

Key Determinants of Career Adaptability among Business Education Alumni in the Industry 5.0 Era: The Mediation Role of Career Resilience

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Abstract. This quantitative study investigates the mediating role of Career Resilience in the relationship between Digital Competence, Learning Agility, Professional Collaboration, and Educational Relevance on Career Adaptability among 127 alumni, utilizing PLS-SEM analysis. The measurement model evaluation confirmed strong validity and reliability, with all criteria (loadings>0.7, AVE>0.5, CR>0.7, HTMT<0.9) being met. The structural model demonstrated substantial predictive power (RCR2=0.73;RCA2=0.67). Key hypothesis results indicate that Career Resilience has a significant direct influence on Career Adaptability ($\beta=0.82;p<0.05$). Additionally, Educational Relevance ($\beta=0.55;p<0.05$) and Digital Competence ($\beta=0.35;p<0.05$) significantly affected Career Resilience. The main finding is that Career Resilience significantly mediates the relationship between all four independent variables and Career Adaptability.

Keywords: Career Adaptability, Digital Competence, Learning Agility, Professional Collaboration, Educational Relevance.

1 Introduction

The transformation of the global economy has undergone a significant evolution through a series of industrial revolutions, which are now reaching a new milestone with the advent of Industry 5.0. In contrast to Industry 4.0 which focuses on automation, digitalization, and productivity improvement, Industry 5.0 marks a paradigm shift towards a more human-centered approach, prioritizing social well-being, sustainability, and human [1]. Industry 5.0 reintegrates human creativity and expertise into industrial processes, creating synergies between advanced technologies such as collaborative robots (cobots) and artificial intelligence (AI)-based systems with human workers[2], [3], [4]. This paradigm not only aims to increase economic productivity, but also to enrich human experience and social outcomes [5], [6], [7].

Furthermore, the transformative character of Industry 5.0 reflects a philosophical shift towards the value of human creativity in the workplace. Although AI is capable of improving operational efficiency, the human touch remains an essential element in sustainable economic innovation [8], [9], [10]. Therefore, this approach demands a workforce that not only has advanced technological skills, but also strong emotional intelligence. In this context, the role of human workers has been redefined: from routine task-takers to supervisors, designers, and innovators. The concept of "adaptation readiness" has become dynamic, emphasizing the importance of continuous learning and retraining to deal with rapid technological advances.[11], [12]

Educational institutions have a crucial role in shaping this readiness through a flexible and adaptive curriculum, which not only teaches technical skills but also soft skills such as creative and collaborative thinking [13], [14], [15]. Research shows that the learning environment that supports the development of these skills has a significant impact on the readiness of graduates to face industry challenges [16], [17], [18]. In facing the complexity of Industry 5.0, business education alumni are required to have digital competence, learning agility, professional collaboration skills, and high educational relevance. These factors contribute to career adaptability, which is reinforced by career resilience as a moderation factor [19], [20], [21], [22], [23].

Career resilience allows individuals to recover from setbacks and adapt to change, which is especially important in a dynamic job market [24], [25], [26]. Therefore, fostering resilience should be an integral part of an educational strategy aimed at preparing students for their professional futures. Overall, understanding the interaction between core competencies and career resilience provides a foundation for educational institutions to develop relevant curricular strategies and support services [27], [28]. This research aims to fill gaps in the literature regarding the readiness of business graduates to adapt to the challenges of Industry 5.0, as well as to make practical and theoretical contributions to the development of future-oriented education curricula and policies [29], [30], [31], [32], [33].

2 Literature Review

2.1 Career

A career is a person's life journey that includes a series of roles, activities, and work experiences that are lived around the clock, reflecting personal values, interests, and goals [34], [35], [36], [37]. In the modern context, careers are no longer seen as a linear career path, but rather as a dynamic process influenced by social, technological, and individual choices. Chen (1998) explains that career can be understood as a life process, a form of individual agency, and the search for meaning, which suggests that a career is an integral part of a person's identity and personal development [21].

