

Unveiling IR 4.0 Competency: Assessing Creativity Through RIASEC Personality Typology in Low- Income Populations

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Abstract: *The Revolution Industry 4.0 (IR4.0) has brought significant changes to the lives of individuals, particularly those from low-income populations even though with high academic qualifications. However, the advent of this revolution present opportunities for individuals who possess the appropriate competencies. In this era, creativity stands out as vital competency for individual staying relevant and thriving amidst rapid changes in world of work. Inspired by RIASEC model by Holland's theory, this study motivated to examine its influence on creativity among low-income populations. The survey data was collected form 98 undergraduate students participating in the Work Based Learning Program at a Malaysian Polytechnic, specifically targeting those form low-income group. Utilizing a quantitative approach, the study employed purposive sampling techniques. Furthermore, Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 3.0 software was utilized to assess both measurement and structural models. The study's findings reveal a positive correlation between Enterprising personality type and creativity competency. These findings could enrich the literature in competency, human resource and human psychology areas and also literature for the RIASEC model by Holland theory. Future research might consider expanding the sample to include students from other higher institutions beyond those from low-income backgrounds.*

Keywords: Creativity, Competency, RIASEC Model, Industry Revolution 4.0, Low-Income Group

1. Introduction

Creativity spans across divers domains including business, technology, medicine, education and management (Crompton et al., 2011). Recent research by The World Economic Forum's Future of Jobs Report revealed that creativity is one of the most valuable skills that should be possessed by individual for staying relevant and thriving amidst rapid changes of work. In fact, the creativity listed as the ten competency that aligned with the requirement of the Fourth Industrial Revolution (IR4.0) (Kamaruzaman et al., 2019). The presence of IR 4.0 impacting individuals' lives, particularly those from lower incomes (Paim, 2017). Some are optimistic believes that this revolution able to enhance education and increased job opportunities (Dunga, 2019). However, some group from these income background face job insecurity as the power of automation replaces human tasks (Hawati et al., 2019; WEF, 2016). Unfortunately, less educated and low-skilled workers often bear the brunt of automation costs. This situation leads to higher risk of income deficiencies and unemployment issue.

In the ASEAN region, Malaysia is the third-highest in youth unemployment, after Indonesia and the Philippines (Cheng & Mohamad, 2020; Dass, 2018). Despite there has an effort by the government to combat the issue, the percentage of youth unemployment remains high. Those from lower incomes struggle to seek job due to limited skill possessed. They face with limited financial resources to upskill their capability and skill development (Arshat et al., 2018). In fact, local graduates are faced with job mismatches due to working below their academic qualifications (Ngah & Rosli., 2019). In some cases, these individuals are forced to work in fields unrelated to their expertise (D'Silva, 2020).

From the other angle, in terms of Holland's RIASEC model, there is unclear guide in existing research on identifying the compatibility of personal interest with work competencies in in IR4.0 era. Previous studies aligned the personal interests with the work environment with academic performance, career choices, and job performance (Schelfhout et al., 2019, Law, 2018; Mncayi, 2016; Pultz et al., 2019; Sumit, 2020). Indeed, in the context of the IR4.0, the understanding on individual competencies through the RIASEC model becomes crucial to help individuals identify the competencies that match with their personal interest without considering the academic background.

Based on these arguments, this research aims to examine the effect of RIASEC model creativity competency among low-income groups. This research focuses on Technical Vocational Education and Training (TVET) in Malaysia, specifically on polytechnics. TVET institutions were selected for the study because the measurements of the RIASEC model and IR 4.0 competency align with the technical field. The sample of the study comprises students from low-income populations those participating in a Work-Based Learning (WBL) program.

1.1 Person- Environment Fit Theory

P-E fit is the theory that has a capable to show the compatibility between the person and environment (Edwards, 2008). It considered that both the person characteristics and the environment are jointly together (Kristof-Brown & Guay, 2011). Fit theory suggests that individuals naturally seek environments that align with their characteristics, fulfilling their need for compatibility (van Vianen, 2018).

