

Determinants of skill stability in the workforce among countries

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ABSTRACT

The stability of skills in a workforce is influenced by a range of determinants that can either promote or hinder the ability of employees to maintain and adapt their skills over time. From the 37 country members of the Organization for Economic Cooperation and Development (OECD), the top 15 countries were contrasted in terms of workforce measured by skill stability with the bottom 15 countries using bipolar analysis. This study aimed to determine the predictors of skill stability among the reskilling foci across countries. Data were analyzed using exploratory data, t-tests, and regression analysis. Results revealed that the top 15 countries outperformed the bottom 15 regarding resilience, flexibility, and agility. It was also found that AI and big data, resilience, flexibility, agility, empathy, and active listening were the three predictors of skill stability in the workforce among countries. Hence, it is recommended that organizations and stakeholders explore collaboration opportunities between the top 15 and bottom 15 countries to leverage their respective strengths, ultimately enhancing overall skill stability.

1. Introduction

Maintaining relevant and in-demand skills over time is a need of an individual or a workforce. The stability of skills in a workforce is influenced by a range of determinants that can either promote or hinder the ability of employees to maintain and adapt their skills over time. Several studies revealed that the stability of skills in the workforce is influenced by many determinants, including economic, technological, educational, and individual factors (Card & DiNardo, 2002; Goldin & Katz, 2008; Polachek et al., 2017). Several published papers mentioned challenges that can disrupt the stability of skills and create a need for ongoing adaptation (Collins & Halverson, 2009; Schwab & Zahidi, 2020; West, 2018). Further, a proactive and adaptable approach to skill development becomes increasingly vital to ensure that skills remain valuable, relevant, and enduring in an ever-changing employment landscape. Hence, this study explores the determinants of skill stability in the workforce among countries.

Skill stability is an essential concept in the context of workforce development, adaptability, and career longevity (Kwon, 2019). It signifies the capacity of workers to maintain their value and relevance in an ever-changing world of work, underscoring the importance of lifelong learning and skill development to achieve this stability.

According to the Future of Jobs Report by The World Economic Forum (WEF) 2023, skills are currently needed for work, and businesses expect them to increase or decrease in

importance in the next five years. Skills are ranked and ordered by the share of organizations surveyed that consider the skills core to their workforce. Among the top 10 core skills, analytical thinking emerged as the first. It is supposed to be a core skill by more companies than any other skill and constitutes, on average, 9% of the core skills reported by companies. Employers prioritize hiring individuals with robust analytical thinking abilities due to the influence of automation and technological progress (Maggioncald, 2023). Although technical data analysis is simplified through automation, the progress of automation in reasoning and decision-making is comparatively slow; hence, there will be a shortage of individuals capable of interpreting its significance.

On the other hand, cognitive skills (creative thinking and self-regulation) are reported to be growing in importance most quickly, reflecting the increasing importance of complex problem-solving in the workplace (World Economic Forum [WEF], 2023). They are essential as they require the capacity to consider the consequences of one's actions, evaluate risk and reward, and accept accountability for the products of one's work (Organization for Economic Cooperation and Development, 2018).

Skills are also being disrupted, and businesses see skills gaps in the local labor market as the foremost barrier to achieving industry transformation. Across the U.S. economy, large-scale changes in work are occurring because of skills disruption: the constant re-invention of work driven by the vigorous, accelerating demand for new skills in virtually all jobs and the spread of those skills across industries and around the world (Dawson et al., 2022). On average, 37% of the top 20 skills requested for the average U.S. job have changed since 2016. In the top 25% of occupations experiencing the most significant upheaval, more than 75% of the required skills have changed within that time frame. American workers must update or acquire more abilities to stay current (Dawson et al., 2022).

European companies face similar challenges, such as the need to address skills shortages and the impact of digital transformation on the workforce (Balkan, 2022; UNESCO, 2009). The European Commission has recognized the importance of addressing these issues. It has launched initiatives such as the European Year of Skills 2023 to provide new momentum for lifelong learning, empower people and companies, and support innovation and competitiveness (European Centre for the Development of Vocational Training, 2023). Eurofound Executive Director Ivailo Kalfin pointed out that high-quality jobs, offering strong motivation and commitment to workers and increased business productivity, are tightly intertwined with skills development (World Economic Forum, 2023).