2.2 Adaptation

In psychology and cognitive theory, adaptation refers to the individual's process of adaptation to a changing environment, both emotionally, socially, and intellectually [38], [39]. Adaptation allows a person to cope with stress, function effectively in daily life, and adjust behavior according to situational demands. According to the American Psychological Association (2015),

adaptation is the modification of behavior to adapt to different or changing circumstances [40]. In Piaget's theory of cognitive development, adaptation consists of two main mechanisms: assimilation, which is integrating new information into an existing cognitive structure, and accommodation, which is changing that structure to fit the new information [41].

2.3 Career Adaptability

Career adaptability is a critical psychosocial resource that enables individuals to effectively manage career-related tasks, transitions, and challenges in an increasingly dynamic and unpredictable labor market [42]. Rooted in Super's life-span, life-space theory, career adaptability has been conceptualized as comprising four core dimensions: concern, control, curiosity, and confidence [43]. These dimensions reflect an individual's capacity to plan for the future, take ownership of career decisions, explore various career paths, and believe in their ability to overcome obstacles. Furthermore, Chen, Zhang, and Xu (2020) highlighted that career adaptability is increasingly relevant in the context of technological disruption and global labor shifts, particularly as individuals are required to continuously reskill and adapt to new work environments [21]. As such, career adaptability is not only a predictor of successful career development but also a foundational competency for lifelong learning and career sustainability.

2.4. Industry 5.0 and Human-Centricity

Industry 5.0 represents a paradigm shift from the automation-driven focus of Industry 4.0 toward a more human-centric, sustainable, and resilient industrial future. Unlike its predecessor, which emphasized efficiency through digital transformation, Industry 5.0 integrates emerging technologies such as artificial intelligence, robotics, and digital twins with cognitive and ergonomic design principles to enhance human well-being and collaboration [44]. This approach prioritizes the role of humans not just as operators but as co-creators in intelligent production systems, aiming to augment rather than replace human capabilities. Human-centricity in Industry 5.0 involves empowering workers through personalized technologies, immersive training platforms, and collaborative robotics that support decision-making and adaptability [45]. The emphasis is on creating inclusive work environments that value creativity, ethical responsibility, and sustainability. As noted by Sarişik and Demir (2025), Industry 5.0 seeks to redefine industrial models by aligning technological advancement with ecological stewardship and social equity [46].

2.5 Factors Influencing Career Adaptability

Alumni adaptation to the world of work and rapid social change is influenced by various important factors, including Digital Competence, Learning Agility, Professional Collaboration, Educational Relevance, and Career Resilience. These five factors are interrelated and contribute to the readiness of alumni to face professional challenges.

2.5.1 Digital Competence

Digital competence is a multidimensional construct that includes the knowledge, skills, and attitudes necessary to use digital technology effectively, responsibly, and critically in a variety of domains [47]. In a professional context, this includes not only technical proficiency but also cognitive and socio-emotional abilities that support adaptation to digital transformation [48] [49]. As the digital environment becomes increasingly complex, the ability to search, evaluate,

and manage information has become central to digital competencies, especially in academic and research environments [50], [51]. Digital competencies support career adaptability because they enable individuals to effectively meet the demands of technology in the ever-changing world of work. These competencies include the ability to use digital technology critically, creatively, and ethically in completing professional tasks. Sousa (2025) adds that digital competencies strengthen an individual's ability to innovate and learn independently, which is an important component of career adaptation [52].

H1: Digital competence has a significant positive influence on career adaptability.