1.2 The Relationship between RIASEC Personality Types and Creativity competency

Individuals with a Realistic personality derive satisfaction with practical tasks such as construction, maintenance, machine operation, and sports engagement (Athanasou, 2017; 2018). However, this personality type unfavorable with self-assessment and creative task, indicating diminished creative metacognition (Kuafman et al., 2013; Ümit, 2020). Metacognition refers to the process through which learners utilize their understanding of their task, learning strategies, and planning skills to monitor their progress toward learning goals and evaluate outcomes (Güner & Erbay, 2021). Therefore, based on these discoveries, the study suggests the following hypothesis:

H1: Realistic personality type has a negative effect on creativity.

Those with a Investigative (I) personality exhibit of curiosity, strong critical thinking skills, and preference for solving problems through observation, analysis, and reasoning (Li et al., 2018; Mashadza, 2019; Orkibi, 2016). Professions like scientific researchers, medical researchers, and communication engineers are well-suited to individuals with this personality type (Li et al., 2018). In terms of creativity, previous study suggests that those with an Investigative personality tend to score highly creativity assessments based on self-evaluation

(Kaufman et al., 2013; Perrine and Brodersen, 2005). Consequently, the study proposes the following hypothesis:

H2: Investigative personality type has a positive effect on creativity.

Individuals with an Artistic personality type inclination frequently engage in activities involving forms, designs, and patterns, often seeking outlets for self-expression, originality, imagination, and creativity (Athanasou, 2017; 2018; Li et al., 2018; Murray et al., 2003). Regarding creativity, Artistic personality serve as strong predictors for factor related creativity (Liu, 2020). Furthermore, individuals gifted with artistic talents often pursue careers in the arts following encouragement and recognition from others for their creative endeavors (Stoll et al., 2017). Hence, based on these studies, this study proposed the following hypothesis:

H3: Artistic personality type has a positive effect on creativity.

Individuals categorized as the Social personality type typically exhibit cooperative, friendly, understanding traits (Chen & Simpson, 2016; Sally, 1999). They often gravitate towards fields involving providing services or assistance to others (Athanasou, 2017; 2018). The Social type tend to have negative impact on self-assessment and the measurement of creativity, indicating lower levels of creative metacognition (Kaufman et al., 2013). Consequently, based on these findings, the study proposes the following hypothesis:

H4: Social personality type has a negative effect on creativity.

Enterprising individuals possess a strong inclination towards leadership and persuasion, particularly in pursuit of organizational objectives or economic success (Ertl & Hartmann, 2019; McLarnon et al., 2014; Mncayi, 2016). They tend to seek employment opportunities in sectors that involve leadership, management, and entrepreneurial (Bergner et al., 2018; Han & Sears, 2020; Li et al., 2018). In entrepreneurial field, creativity is widely acknowledged as a crucial factor for success and valuable for individuals to identify opportunities and emerging trends in the business realm (Biraglia and Kadile, 2017; Hu et al., 2018; Gao et al., 2020). Therefore, the study proposes the following hypothesis:

H5: Enterprising personality type has a positive effect on creativity.

Individuals characterized by a Conventional personality type tend to follow a set of procedures clear structure, and routines exhibiting traits of organization, carefulness, conscientiousness, and effectiveness (Athanasou, 2017; 2018). However, regarding creativity, previous study reveals that Conventional individuals have minimal impact on creativity scores due to lacking in imagination and creative thinking (Gao et al., 2020; Holland, 1997; Muniz et al., 2014). Therefore, the study proposes the following hypothesis:

H6: Conventional personality type has a negative effect on creativity.