Four disruptive forces are reshaping the contemporary Philippine work environment: the rise of technologies such as artificial intelligence, the ability to work from any location facilitated by the internet, the prevalence of gig work, and the integration of digital natives into the workforce (Ibrahim, 2022). The stability of skills in the Philippines is closely tied to the economic landscape. Economic growth, industry expansion, and technological advancements can influence the demand for specific skills.

The stability of skill encompasses the idea that individuals' skills remain valuable, adaptable, and in demand in the job market despite ongoing technological changes, industry requirements, and economic conditions (Kerste et al., 2023). Skill stability and reskilling are interconnected concepts, as reskilling efforts are often initiated to maintain or enhance skill stability in response to technological advancements and changing job requirements.

2. Theoretical basis

The theoretical bases for skill stability in the workforce can be understood through several key perspectives in line with economics, sociology, and psychology.

Developed by economists like Becker (1993), as cited in Ross (2023), Human Capital Theory refers to an employee's educational attainment, knowledge, experience, and skills. According to this theory, individuals invest in their human capital through education and training, acquiring skills valued in the labor market. Skill stability in the workforce can be explained by the notion that individuals who possess valuable skills can maintain stable employment over time as their skills remain in demand by employers.

Ulker-Demirel and Demirel (2016) proposed that in Institutional Theory, the institutional environment could mainly affect the development of formal organizational structures, often more profoundly than market stresses. Rooted in sociology and organizational studies, this theory emphasizes the role of social institutions and norms in shaping behavior within organizations and the broader labor market. Institutional elements such as labor market regulations, industry norms, and organizational procedures can potentially impact the need for particular skills and the continuity of employment within specific industries or job categories.

Psychological Contract Theory, which was put forward by Argyris (1960), as cited in Shapiro and Parzefall (2008), was a match between what the individual contributes and what the organization seeks to achieve, as well as what the organization offers in return and what the individual anticipates gaining. According to this theory, employees develop expectations about their employment relationship based on job security, advancement opportunities, and performance rewards. When these expectations are met, employees are most likely to remain committed and invest in maintaining their skills over time, leading to more excellent skill stability in the workforce.

Individuals and organizations prioritizing ongoing learning are better equipped to maintain skill stability. Research emphasizes the importance of fostering a culture of lifelong learning and continuous skill development in the workforce. According to Knapper and Cropley (2000), lifelong learners plan and evaluate their learning process, learn in different settings and diverse contexts from others, and integrate knowledge from various subject areas using many strategies when required. For this reason, organizations and the labor market should care about lifelong learning and continuous skill development among employees. That can also help them meet skill shortages, prepare future leaders, and facilitate internal mobility (Plaza et al., 2021).

2.1. Related literature and studies

Core skills

It is a question of many to determine what core skills the workforce requires to remain in the next five or more years. The WEF (2023) reported 26 core skills. To wit, analytical thinking, creative thinking, resilience, flexibility and agility, motivation and self-awareness, curiosity and lifelong learning, technological literacy, dependability and attention to detail, empathy and active listening, leadership and social influence, quality control, systems thinking, talent management, service orientation, and customer service, resource management and operations, AI and big data, reading, writing and mathematics, design and user experience, multilingualism, teaching and mentoring, programming, marketing and media, networks and cybersecurity, environmental stewardship, manual dexterity, endurance and precision, global citizenship, and sensory-processing abilities.

Some of the core skills mentioned are supported by The Organization for Economic Cooperation and Development (OECD) Learning Compass 2030 as it distinguishes between three different types of skills: 1) cognitive and meta-cognitive skills, which include critical thinking, creative thinking, learning-to-learn and self-regulation; 2) social and emotional skills, which include empathy, self-efficacy, responsibility and collaboration; and 3) practical and physical skills, which include using new information and communication technology devices (Organization for Economic Cooperation and Development [OECD], 2018). In an increasingly changing labor market, core skills do matter. They pose importance to the following: 1) For individuals, these enhance their capacity to secure and retain employment, navigate the job market effectively, and participate in continuous lifelong learning; 2) For employers, these fundamental skills translate to employees who can more effectively adapt to changes in the work environment; and 3) Employees acquire knowledge swiftly and demonstrate enhanced performance, enabling businesses to cultivate innovative and adaptable work environments. In such settings, workers can contribute fresh ideas and quickly adapt to technological advancements and organizational restructurings (Fourie, 2016; Van den Heuvel et al., 2020).