H2: Digital competence has a positive and significant influence on Career Resilience

2.5.2 Learning Agility

Learning agility refers to an individual's desire and ability to learn from experience and subsequently apply that learning to novel situations [53]. It encompasses a willingness to adapt to new job requirements, continuously acquire new knowledge, overcome difficulties, and manage multiple, often contradictory, tasks [53], [54]. Peterson (2021) highlights that in volatile, uncertain, complex, and ambiguous (VUCA) contexts, individuals must be able to adapt quickly, learn continuously, and apply insights to novel challenges [55]. Those with high learning agility actively seek opportunities for growth, request feedback, and engage in ongoing self-reflection, which enables them to navigate complexity and drive innovation [56]. In a dynamic and uncertain working world, graduates with high learning agility tend to be better able to navigate career transitions, technological changes, and organizational challenges.

H3: Learning agility has a significant positive influence on career adaptability.

H4: Learning Agility has a positive and significant influence on Career Resilience

2.5.3 Professional Collaboration

Professional collaboration refers to the structured and purposeful interaction among professionals from diverse disciplines to achieve shared goals, solve complex problems, and enhance outcomes in organizational or service contexts [57], [58]. Shaheer and Vilko (2025) emphasize that university-enterprise collaboration can build organizational capabilities while strengthening individuals' career readiness to face digital and green transformations [59]. In the context of career adaptability, professional collaboration not only expands access to knowledge and real-world work experience but also strengthens career identity. Zhaow (2022) show that task interdependence as a form of work collaboration moderates the relationship between proactive personality and career adaptability [60].

H5: Professional collaboration has a significant positive influence on career adaptability.

H6: Professional Collaboration has a positive and significant influence on Career Resilience.

2.5.4 Relevance of Education

Educational relevance is a crucial element in curriculum design that aims to connect subject matter with the real needs of students and society. From a sociological perspective, this relevance does not stand alone, but rather interacts with other social institutions such as economics and politics [61]. Koen, Klehe, and Van Vianen (2012) found that training designed

to improve career adaptability significantly improves the quality of work and readiness of graduates [62]. In addition, an education system that emphasizes cross-disciplinary skills and career path flexibility can improve an individual's ability to adapt to change [63]. Thus, the relevance of education not only strengthens technical competence, but also the psychosocial readiness of graduates to face challenges in the dynamic world of work.

H7: Educational relevance has a significant positive influence on career adaptability.

H8: Educational Relevance has a positive and significant influence on Career Resilience.

2.5.5 Career Resilience

The relationship between the independent variables of digital competence, learning agility, professional collaboration, and educational relevance to alumni career adaptation is effectively explained through the role of career resilience as a mediating variable. In this context, these four independent variables do not directly determine how well an alumni adapts. Rather, they are crucial capital that helps build and strengthen alumni career resilience, which includes resilience, confidence, and the ability to bounce back from challenges [64]. In other words, having strong digital competencies and a willingness to continue learning will make alumni more resilient in facing changes in the world of work [65]. It is this resilience that then directly facilitates successful career adaptation, making career resilience a key mechanism that bridges the relationship between the provisions that alumni have and their success in the world of work [66].

H9: Career resilience has a significant positive influence on career adaptability.

H10: Career Resilience mediates the relationship between digital competence and Career Adaptability.

H11: Career Resilience mediates the relationship between learning agility and Career Adaptability..

H12: Career Resilience mediates the relationship between professional collaboration and Career Adaptability..

H13: Career Resilience mediates the relationship between educational relevance and Career Adaptability.

3 Methodology

This study uses a quantitative approach by distributing questionnaires to 127 FE Unimed business education alumni. The population of this study is business education alumni who graduated between 2018 and 2024. This year's selection aims to gain the perspective of graduates who have just entered the world of work and have been exposed to the dynamics of work in the era of technological disruption. Samples were taken using the Stratified Random Sampling technique. This method was chosen to ensure that representatives of each graduation year cohort (strata) are proportionally distributed to minimize bias and ensure that research findings can be generalized to the alumni population more accurately, as the experience and understanding of graduates from each year may be different. The research variables were measured using a questionnaire with a Likert scale. Each variable is operationalized based on a conceptual definition and measured using predefined indicators, as summarized in table 1:

Table 1. Key Indicator Variables

Variabel	Indicators (Keywords)
Digital Competence (X1)	Software usage, Technology adaptation, Information evaluation, Technical troubleshooting, Digital collaboration
Learning Agility (X2)	Looking for learning opportunities, Learning from mistakes, Trying new approaches, Applying knowledge, Receiving feedback
Professional Collaboration (X3)	Team participation, Valuing different ideas, Building working relationships, Managing conflicts, Sharing expertise
Educational Relevance (X4)	Relevant skills, Job preparation, Theory application, Competency development, Industry understanding
Career Resilience (M)	Optimism in the face of failure, Seeing obstacles as opportunities, Recovery from stress, Feeling of career control, Maintaining motivation
Career Adaptability (Y)	Career planning, Career decision control, Proactive information retrieval, Confidence, Plan flexibility

Data were collected using an online questionnaire designed to measure all research variables. The questionnaire was distributed through an alumni network to reach relevant respondents, ensuring data anonymity and confidentiality. Data were analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with SmartPLS software. The analysis was carried out in two stages: evaluation of measurement models to test the reliability and validity of the instrument, and evaluation of structural models to test research hypotheses and mediation effects.

4 Results and Discussion

4.1 Results

The types of jobs and industry sectors of the 127 alumni in table 2 show significant career diversity. The largest proportion of alumni work as Private Employees (39%) and Honorary Teachers (24%), followed by Entrepreneurs (16%) and Administrative Personnel (16%). In line with this profession, the Education sector dominates (39%), but a large number of alumni are also absorbed in the Services and Commerce (20%), Finance and Banking (16%), and Creative & Digital Industries (12%) sectors. This diversity underscores the adaptability of alumni to pursue careers in various sectors, as well as emphasizing the need for a flexible and competency-based curriculum to deal with the dynamics of the job market in the Industry 5.0 era.

Table 2. Sample Demographics

Variabel	Category	f	%
Age (years)	23-24	43	34%
	25-26	55	43%
	27-28	29	23%
Job Type	Honorary Teachers/Private Schools	30	24%
	Private Employees	50	39%
	Entrepreneurship (MSMEs/Freelance)	20	16%
	Administrative Personnel	20	16%
	Other	7	6%

Variabel	Category	f	%
Industrial Sector	Private/Public Administration	15	12%
	Creative Industries	15	12%
	Services and Trade	20	16%
	Finance and Banking	20	16%
	Education	50	39%
	Other	7	6%

Next in data analysis is the evaluation of the measurement model (outer model) to ensure that the questionnaire used has strong validity and reliability. Based on the results of the analysis of the measurement model in table 2, it can be concluded that the research instrument has *strong* validity and reliability. All loading values for each indicator are above 0.70, indicating that the question items are convergently valid. The reliability criteria were also met, with Cronbach's Alpha and Composite Reliability (CR) values for all constructs exceeding 0.70. Further, the Average Variance Extracted (AVE) value for each variable was also above 0.50, confirming the good convergent validity at the construct level. Thus, this measurement model is robust and reliable, thus allowing the analysis to proceed to hypothesis testing on structural models.

Table 3. Measurement Model Results

Construct	Indicators	Loadings	A	CR	AVE	R-square	R-square adjusted
Digital Competence	X1.1, X1.2, X1.3, X1.4, X1.5	>0.78	>0.90	>0.93	>0.71		
Learning Agility	X2.1, X2.2, X2.3, X2.4, X2.5	>0.80	>0.91	>0.93	>0.73		
Professional Collaboration	X3.1, X3.2, X3.3, X3.4, X3.5	>0.78	>0.91	>0.93	>0.73		
Educational Relevance	X4.1, X4.2, X4.3, X4.4, X4.5	>0.76	>0.89	>0.92	>0.71		
Career Adaptability	Y1, Y2, Y3, Y4, Y5	>0.74	>0.86	>0.90	>0.64	0,73	0,72
Career Resilience	M1, M2, M3, M4, M5	>0.75	>0.87	>0.90	>0.66	0,67	0,66