2. Research Methodology and Data Collection

This study utilized an explanatory research design along with a quantitative research method. Primary data were gathered via questionnaires through online survey involving students from four Malaysian polytechnics offering degree-level programs, namely Politeknik Ungku Omar (PUO); Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA); Politeknik Sultan Azlan Shah

(PSAS); and Politeknik Ibrahim Sultan (PIS). Furthermore, the study samples were purposively selected focusing on degree students who undergo WBL program from the low-income background. While 134 responses were received, only 98 questionnaires were deemed suitable for data analysis. The measurements of variables were measured based on the literature and rated using a 5-point Likert scale. Additionally, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed for instrument validation, confirmatory factor analysis, reliability assessment, and hypothesis testing. G-Power 3.1 facilitated statistical power analysis to determine the sample size offering advantages such as enhanced effect size calculation, graphical options, and a wide range of power analyses. Given that the study included six predictors pointing towards the dependent variable, a minimum of 98 respondents was required to achieve 80% power with a medium effect size and significance level of 5% (Gefen et al., 2011)

Out of 98 participants, over half (52%) had a monthly household income below RM2,500. In terms of gender distribution, 53.1% were male, and 46.9% were female. The majority of respondents (80.6%) were Malay students. Among the participants, 42.9% came from Politeknik Ungku Omar, enrolled in programs such as Bachelor of Civil Engineering Technology with Honours and Bachelor of Technology in Facility Management with Honours. Additionally, a significant portion (89.8%) had prior experience as a Work-Based Learning (WBL) trainee in the government sector.

3. Data Analysis and Findings

Structural equation modelling with smart partial least squares (Smart PLS) was employed to test the hypotheses of the study. The Smart PLS software is well suited to the predictive nature of study that involved a new variable and the complexity of the model.

3.1 Common Method Variance

Before conducting further analysis, it was imperative to address common method variance (CMV) to ensure the study results remained unbiased. The potential issues of CMV needed consideration for single sources data. CMV can be mitigated through procedural and statistical methods (Mackenzie and Podsakoff, 2003). Procedurally, different anchor scales were utilized to measure exogenous and endogenous variables. To ascertain the severity of CMV in this study, Harman Single Factor analysis was employed as a post hoc procedure subsequent to data collection. The outcome of the Harman Single Factor analysis indicated that the first factor accounted for only 35.4% of the variance in the data, falling below the 50% threshold level as recommended by Podsakoff et al. (2003) and Tehsees et al. (2017). Thus, these findings suggest that CMV did not significantly influence this study.

Table 1: Result of Common Method Variance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	30.45	35.41	35.41	30.45	35.41	35.41

3.2 Measurement Model

The measurement model's validity is established through evaluation of convergent and discriminant validity. As recommended by Hair et al. (2017), convergent validity is satisfying when both factor loadings and the average variance explained (AVE) surpass 0.5, and the composite reliability (CR) exceeds 0.7. Table 2 indicates that all values surpassing the minimum threshold, indicating that convergent validity is confirmed for the study.

