y1.4. Based on the criteria proposed by Hair et al. (2021), these two indicators did not meet the required validity standard and were subsequently removed from the analysis. Following their exclusion, all remaining indicators satisfied the validity requirements and were retained for the subsequent analysis.

Table 2. Model Validity and Reliability

Construct / Item	Cronbach's Alpha	Composite Reliability	AVE	R Square
The Big Five Personality (X1)	0,769	0,852	0,591	
Technology Adoption (Me)	0,858	0,898	0,640	0,586
Dynamic Environment (Mo)	0,873	0,922	0,797	
Innovativeness (Y)	0,823	0,875	0,584	0.190
Moderating Effect 1	1,000	1,000	1,000	1,000

Source: Author's Calculation

The measurement model demonstrated satisfactory validity and reliability. All constructs achieved AVE values above 0.50, indicating adequate convergent validity (Hair et al., 2017). Composite reliability and Cronbach's alpha values also exceeded 0.70, confirming satisfactory internal consistency. The structural model yielded an R^2 of 0.586 for technology adoption and 0.190 for innovativeness, indicating that the model explains 58.6% and 19.0% of their respective variance (Majid et al., 2022). Overall, the results confirm that the measurement and structural models meet the required criteria for further hypothesis testing.

Table 3. Outer Loading Results

Variable	Loading Factor	Results
Big five personality * dynamic environment	1.121	Valid
X1.1	0.760	Valid
X1.2	0.727	Valid
X1.3	0.771	Valid
X1.4	0.814	Valid
X1.5	0.272	Invalid
Me1.1	0.877	Valid
Me1.2	0.886	Valid
Me1.3	0.757	Valid
Me1.4	0.725	Valid
Me1.5	0.740	Valid
Mo1.1	0.907	Valid
Mo1.2	0.904	Valid
Mo1.3	0.867	Valid
Y1.1	0.752	Valid
Y1.2	0.760	Valid
Y1.3	0.788	Valid
Y1.4	0.635	Invalid
Y1.5	0.803	Valid
Y1.6	0.713	Valid

Source: Author's Calculation

Factor loading represents the strength of the relationship between an observed variable and

its underlying latent factor. It indicates the extent to which the variance of an observed variable can be explained by the corresponding construct. In Structural Equation Modeling (SEM), a factor loading of 0.70 or higher is generally considered to indicate adequate convergent validity, as it suggests that the construct explains a substantial proportion of the indicator's variance. The reliability and validity of the measurement model can therefore be assessed by examining the loading of each indicator on its respective latent construct. Following the criterion proposed by Hair et al. (2017), indicators with loading values of 0.70 or above are considered acceptable. As shown in Table 3, all remaining operational items meet the required validity criteria, while X1.5 and Y1.4 were excluded from the analysis due to their previously identified inadequate loading values.

Table 4. Value of T-Statistic and P-Value

Hypothesis	T-Statistics	P Value	Results
Big five personality -> technology adoption	6.267	0.000	Supported
Technology adoption -> innovativeness	4.938	0.000	Supported
Big five personality -> innovativeness	1.737	0.083	Not supported
Dynamic environment -> innovativeness	7.475	0.000	Supported
Moderating Effect 1 -> innovativeness	0.757	0.449	Not supported

Source: Author's Calculation

Following the assessment of the path coefficients in the inner model, hypothesis testing was conducted using the bootstrapping procedure. Based on the results presented in Table 4, the path coefficients involving Big Five personality traits and technology adoption, as well as technology adoption and innovativeness, show T-statistic values exceeding the critical value of 1.96. In contrast, the direct path from Big Five personality traits to innovativeness produces a T-statistic of 1.737, which is below the 1.96 threshold, indicating that the direct relationship is not statistically significant. Similarly, the interaction term representing Moderating Effect 1 on innovativeness has a T-statistic of 0.757, which is also below 1.96, suggesting that the hypothesized moderating effect is not statistically significant. These findings indicate that Big Five personality traits have a significant relationship with technology adoption, while their direct relationship with innovativeness is not statistically significant. When the indirect effect through technology adoption is significant while the direct effect is not significant, the results are consistent with a full mediation relationship. Regarding the moderating variable, the non-significant interaction effect suggests that the dynamic environment does not provide sufficient statistical evidence to moderate the relationship examined in the model.