Skill evolution

Skills continue to evolve; the skills required 20-plus years ago have changed or become irrelevant. Gartner's (2023) report showed that 33% of skills required in an average job advertisement in 2017 will not be needed this year and that skills necessary for a particular job are increasing by 10% yearly. It has become a pressing business concern among leaders. Mercer's Global Talent Trends report states that "without accelerating our progress on the skills agenda, we won't have the talent to take advantage of the new jobs we're creating" (Mercer, 2023, para. 3).

Reskilling and upskilling

As reported by WEF (2023), reskilling skill focus shows the share of surveyed companies that operate in the respective economy or region that selects a particular level-3 skill in the Global Skills Taxonomy, based on responses to the question, "Keeping in mind your current strategic direction, please select the skill clusters on which you are focusing your organization's reskilling and upskilling efforts in the next five year" (WEF, 2023, p.66). For this question, respondents ranked an unlimited number of the 26 skills according to their importance. The Global Skills Taxonomy focuses on the skills workers across sectors and regions need in a fast-changing labor market. It is designed to serve as a "universal adapter" between data presented in the language of the many areas and industry-specific skills taxonomies in use.

As the skills are being disrupted, businesses design and scale their training programs (WEF, 2023). Upskilling enhances an employee's existing abilities by teaching them new trade tricks. In contrast, reskilling prepares current workers for different roles (Hall, 2023).

In summary, skill stability and a focus on reskilling are intertwined and mutually reinforcing. While skill stability provides a foundation of relevant skills, reskilling is updating and acquiring new skills to maintain and enhance that stability. This relationship is essential in a rapidly changing job market, where adaptability and continuous learning are keys to individual and organizational success.

2.2. Research questions

1. What is the skill stability rate among different countries?
2. How do the countries prioritize their reskilling skill focus in terms of the following core skills (analytical thinking, creative thinking, AI and big data, leadership and social influences, resilience, flexibility and agility, curiosity and lifelong learning, technological literacy, design and user experience, motivation and self-awareness; and empathy and active listening)?
3. Is there a significant difference between each country's reskilling focus and skill stability rate?
4. Which of the reskilling skills predicts the skill stability?

3. Methodology

This study utilized the bipolar analysis by Tchangani et al. (2012), in which the top 15 countries were contrasted with the bottom 15 countries regarding skill stability. Factors were done using exploratory data, cluster, t-test, and regression analysis. It includes profiling the skill stability of countries in the study using the forced cluster analysis. Further, two groups were compared regarding variables for skill stability and reskilling foci using a simple t-test for independent samples. Finally, those variables were found to be significant as a distinguishing characteristic between the top 15 and bottom 15 countries; regression analysis was used to ascertain determinants of the skill stability rate of these countries. The measurement of variables is given in Table 1.

Table 1

Variable and Measurement

Variable	Measurement
Skill Stability	Percentage
Reskilling Skill Focus:	
Analytical Thinking	Percentage
Creative Thinking	Percentage
AI and Big Data	Percentage
Leadership and Social Influences	Percentage
Resilience, Flexibility, and Agility	Percentage
Curiosity and Lifelong Learning	Percentage
Technological Literacy	Percentage
Design and User Experience	Percentage
Motivation and Self-awareness	Percentage
Empathy and Active Listening	Percentage

Source. Data analysis result of the research

4. Result and discussion

In this section, the study's results are presented and discussed concerning the aim of the study, which was to determine the predictors of skill stability.

4.1. Result

The cluster analysis of countries regarding the skill stability in the workforce and the reskilling skill focus is presented in Table 2. Cluster 1 describes the bottom 15 workforces of countries measured by skill stability, whereas Cluster 2 describes the top 15 workforces of countries.