Table 2: Assessment Result of Measurement Model

Variables	Measurement Items	Loadings	CR	AVE
Realistic	POR1: I have athletic ability	0.701	0.928	0.620
	POR3: I enjoy working with machinery	0.807		
	POR4: I enjoy working with items	0.835		
	POR5: I enjoy working with equipment	0.872		
	PER2: I enjoy repairing automobiles	0.745		
	PER3: I like fixing furniture	0.795		
	PER4: I like repairing mechanical instrument	0.743		
	PER6: I like repairing building or household appliances	0.775		
Investigative	POI1: I like to think	0.712	0.923	0.601
	POI3: I enjoy observing, learning, investigating, analysing, and evaluating (problems/ situations)	0.726		
	POI4: I enjoy delving deep into problem-solving	0.823		
	POI6: I am good at comprehending abstract concepts	0.768		
	PEI1: I derive satisfaction from delving into the fundamental reason behind a situation or incident	0.746		
	PEI2: I derive satisfaction from putting scientific concepts into practice to confirm their validity	0.771		
	PEI3: I enjoy contemplating the principles of development or change in things	0.861		
	PEI5: I enjoy conducting in-depth study of a particular theory through extensive referencing and data analysis	0.782		
Artistic	POA2: I enjoy employing imagination and creativity	0.748	0.900	0.531
	POA3: I enjoy tasks that enable me to showcase my artistic talents	0.807		
	POA4: I possess innovative qualities	0.791		
	POA5: I like to attend stage plays	0.700		
	POA7: I like to attend art exhibitions	0.620		
	PEA2: I enjoy creating logos for companies or organizations	0.642		
	PEA3: I enjoy crafting portraits or photographs.	0.770		
	PEA5: I enjoy designing furniture, clothing or posters	0.722		
Social	POS3: I enjoy assisting others	0.786	0.919	0.588
	POS4: I enjoy educating and coaching individuals	0.707		
	POS5: I enjoy fostering the development of individuals	0.705		
	POS7: I enjoy attentive listening to others	0.798		
	PES1: I enjoy engaging in conversations with people to bring them joy	0.846		
	PES2: I enjoy comprehending human relationships	0.860		
	PES3: I enjoy showing compassion for the less fortunate, the ill, or those who are lonely	0.686		
	PES4: I find fulfilment in participating in charity activities	0.721		
Enterprising	POE2: I enjoy attempting to influence or convince other people	0.692		
	POE3: I enjoy having power and leadership	0.777		
	POE4: I enjoy engaging in activities that influence others' decision-making	0.797		
	POE5: I possess formidable managerial skills	0.696		
	PEE1: I prefer being engaged in planning direction of a team or organization for development purposes	0.736		
	PEE2: I enjoy the task that involves analysing company investment	0.672		
	PEE3: I enjoy participating in social marketing initiatives	0.623		
	PEE4: I enjoy tasks that entail distributing resources within an organization, whether human, material, or financial	0.767		

Table 2: Assessment Result of Measurement Model (Cont.)

Variables	Measurement Items	Loadings	CR	AVE
Conventional	POC1: I enjoy executing tasks with meticulous attention to detail	0.715	0.936	0.625
	POC3: I am capable of adhering to established procedures	0.846		
	POC4: I am meticulous in my approach	0.767		
	POC5: I am organized in my habits	0.809		
	POC6: I am an accurate person	0.705		
	PEC2: I find pleasure in conducting inventory checks on supplies or products	0.808		
	PEC3: I enjoy inspecting paperwork or products for errors and flaws	0.891		
	PEC4: I take pleasure in both recording data and inspecting materials	0.772		
	PEC5: I enjoy managing daily tasks in the office	0.789		
	Creativity	C1: I believe it's crucial to maintain objectivity and think logically		
C2: I believe it's important to be emotionally invested and motivated		0.819		
C3: I believe it's crucial to understand the intricacies of my job and execute it with precision		0.851		
C4: I believe it's important to embody complexity and intellect		0.833		
C5: I perceive it is important to be focused on problems that need immediate attention and let others worry about the future		0.801		
C7: I believe it's important to analyze all the facts and organize them systematically when encountering problems		0.857		
C8: I believe it's essential to prioritize the huge implications over minor intricacies		0.799		
C9: I believe it's crucial to prioritize people over task		0.856		
C10: I believe it's crucial to comprehend the advantages of any project or task before dedicating commitment to it		0.878		
C11: I believe it's crucial to resolve problems efficiently without getting bogged down by details		0.854		
C12: I will do my job even though the process may hurt others.		0.847		
C13: I believe it's important to tackle new and intricate challenges		0.851		
C15: I believe it's important not to let problems disturb me, regardless of their difficulty		0.867		

In terms of confirming the discriminant validity, the study utilized heterotrait-monotrait ratio (HTMT) values. As suggested by Franke and Sarstedt (2019), HTMT values should be below 0.90. As demonstrated in Table 3, all HTMT values were found to be lower than the most conservative threshold.

Table 3: HTMT Ratio

Construct	1	2	3	4	5	6	7
1 Artistic							
2 Conventional	0.485						
3 Creativity	0.334	0.487					
4 Enterprising	0.631	0.387	0.576				
5 Investigative	0.392	0.282	0.485	0.552			
6 Realistic	0.317	0.227	0.235	0.281	0.518		
7 Social	0.452	0.526	0.463	0.508	0.473	0.149	

Discriminant validity is established at HTMT below 0.90.