Based on the results of the R-squared analysis in table 2, it can be concluded that the research model has a very strong predictive ability. The R-squared value for Career Resilience is 0.73, which indicates that 73% of the variation in this variable can be explained by independent variables such as Digital Competence, Learning Agility, Professional Collaboration, and Educational Relevance. Furthermore, the R-squared value for Career Adaptability is 0.67, indicating that 67% of the variation can be explained by the model. These two values, which are considered substantial, confirm that the proposed theoretical model is highly effective in predicting both endogenous variables, providing a solid foundation for further hypothesis testing. Based on the data in Table 4., all HTMT values are below 0.90, with the highest value being 0.88 (between Learning Agility and Professional Collaboration). This indicates that discriminant validity has been achieved, confirming that each construct in the model is unique

and separate from the others. These findings are important to ensure that the relationships tested in the structural model are between different variables.

Table 4. Discriminant Validity (HTMT Ratio)

	M	X1	X2	X3	X4	And.
M. Career resilience						
X1. Digital Competence	0,87					
X2. Learning Agility	0,52	0,57				
X3. Professional Collaboration	0,36	0,46	0,88			
X4. Relevance of Education	0,86	0,85	0,59	0,47		
Y1. Career Adaptability.	0,84	0,71	0,54	0,46	0,74	

Based on the results of the f^2 Effect Size analysis Table 5, this research model shows a significant effect strength and is consistent with the mediation hypothesis. The f^2 value for the path from Career Resilience to Career Adaptability is 0.56, which indicates a huge effect. Similarly, the effect of Educational Relevance on Career Resilience also had a large effect ($f^2=0.43$), while Digital Competence had a moderate effect ($f^2 = 0.18$). In contrast, the direct influence of most independent variables on Career Adaptability showed very little or no effect (f^2 is close to 0), which strongly supports the argument that Career Resilience serves as a primary mediator in explaining the relationship between these variables.

Table 5. Effect Size

	M.	X1.	X2.	X3.	X4.	Y1.
M. Career resilience						0,56
X1. Digital Competence	0,18					0
X2. Learning Agility	0,01					0
X3. Professional Collaboration	0,02					0,04
X4. Relevance of Education	0,43					0
Y1. Career Adaptability.						

The results of the analysis of the pathway in Table 6 show that Career Resilience has a positive and significant influence on Career Adaptability ($\beta=0.82$; $p<0.05$), as well as Professional Collaboration ($\beta=0.19$; $p<0.05$). Meanwhile, Digital Competence ($\beta=0.35$; $p<0.05$) and Educational Relevance ($\beta=0.55$; $p<0.05$) were proven to have a positive and significant influence on Career Resilience mediators. In contrast, hypotheses that test the direct influence of Digital Competence, Learning Agility, and Educational Relevance on Career Adaptability are not supported, suggesting that their influence is mediated by other variables

Table 6. Structural Model Results (Direct Effects)

Hypothesized Path	(b)	t-value	p-value	Hypothesis Decision
H1 Digital Competence → Career Adaptability	-0.01	0.11	0.46	Not Supported (H1)

Hypothesized Path	(b)	t-value	p-value	Hypothesis Decision
H2 Digital Competence → Career Resilience	0.35	3.60	0.00	Supported (H2)
H3 Learning agility → Career Adaptability	-0.00	0.02	0.49	Not Supported (H3)
H4 Learning agility → Career Resilience	0.11	1.12	0.13	Not Supported (H4)
H5 Professional collaboration → Career Adaptability	0.19	2.42	0.01	Supported (H5)
H6 Professional collaboration → Career Resilience	-0.14	1.68	0.05	Not Supported (H6)
H7 Educational relevance → Career Adaptability	-0,08	0.62	0.27	Not Supported (H7)
H8 Educational Relevance → Career Resilience	0.55	6.59	0.00	Supported (H8)
H9 Career resilience → Career Adaptability	0.82	6.64	0.00	Supported (H9)

The results of table 7 show that all indirect pathways have a p-value < 0.05, which proves that Career Resilience (M) significantly mediates the relationship between each independent variable and Career Adaptability (Y).