DISCUSSION

Effect of Big Five Personality on Technology Adoption

The Big Five personality dimensions (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) may shape individuals' attitudes toward technology adoption through distinct behavioral tendencies. Openness to experience is characterized by curiosity, receptiveness to novelty, and willingness to explore unfamiliar experiences, which may facilitate greater acceptance of emerging technologies. Conscientiousness, reflected in organization, responsibility, self-discipline, and goal orientation, may encourage individuals to adopt technologies

that enhance operational efficiency and task performance. Extraversion, characterized by sociability and interpersonal engagement, may increase the use of technology for communication, networking, and maintaining social relationships. Agreeableness, which reflects cooperation, empathy, and consideration for others, may support the adoption of technologies that facilitate collaboration and interpersonal interaction. In contrast, higher levels of neuroticism may be associated with greater sensitivity to uncertainty, anxiety, and perceived risks, potentially resulting in more cautious attitudes toward unfamiliar technologies. The characteristics of the respondents may also provide contextual support for these findings. Most respondents established their businesses in 2022, indicating that their ventures had gained approximately two years of operational experience at the time of data collection. As these businesses developed more established operational processes, technology may have become increasingly relevant to supporting business activities and improving efficiency. In addition, accumulated operational experience and available resources may have enabled entrepreneurs to allocate greater attention and resources to technology adoption. The findings are consistent with Felix et al. (2023), who examined the interplay between entrepreneurial personality, technology adoption, and start-up innovativeness and identified technology adoption as an important mechanism linking entrepreneurial personality characteristics with innovation outcomes.

Effect of Technology Adoption on Innovativeness

Technology adoption can contribute significantly to organizational innovativeness by expanding access to digital resources, capabilities, and tools that support the development and implementation of new ideas. The integration of technology can improve operational efficiency through process optimization and task automation, thereby allowing individuals and organizations to allocate greater time and resources to creative problem-solving, experimentation, and innovation. By reducing repetitive activities and facilitating access to relevant information, technology can also enhance opportunities for knowledge acquisition, idea generation, and informed decision-making. Furthermore, digital platforms, communication technologies, and online resources enable individuals and organizations to access industry knowledge, monitor emerging trends, and identify new opportunities for innovation. Technology-supported collaboration tools can also facilitate real-time communication, knowledge sharing, and feedback exchange among team members, thereby supporting collaborative innovation. These findings are consistent with Felix et al. (2023), whose study *The Interplay of Entrepreneurial Personality and Startup Innovativeness—The Mediation Effect of Technology Adoption* highlights the role of technology adoption in supporting start-up innovativeness. Thus, technology adoption may serve not only as an operational resource but also as an enabling mechanism that strengthens an organization's capacity to develop and implement innovative solutions.

Effect of Big Five Personality on Innovativeness

In this study, the Big Five Personality Traits variable was found to have no impact on an individual's propensity for innovation. It is important to recognize that personality traits are just one of several factors that contribute to the process of innovation. Other elements, such as educational background, professional experience, personal drive, organizational environment, and external support, also play a significant role in fostering innovation. Moreover, individuals are intricate and multifaceted beings, and their actions are shaped by a combination of influences beyond their

personality traits alone. As a result, individuals with varying personality profiles may display similar levels of innovation based on their distinct backgrounds, abilities, and contexts. There are instances where individuals may exhibit qualities typically linked to innovation (e.g., creativity, risk-taking, and receptivity to novel concepts) regardless of their Big Five personality traits. Conversely, individuals with personality traits not conventionally associated with innovation (e.g., low openness or conscientiousness) may still demonstrate innovative behaviors under specific circumstances or environments.

The composition of the respondents, most of whom hold chief executive officer (CEO) positions, may provide relevant context for interpreting the findings of this study. As the highest-ranking executives, CEOs are responsible for establishing strategic direction, making key organizational decisions, and coordinating resources to achieve business objectives. Their leadership role also places them in a strategic position to influence the development and implementation of innovation within the organization. Innovation involves the development and implementation of new ideas, products, services, processes, or approaches that create value for both the organization and its stakeholders. CEOs can contribute to organizational innovativeness by articulating a clear strategic vision for innovation, fostering an organizational culture that supports creativity, and allocating adequate resources for innovation-related activities. In addition, their decisions regarding organizational structures, technology, human resources, and investment priorities can shape the organization's capacity to pursue and implement innovative initiatives. Therefore, the predominance of CEO respondents provides an important contextual consideration in explaining the observed findings. Their strategic authority and direct involvement in organizational decision-making may facilitate the alignment of innovation initiatives with broader business objectives. Effective leadership can further support an environment in which employees are encouraged to generate, exchange, and implement new ideas, thereby strengthening the organization's capacity to adapt to changing market conditions and sustain its competitiveness.