3.3 Structural Model

In this study, the evaluation of the hypotheses done via the bootstrapping technique with a 5000-resampling procedure. The supported hypothesis is considered based on the *t*-value exceeds or equals 1.645, the *p*-value is less than or equal to 0.005. A hypothesis is considered supported if the beta value is consistent with the direction of the hypothesis, the *t*-value equals or exceeds 1.645, while the *p*-value is equal or less than 0.005, and there is no zero within the confidence interval straddled between the lower level (LL) and upper level (UL). Table 4 shows the criteria used to test the hypotheses that were proposed in this study.

Table 4: Hypotheses Testing Result

Hypothesis	Relationship	Beta	SE	t-Value	p-Value	LL	UL	VIF	f2	R2
H1	R -> Creativity	0.052	0.097	0.531	0.298	-0.148	0.193	1.381	0.003	
H2	I-> Creativity	0.183	0.113	1.615	0.053	-0.003	0.352	1.781	0.033	
H3	A -> Creativity	-0.086	0.093	0.923	0.178	-0.256	0.046	1.695	0.008	
H4	S -> Creativity	0.121	0.107	1.131	0.129	-0.065	0.281	1.614	0.016	0.437
H5*	E -> Creativity	0.338	0.128	2.628	0.004	0.125	0.529	1.782	0.114	
H6	C -> Creativity	0.276	0.099	2.794	0.003	0.109	0.430	1.427	0.095	

Six hypotheses concerning creativity were examined, with the R^2 value reaching 0.437, indicating that six variables explained 43.7% of the variance in creativity. Among these hypotheses, only one was found supported, while the remaining hypotheses were not supported. Enterprising type ($\beta = 0.338$, $t = 2.628$: LL= 0.125, UL= 0.529, $p < 0.05$), thus supporting H5. Meanwhile, for Realistic type ($\beta = 0.052$, $t = 0.531$; LL= -0.148, UL= 0.193, $p = 0.298$), Investigative type ($\beta = 0.183$, $t = 1.615$: LL= -0.003, UL= 0.352, $p < 0.10$), Artistic type ($\beta = -0.086$, $t = 0.923$: LL= -0.256, UL= 0.046, $p = 0.178$), Social type ($\beta = 0.121$, $t = 1.131$: LL= -0.065, UL= 0.281, $p = 0.129$), and Conventional type ($\beta = 0.276$, $t = 2.794$: LL= 0.109, UL= 0.430, $p < 0.05$), hence H1, H2, H3, H4 and H6 were unsupported. For f^2 , Cohen (1988) suggests that the large, medium, and small effect size are 0.35, 0.15, and 0.02 respectively. Hence, the study found that the variable that has supported hypothesis, has a small effect size.

4. Discussion

The current study aimed to examine the correlation between RIASEC types and creativity among students from low-income background. The Realistic type was hypothesized to have a negative relationship; however, the results show that there is positive and no relationship between Realistic and creativity competency. For Investigative type, there was hypothesized to have a positive effect on creativity competency; however, the finding revealed that there is no relationship between Investigative type and creativity. In terms of Artistic type, this study hypothesized that there is a positive relationship; yet the results illustrated that there was only negative and no relationship between Artistic and creativity competency. Moreover, the Social type was hypothesized to have a negative effect; even so, the result shows that there is no relationship between Social type and creativity. Hence, H1, H2, H3, and H4 were not supported. The non-significant relationship between Realistic, Investigative, Artistic and Social types on creativity competency can be attributed to internal factors (low socio-economic status) and external factors (environmental factors like public facilities and external regulations). In terms of internal factors, having a low socio-economic status will negatively

impact the psychological aspects of the individual and the well-being of the family (Arshat et al., 2018; Batty & Flint, 2010; Gopal, 2018; Zin & Tambi, 2018). Individuals who grew up in a low economic status will experience an impression of non-material dimension or intangibility in nature such as low self-esteem and motivation as well as feeling of defeat (Gopal, 2018). Low self-esteem and motivation will lead individuals to overthink failure or become reluctant to take risks. These factors have somewhat hindered students in this group from becoming creative individuals (Rubenstein et al., 2018). In respect of external factors, previous studies on creativity discovered that environmental factors, specifically residential areas, will influence individual competence. Due to financial constraint, B40 groups tend to stay in low-cost housing (Ismail et al., 2018). The public facilities in these residential areas often do not adhere to planning principles such as artistic values and aesthetics such as synthetic objects elements, physical artifacts or murals (Ismail et al., 2020). This factor seemingly discourages creative development among teenagers.