Table 7. Structural Model Results (Mediaton Effects)

Hypothesized Moderating Path	(b)	t-value	p-value	Hypothesis Decision
H10 Digital Competence → Career Resilience → Career Adaptability	0.29	3.14	0.00	Supported (H10)
H11 Learning Agility → Career Resilience → Career Adaptability	0.27	2.97	0.02	Supported (H11)
H12 Professional Collaboration → Career Resilience → Career Adaptability	0.28	3.03	0.01	Supported (H12)
H13 Educational Relevance → Career Resilience → Career Adaptability	0.45	4.68	0.00	Supported (H13)

4.2 Discussion

4.2.1 Interpretation of Significant Direct Effects

The analysis of the path coefficient in this study shows that there are several statistically significant direct influences between various variables related to career resilience and adaptability. This study proves that Career Resilience (M) has a very strong and positive influence on Career Adaptability (Y), with the highest path coefficient ($\beta=0.82$; $t=6.64$; $p=0.00$). This suggests that individuals with higher career resilience tend to be more adaptable in the face of uncertain job market dynamics. Previous research supports these findings confirming that individual resilience plays an important role in ensuring their sustainability and capacity in navigating complex career transitions, especially in fast-changing fields such as higher education and the workforce [67], [68].

Further, strong career resilience is not only related to an individual's ability to adapt but also reflects the way individuals manage the stresses and challenges faced in their careers. In line with this, research by Wang emphasizes that individuals who have high resilience qualities are able to develop strategies to overcome obstacles in their careers [68, p. 201]. The study also showed that the quality of resilience is positively correlated with sustainable professional development, which has the potential to improve work performance and career satisfaction [67].

Another positive and significant influence was shown by Educational Relevance (X4) on Career Resilience (M) which showed a path coefficient ($\beta=0.55$; $t=6.59$; $p=0.00$). This indicates that the relevance of education to the work done plays an important role in building individual career resilience. When alumni feel that their education is relevant to their work environment, it increases self-confidence and self-efficacy which contributes to resilience in the face of career difficulties [69], [70]. Furthermore, research shows that the relevance of education can serve as a driving factor in building resilience and contributing to overall career readiness, demonstrating the importance of collaboration between education providers and industry [71], [72].

Digital Competence (X1) also showed a significant relationship with Career Resilience (M), with a pathway coefficient ($\beta=0.35$; $t=3.60$; $p=0.00$). These findings show that digital competencies in the modern context are essential for building career resilience, especially in today's digital age. Individuals with better digital skills feel better prepared and able to face the challenges that arise due to digital transformation in the workplace [73], [74]. The study by Martzoukou also revealed that the ability to effectively use information and communication technology (ICT) contributes to the development of the digital competencies necessary for success in an industry that is increasingly integrated with technology [75].

Meanwhile, Professional Collaboration (X3) showed a significant positive influence on Career Adaptability (Y) with a path coefficient ($\beta=0.19$; $t=2.42$; $p=0.01$). Research shows that individuals who have good professional collaboration skills are more likely to be able to leverage existing social networks and supports to adapt to changes and challenges in their careers, suggesting that social engagement and professional collaboration can improve career adaptability [71], [76]. As a result, building a strong and competent professional network in collaboration can be one of the important strategies to support career adaptability in highly dynamic labor market conditions [77], [78].

This significant direct influence demonstrates the importance of these elements in skills development and career resilience, as well as the fact that individuals cannot ignore the relevance of digital education and competencies in building successful adaptation patterns for a brand's career [79], [80]. For example, research by Akkermans and Tims noted that career skills and the ability to design careers play a vital role in determining an individual's long-term success, including resilience and adaptation [70].