Table 2

Workforce of Countries Measured by Skill Stability

Variable	Cluster 1	Cluster 2	Grand Centroid
Skill Stability	54%	59%	56.5%
Analytical Thinking	41%	53%	47%
Creative Thinking	41%	31%	36%
AI and Big Data	49%	40%	44.5%
Leadership and Social Influences	35%	41%	38%
Resilience, Flexibility, and Agility	34%	24%	29%
Curiosity and Lifelong Learning	25%	29%	27%
Technological Literacy	17%	28%	22.5%
Design and User Experience	31%	8%	19.5%
Motivation and Self-awareness	2%	8%	5%
Empathy and Active	16%	9%	12.5%

Source. Data analysis result of the research

Table 3

Comparison of Top and Bottom Countries in terms of Workforce Measured by Skill Stability

Variable	t-value	Interpretation
Skill Stability	3.513	Significant, $p < 0.002$
Analytical Thinking	2.419	Significant, $p < 0.002$
Creative Thinking	-1.296	Significant, $p > 0.242$
AI and Big Data	-1.841	Significant, $p < 0.076$
Leadership and Social Influences	0.162	Significant, $p > 0.872$
Resilience, Flexibility, and Agility	-1.681	Significant, $p > 0.104$
Curiosity and Lifelong Learning	0.132	Significant, $p > 0.896$
Technological Literacy	1.445	Significant, $p > 0.160$
Design and User Experience	-5.732	Significant, $p < 0.000$
Motivation and Self-awareness	1.541	Significant, $p > 0.135$
Empathy and Active Listening	-1.460	Significant, $p > 0.155$

Source. Data analysis result of the research

Table 4*Regression Analysis with Skill Stability Rate as Dependent Variable*

Predictor	Estimate	SE	t	p
Analytical Thinking	0.109	0.095	1.145	> 0.266
Creative Thinking	-0.046	0.054	-0.853	> 0.404
AI and Big Data	-0.205	0.088	-2.334	< 0.031
Leadership and Social Influences	-0.080	0.082	-0.976	> 0.341
Resilience, Flexibility, and Agility	0.094	0.043	2.190	< 0.041
Curiosity and Lifelong Learning	-0.087	0.056	-1.549	> 0.138
Technological Literacy	-0.047	0.064	-0.730	> 0.474
Design and User Experience	-0.071	0.067	-1.073	> 0.297
Motivation and Self-awareness	-0.055	0.075	-0.730	> 0.474
Empathy and Active Listening	-0.176	0.061	-2/897	< 0.009
<i>R-sq = 0.575</i>	<i>R-q(adj) = 0.351</i>			

Source. Data analysis result of the research

4.2. Discussion

The data in Table 2 reveal several essential insights about the two clusters, Cluster 1 and Cluster 2, and the overall trends represented by the grand centroid. Regarding skill stability, Cluster 2 (59%) demonstrates a higher mean score, indicating a greater capacity to maintain skills over time than Cluster 1 (54%). The grand centroid (56.5%), an average for both clusters, falls between their scores, suggesting moderate skill stability across the groups.

Interestingly, Creative Thinking for Cluster 1 (41%) has a higher mean score than Cluster 2 (36%). Though clustered as the bottom 15 countries in terms of workforce measured by skill stability, high creativity skills in these countries may be deeply rooted in all cultures. The dichotomy of “the West” and “the East” is one of the most influential approaches in characterizing (potential cultural) differences in understanding and defining creativity (Shao et al., 2019). For Westerners, creativity involves departing from established traditions and venturing into new territory, whereas, for Easterners, creativity conveys the idea of reinterpreting or rediscovering tradition. This is supported by the study of Maddux and Galinsky (2009), which empirically revealed the positive association between multicultural experiences and creativity, demonstrating that foreign living experiences and the experience of adapting to a foreign culture temporarily boosted creativity in individuals who had lived abroad.

Interestingly, Cluster 1 (34%) outperforms Cluster 2 (24%) in resilience, flexibility, and agility, though the grand centroid suggests room for growth in both clusters in these areas (29%). The needs of the job market can drive the development of specific skills. For example, if businesses are seeking resilient, flexible, and agile employees to adapt to changes, these skills may be more emphasized in training and education.