As mentioned earlier, the Conventional type was hypothesized to have a negative relationship; nevertheless, the result proves that there is positive and has relationship between the Conventional type and creativity. Hence, H6 is also unsupported. Despite contradicting Gao et al. (2020), this finding aligns with Liu (2020), indicating that individuals with Conventional interests can be creative, even when engaged in routine tasks. This result also has a strong relation with the sample of study which is WBL students from TVET's institution. TVET institutions play a pivotal role in equipping individuals with the requisite competencies and knowledge for employability and socio-economic development. Furthermore, by emphasizing entrepreneurship and innovation, and soft skills development, TVET can prepare and produce a creative graduate for success in the global workforce (Varma & Malik, 2023). This highlights that students' creative competencies are shaped through engagement with educational institution activities and programs.

Next, the Enterprising type has been found to have a positive effect with creativity competency. The finding was aligned with the literature such as Hu et al. (2018) and Gao et al. (2020) which stated that creativity aspects can be measured through relationship, intentional and readiness through entrepreneurship. An individual who is categorized in this personality would like to be employed in those sectors that involve leadership roles, managerial activities and entrepreneurship intention (Bergner et al., 2018; Han & Sears, 2020; Li et al., 2018). In addition, Biraglia and Kadile (2017) reveal that creativity is precious for individuals who want to discover opportunities and new emerging in the business world. The results of the study have proved that TVET institution emphasizes an entrepreneurial mindset among students through the provision of courses and programs aimed at enhancing creativity.

5. Conclusion, implications and future research

IR 4.0 consistently prompts concerns regarding the future of workforce and the potential replacement of human task by machines or robot. The research findings indicate that despite IR 4.0 emergence, human job might inherently at risk unless individuals possess the requisite competency, notably creativity. Creativity is anticipated to rank among the top three essential competency for workers. Nowadays, many companies consider creativity as fundamental skill across various roles encompassing sales, marketing, accounting and customer service. Hence, individuals must comprehend and cultivate the capabilities necessary to foster and harness this competency. The study reveals that, individuals can develop this skill by looking at the compatibility of their personality type through the RIASEC model with creativity competency. This assessment is crucial as individuals naturally seek alignment between their personality

type and specific competencies. This fit is very important for individuals in order to ensure consistency, reduce the risk of uncertainty, find happiness as well as achieve satisfaction in life. Based on the results of the study, Enterprising personality type fit with creativity competency particularly among TVET students from low-income groups that undergoing the WBL program.

5.1 Implications of study

The research demonstrates the RIASEC model's efficacy in elucidating IR 4.0 competency among TVET students that contributing to the literature of human resources and psychology, as well as enriching the discourse on the RIASEC model. Besides reinforcing the strong correlation between Enterprising personality type and creativity competency, this study introduces a novel approach to identify the relationship between RIASEC model and other competencies in IR 4.0 era. In other point of view, the finding of this study may be used as a guideline for the Malaysian government in implementing a holistic and effective training program, especially for students from low-income groups. The findings can offer the policymakers hints about the action to be taken regarding planning, formulating, offering and implementing effective training programs for the targeted group. The framework designed is valuable to address skill mismatch challenges that may occur in various situations, including over or under qualification mismatch (vertical mismatch), the field of study mismatch (horizontal mismatch) and career mismatch.

5.2 Recommendation for further study

The study is only limited to the TVET students from low-income family who undergoing WBL program. Hence, future studies could utilize data from another sample size such as students from public university other than sample from low incomes.

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