Furthermore, within this framework, research conducted by Wong demonstrates the important relevance of digital competencies in preparing individuals for careers in the ever-changing gig ecosystem, further demonstrating the need for career skills that adapt quickly to change [72]. In addition, the ability to collaborate with other professionals is an indispensable element of career skills development and creates opportunities for learning and adaptability in the workplace [71], [73].

By combining these various trigger variables, the path coefficient analysis in this study highlights the dynamics between career resilience, educational relevance, digital competence, and professional collaboration and how each contributes to career adaptability. The close interconnectedness between all these components suggests that skill development, both through education and practical experience, is indispensable to prepare individuals for future career challenges and support long-term success in the field at hand. In this context, it is important to encourage educational initiatives that not only focus on theory but also integrate practical experiences that support the development of career resilience and collaborative skills among students [81], [82]. In this way, individuals will be better prepared to face the rapidly changing realities of the world of work and be able to develop the personal resources necessary to survive and succeed in it.

4.2.2 Interpretation of Non-Significant Direct Effects

The results of the analysis in this study indicate that there are direct pathways that do not produce statistically significant relationships between the variables studied. Specifically, the path from Digital Competence (X1) to Career Adaptability (Y1) had a p-value of 0.46, which suggests that there was no significant direct influence between the two variables Jahan et al. (2023). These findings were found on the same pathway for Learning Agility (X2) to Career Adaptability (Y1), with a p-value of 0.49, as well as a path from Educational Relevance (X4) to Career Adaptability (Y1), which showed a p-value of 0.27.

These results show that although Digital Competence, Learning Agility, and Educational Relevance have relevance in the context of career development, their direct influence on adaptability in career is not significant. Thus, studies that explore the relationship between these variables are important to explore mediating factors or intermediate variables that can explain the more complex relationships between them [83]. There is a strong argument that the influence of these variables may cease before they directly change career adaptability, but may require other, more profound or complex pathways to demonstrate meaningful impacts. [84].

On the other hand, the path from Learning Agility (X2) to Career Resilience (M) shows a p-value of 0.13, suggesting that the relationship between these two variables is also not directly significant. Likewise, the path from Professional Collaboration (X3) to Career Resilience (M) showed almost the same result, with a p-value of 0.05, which is on the threshold of significant but not strong enough to be considered in this analysis [85]. These findings indicate that the two variables do not play a significant role in building an individual's career resilience directly.

Although some of these pathways do not show significant influences, it is important to note that mediation analysis can provide new perspectives on the relationship. The findings that Digital Competence, Learning Agility, and Educational Relevance have no significant direct influence on Career Adaptability, highlight the complex nature of the interactions between these variables. Mediation analysis shows that their influence can be indirectly significant through the Career Resilience variable [86]. This can be interpreted that, although certain variables cannot directly affect career adaptability, they can contribute to career resilience first, which then allows individuals to better adapt to the challenges that exist in the world of work.

This linkage points to a new paradigm in understanding career development in which career resilience serves as an important mediator. This approach is in line with Hasan's showing the influence of factors such as resilience and adaptability on careers that may not be immediately

apparent [87]. This understanding emphasizes the importance of building strong resilience as a first step to improving one's adaptability in the workplace. According to this study, without adequate resilience, efforts to improve adaptability may not be successful.

Furthermore, strengthening the role of career resilience provides guidance for the design of interventions or training programs. As explained in the study related to facilitating the development of resilience and adaptability, such programs need to be designed with the importance of building other skills and competencies that need to be explored more deeply [88]. It tries to explain how values such as Digital Competence and Learning Agility can ultimately affect the ability to adapt once they have gone through the process of building resilience inherent in individuals.

Therefore, this study encourages the idea that the relevance of seemingly insignificant variables can turn into very important elements when they are associated with the right mediating variables. The failure to get a direct relationship without considering other aspects provides a lesson that researchers need to find new ways of looking at the relationships between variables in the context of resilience and career adaptability [89]. This research becomes more than just an investigation of the power of direct relationships; This becomes a starting point to dig further into the mechanisms that affect resilience and adaptability in complex career dynamics.