Empathy and active listening are more pronounced in Cluster 1 (16). The grand centroid (5% and 12.5%) value for both attributes aligns with the appreciation for empathy and active listening across both clusters. This may be attributed to how individuals in these countries adjust their communication style to accommodate others, which is closely related to active listening and

empathy, as explained in the Communication Accommodation Theory by Giles and Ogay (2007). The theory seeks to explain and predict why, when, and how people adjust their communicative behavior during social interaction and what social consequences result from those adjustments (Dragojevic et al., 2015).

This analysis provides a comprehensive view of the relative strengths and weaknesses of cluster 1 and cluster 2 in various skill areas. It reveals that each cluster excels in different domains, suggesting potential areas for collaboration and skill-sharing between the two groups. The grand centroid values represent a balanced assessment across both clusters, indicating a moderately positive overall skill profile. This data is valuable for tailoring training and development strategies to address each cluster's needs and strengths.

A formal statistical test was performed through a t-test. Table 3 compares top and bottom countries regarding workforce measured by skill stability.

The outcomes of independent samples t-tests conducted to assess variations in reskilling focus among different countries reveal noteworthy insights into the dynamics of workforce development and training strategies across various skill categories. The analysis of the skill category "Analytical Thinking" exhibits significant differences in reskilling focus, with a robust mean difference of 9.286 and a 95% confidence interval spanning from 1.423 to 17.148, underpinning variations in the prioritization of logical and systematic reasoning skills among countries. In contrast, skill categories such as "Creative Thinking," "Technological Literacy," and "Curiosity & Lifelong Learning" do not indicate significant distinctions in reskilling focus. Furthermore, "Design & User Experience" emerges as an area with highly significant disparities, implying that the cultivation of competencies in this domain varies significantly among nations.

Across the skill categories, the findings reveal varying differences in reskilling focus among different countries. Analytical Thinking, AI & Big Data, and Design & User Experience were identified as areas with significant divergence among countries.

While some skill categories exhibit significant differences, others do not. These findings contribute to a deeper understanding of the global landscape of reskilling initiatives and highlight areas of potential collaboration or specialization among countries.

The observed differences in reskilling focus suggest that nations prioritize different skill categories in their workforce development strategies. Developing skills can contribute to structural transformation and economic growth by enhancing employability and labor productivity and helping countries become more competitive (The World Bank, 2023). Moreover, these variations may be attributed to regional economic conditions, technological landscapes, or other factors. According to the study of Maclean et al. (2013), countries in these regions are very different in size, economic growth, and resource endowment, so differences in financial development impact every aspect of life, including employment, labor force considerations, education, and training.

Table 4 (model summary) presents a multiple regression analysis examining the relationship between various skill-related predictors and the criterion variable. The model's overall explanatory power is substantial (R -squared = .575), signifying that the predictors can explain around 57.5% of the variance in the criterion variable. The adjusted R - R -squared considers model complexity and stands at .351.

The standard error of the estimate (3.431) quantifies the average prediction error. The change statistics indicate a significant improvement in the model's ability to explain variance

compared to an intercept-only model, as highlighted by an R-squared change of 0.575 and an F-change statistic of 2.569 with a significance level of 0.037.

This regression model, incorporating various skill-related predictors, effectively explains a substantial portion of the variance in the criterion variable, demonstrating its predictive utility in understanding the interplay between these predictors and the outcome under examination.

The regression analysis examining the predictors' influence on "Skill Stability" reveals a relationship between various skill categories and the dependent variable.

Among the individual predictors, "AI & Big Data" exhibits a statistically significant negative effect with a Beta of -0.458 ($p = 0.031$), indicating that focusing on AI and big data is associated with reduced skill stability. The negative impact means skill stability decreases as AI and significant data levels increase. In other words, a higher presence of AI and big data in a given context is linked to lower levels of stability in the skills of individuals or the workforce. This might be related to improvements in the productivity of AI and big data, which drive divergence between the top 15 being advanced and the bottom 15 being developing countries in terms of workforce if AI substitutes easily for workers. In addition, those improvements will tend to increase incomes and income inequality, at least during the transition and possibly in the long run, for some groups of workers in advanced and developing economies (Alonso et al., 2020).