Mediation Effect of Technology Adoption on Big Five Personality and Innovativeness

Technology adoption can have a full mediation effect on Big Five personality traits and innovativeness because individuals with different personality traits may approach technology adoption differently. For example, someone high in openness to experience may be more likely to adopt new technologies compared to someone low in openness. This can affect their innovativeness, as those who are more open to innovativeness, as those who are more open to trying new technologies, may also be more likely to come up with innovative ideas or solutions. In this way, technology adoption can act as a mediator between personality traits and innovativeness, influencing how individuals interact with and use technology in their lives. The adoption of technology has a significant impact on how individuals interact with their surroundings, ultimately shaping their personality and behavior. Early adopters of technology tend to be more open to new experiences and risks, which are qualities typically associated with higher levels of innovation. Furthermore, technology adoption can provide individuals with access to new information and resources that can boost their creativity and problem-solving skills, ultimately leading to increased innovativeness. Tech-savvy individuals are also more likely to actively seek new ideas and opportunities for innovation, demonstrating a strong link between technology adoption, personality traits, and innovativeness. Overall, the significant role of technology in influencing individuals' behavior and propensity for innovation is further underscored by its mediating effect

on both personality traits and innovativeness.

Moderation Effect of Dynamic Environment on Big Five Personality and Innovativeness

In a dynamic business environment characterized by continuous changes and uncertainty, environmental conditions may influence the extent to which technology adoption contributes to organizational innovativeness. The findings of this study indicate that environmental dynamism plays a moderating role in the relationship between technology adoption and innovativeness. This suggests that the contribution of technology adoption to innovation may vary depending on the degree of change and dynamism experienced within the business environment. A dynamic environment may also influence the translation of personality traits into innovative behavior. Under rapidly changing conditions, characteristics such as openness to experience and adaptability may become particularly relevant, as individuals are required to respond to new situations, explore alternative approaches, and develop novel solutions. Individuals who are receptive to new ideas may be more likely to respond positively to environmental changes and engage in innovative activities. In contrast, in relatively stable environments, there may be fewer external pressures that require individuals to adapt their behavior or seek new solutions.

These findings are consistent with Felix et al. (2023), which examines the relationships among entrepreneurial personality, technology adoption, and start-up innovativeness. The findings also suggest that environmental dynamism may condition the relationship between technology adoption and innovativeness, indicating that the contribution of technology adoption may vary across different levels of environmental change and uncertainty. However, the role of environmental dynamism is likely to depend on the organizational context and the challenges encountered by firms. Dynamic environments may stimulate creativity, experimentation, and risk-taking, while uncertainty may also encourage more cautious responses. In addition, organizational factors, including culture, resource availability, managerial support, and organizational capabilities, may influence how personality characteristics and technology adoption are translated into innovative outcomes. Thus, environmental dynamism should be regarded as an important contextual factor that shapes, rather than solely determines, the relationship between technology adoption and innovativeness.

CONCLUSION

The findings suggest that Big Five personality traits are associated with technology adoption, as individuals may utilize their personal characteristics, skills, and capabilities to engage effectively with technological tools. Technology adoption also contributes to the development of innovativeness, particularly in entrepreneurial settings where the application of technology can support the creation of customer value and facilitate sustainable business growth. Nevertheless, innovativeness cannot be attributed solely to Big Five personality traits, as various individual, organizational, and environmental factors may influence the successful development and implementation of innovative ideas. The findings further highlight the importance of environmental dynamism as a contextual factor that may shape innovative outcomes. Changes and uncertainties in the external business environment can influence how innovation initiatives are implemented and may produce outcomes that differ from initial expectations. Thus, the relationship between personality, technology adoption, and innovativeness should be understood

within the broader organizational and environmental context.

LIMITATION

This study has several limitations that should be considered when interpreting its findings. The respondents were limited to business owners at Universitas Ciputra, whose entrepreneurial development may be influenced by the university's specific business development curriculum, systems, and procedures. Consequently, the findings may have limited generalizability to entrepreneurs in different educational institutions or organizational contexts. Future research should therefore consider broader and more diverse populations to enhance the external validity and applicability of the findings. From a practical perspective, entrepreneurs are encouraged to pursue innovation while continuously monitoring changes in the external environment. Careful consideration of environmental conditions, supported by systematic planning, may help businesses develop innovations that are more responsive to market dynamics. In addition, technology adoption should be considered an important supporting mechanism for facilitating and accelerating innovation processes. The effective integration of technology with organizational resources and capabilities may strengthen firms' capacity to develop and implement innovative solutions.

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