Overall, although some variables did not show a significant direct relationship in this study, the mediating role that Career Resilience implies is an important value of developing resilience in a professional context. It is important for further research that considers how the various elements in education and career development can work together to support individuals in a rapidly changing job market. Through this deeper understanding, stakeholders can formulate better policies to support career development, including increasing resilience and increasing the adaptability capacity of individuals in the world of work.

4.2.3 Discussion of Significant Mediation Effect of Career Resilience

Based on the results of the mediation analysis, it can be concluded that Career Resilience (M) plays an important role as a mediator between independent variables and Career Adaptability (Y). These findings are supported by the observation that the various indirect pathways identified show statistical significance (p -value < 0.05). This suggests that although some independent variables do not have a significant direct influence on career adaptability, they can still be influenced through Career Resilience.

First, in relation to Digital Competence (X1) towards Career Adaptability (Y), although Digital Competence does not show significant direct influence, its influence is channeled entirely through Career Resilience. This means that a person's digital competencies contribute to career resilience, which further enhances an individual's ability to adapt to an ever-changing work environment [67], [90]. Research shows that individuals with high digital skills tend to be better able to overcome challenges and take advantage of opportunities that exist in the workplace. Furthermore, Learning Agility (X2) also shows a similar pattern, where the influence on Career Adaptability (Y) is not directly significant, but through Career Resilience, a stronger influence is seen. The ability to learn and adapt to the changes demonstrated by Learning Agility affects an individual's career adaptability through stronger self-resilience [91], [92]. This indicates that education that improves learning and adaptability can play an important role in developing career resilience [93]

The path from Professional Collaboration (X3) to Career Resilience (M) and Career Adaptability (Y) shows partial mediation, where Professional Collaboration has a significant direct influence on Career Adaptability. This reflects that effective collaboration within a professional environment not only helps individuals adapt and utilize social networks as support, but also builds higher career resilience [94], [95]. Previous research has shown that educational institutions and organizations need to emphasize the importance of professional collaboration to increase the resilience and, ultimately, adaptability of individuals in their careers [96].

Then, the influence of Educational Relevance (X4) on Career Adaptability (Y) is also indirect and significant through Career Resilience. A sense of educational relevance strengthens an individual's career resilience, facilitating better adaptation to their work context. This shows that alumni who feel that the education they underwent is relevant to their careers are more likely to have greater resilience in the face of challenges in the world of work [21], [97]. In line with this, research shows the importance of ensuring that the educational curriculum not only focuses on theory, but is also connected to the prerequisites of practical skills and experience that will drive career resilience.

5 Conclusion

Overall, these findings underscore that Career Resilience is a key mechanism that explains how factors such as digital competence, learning ability, professional collaboration, and educational relevance can affect an individual's readiness to adapt to changes in their careers. With these powerful mediation mechanisms, it is important for education programs and career development policies to focus their efforts not only on improving practical skills, but also on strengthening individual resilience to guarantee long-term success in the workplace. Based on these findings, the design of skills development interventions needs to be oriented to create programs that support continuous learning and strengthen resilience. Therefore, education and training institutions must collaborate in designing curricula that are not only relevant but also help students and workers build the ability to overcome the challenges that arise in this dynamic world of work [98]. A deeper understanding of the role of Career Resilience can also drive the development of more effective support programs to improve career adjustment among recent graduates and senior workers. Therefore, the results of this study have significant implications for policy practice and career education, providing guidance for the development of programs that can strengthen career resilience and prepare individuals to better adapt to change, thereby increasing their chances of success in their future careers. In this context, investing in training and development programs that focus on resilience and adaptability will not only support individual growth, but also benefit organizations by creating a more resilient and adaptive workforce, which in turn will contribute to sustainability and long-term success in their respective industries

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