Although AI will perpetuate in the next five years, this implies that the introduction or increased adoption of AI and big data technologies might be associated with challenges in maintaining stable skill sets among individuals. This might be due to the dynamic nature of these technologies, which often require continuous learning and adaptation to stay relevant.

Students, teachers, and the like can work alongside AI in education. Unlike AI capabilities that merely react to existing data, humans can envision, predict, experience emotions, and make assessments in evolving situations, allowing them to shift from short-term to long-term concerns. These abilities are unique to humans and do not require a steady flow of externally provided data, as with artificial intelligence (De Cremer & Kasparov, 2021).

Moreover, "Empathy & Active Listening" displays a statistically significant negative effect with a substantial Beta of -0.609 ($p = 0.009$), implying that a focus on empathy and active listening is associated with decreased "Skill Stability." It could be that there might be an overemphasis on soft skills in both clusters of countries, like empathy and active listening, to the detriment of technical or complex skills. An imbalance in skill development could reduce overall skill stability in specific fields or industries. Murriner (2023) states that striking the right balance is crucial, as good leadership skills must be harmonized with meticulously honed talents and hard skills.

On the other hand, "Resilience, Flexibility & Agility" is another significant predictor, showing a positive impact with a Beta of 0.386 ($p = 0.041$), suggesting that a greater emphasis on resilience and agility is linked to higher "Skill Stability." The positive effect indicates that individuals or the workforce with higher resilience, flexibility, and agility are likelier to exhibit increased skill stability over time. This could mean that their ability to adapt to changing circumstances, bounce back from setbacks, and quickly acquire new skills contributes to overall stability in their skill sets. A report found that organizations prioritizing resilience were twice as likely to outperform their competitors in revenue growth (Deloitte, 2021). The World Economic Forum's Future of Jobs Report (2023) projected that 65.8% of organizations surveyed consider skills to be increasing in importance, with the majority of these skills being in digital technology. In addition, Jadoul et al. (2020) noted that agile business units had outperformed their non-agile

counterparts in the same organization by an average of approximately 87% in overall performance ratings, providing a clear indicator of the advantage of this skill set.

Resilience, flexibility, and agility are crucial attributes that can significantly impact skill stability in the workforce.

These findings offer valuable insights into the predictive power of individual skill categories in explaining variations in “Skill Stability.” While some predictors indicate significant relationships, others do not, highlighting the need for further investigation to understand better the dynamics of reskilling initiatives about specific skill categories.

5. Conclusions and recommendations

The analysis has revealed that Cluster 1 outperforms Cluster 2 in terms of resilience, flexibility, and agility, though both clusters have room for improvement. This suggests that each cluster possesses distinct strengths and areas of expertise, creating opportunities for collaboration and skill-sharing between the two groups. Furthermore, the findings shed light on the predictive power of individual skill categories in explaining variations in “Skill Stability.” Some predictors demonstrate significant relationships, while others do not. This highlights the need for further investigation to understand better how reskilling initiatives relate to specific skill categories and the dynamics involved. Both clusters should develop targeted policies and strategies for their particular reskilling needs. Cluster 1 could focus on maintaining and enhancing its strengths in flexibility and agility, while Cluster 2 could adopt best practices from Cluster 1 to improve these areas. A holistic approach involving significant investment in education and workforce development is essential. Countries should implement educational reforms emphasizing critical thinking, problem-solving, and adaptability. Workforce development programs should be designed to provide continuous learning opportunities and support lifelong learning. It is recommended that organizations and stakeholders explore collaboration opportunities between Cluster 1 and Cluster 2 countries to influence their respective strengths, ultimately enhancing overall skill stability. An in-depth analysis of predictive skill categories may be conducted to understand why specific skill categories are significant predictors of skill stability and others are not. This could involve qualitative research methods, such as case studies and interviews, to gain deeper insights into the contextual factors influencing these relationships.

Additionally, the role of emerging technologies in reskilling and skill stability may be investigated. This includes examining how digital tools and platforms can facilitate more efficient and effective reskilling programs. Addressing these disparities requires a holistic approach involving investment in education, workforce development, and policies promoting agility and adaptability in changing economic landscapes. Continued research and analysis are suggested to uncover the variations of skill in development and stability, allowing for more informed decision-making in reskilling initiatives.

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