

Employee competency advancement and technology adoption in electronic industry

Bartolome, Mimi D. ✉

Graduate School, Lyceum of the Philippines University - Batangas, Philippines

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Abstract

The high pace of technological development is one of the most significant difficulties confronting the electronic sector through a rapid transformation. Technologies are changing how electronics organizations function, offering new opportunities and challenges for employees. Electronics companies must emphasize employee competency advancement to succeed in the industry 4.0 era since new knowledge and skills need to be acquired to operate the technologies effectively. This study determined the employee competency advancement and technology adoption in the electronic industry in CALABARZON. Specifically, it defined the degree of employee competency advancement in terms of technological skills, soft skills, and personal attributes; it intended to assess the level of technology adoption in terms of usefulness, ease of use, and organizational support. This study also confirmed a highly significant relationship between employee competency advancement and technology adoption. Finally, an intermediate employee competency advancement in terms of technological skills, soft skills, and personal attributes while early adopters in terms of usefulness, ease of use, and organizational support were observed; a proposed action plan was formulated to strengthen the foundational technology skills and consider incorporating soft skills development opportunities in electronic industry.

Keywords: employee competency advancement, technology adoption, soft skills, usefulness

Employee competency advancement and technology adoption in electronic industry

1. Introduction

The 21st century has witnessed an explosion in the electronics industry, fueled by miniaturization, surging processing power, and constant innovation. Transistors, once bulky and limited, have become microscopic building blocks of powerful integrated circuits, enabling ever smaller and more capable devices. This has led to a revolution in communication, entertainment, and nearly every aspect of modern life. From smartphones that fit in our pockets to artificial intelligence that learns and adapts, the electronics industry continues to shape the future at an unprecedented pace. The electronics industry demands a highly skilled workforce to keep pace with this rapid transformation. Employee advancement hinges on a three-pronged approach to competency development (Butt, 2020). As mentioned by Ciarli et al. (2021), technological skills, encompassing areas like circuit design and programming languages, are crucial for building and maintaining complex devices. However, success also requires strong soft skills like communication and teamwork to collaborate effectively in fast-paced environments. As stated by Machado et al. (2021), personal attributes like adaptability and a thirst for learning to ensure employees can navigate the ever-changing technological landscape and continuously upskill themselves for future advancements.

Adopting new technologies seamlessly is another key factor in employee advancement (Wahab et al., 2021). Here, three dimensions of technology adoption come into play. Firstly, employees need to understand the new technology's usefulness and how this will benefit work and the company's goals. Secondly, the ease of use of the technology is crucial. Intuitive interfaces and readily available training minimize frustration and ensure employees can quickly become proficient. Finally, strong organizational support is essential (Wong, 2020). This includes providing access to resources, encouraging experimentation, and fostering a culture of continuous learning. By focusing on employee competency development and fostering a smooth technology adoption process, the electronics industry can empower its workforce to thrive in this dynamic and ever-evolving landscape (Elizondo & Reyes, 2023).

Rapid progression of digital technologies, including artificial intelligence (AI), automation, and the (IoT) Internet of Things, necessitates a shift in the competencies required in the workplace (Oh et al., 2021). This transformation is further accelerated by the COVID-19 pandemic, which underscored the importance of digital readiness and adaptability (Selimovic et al., 2021). However, adopting such technologies is not without its challenges. Enterprises often struggle with integrating new digital tools, hindered by both internal and external factors (Csiszár, 2023). Moreover, the socioeconomic environment and employee collaboration play significant roles in AI adoption and technology within organizations (Tao & Hao, 2023). The UTAUT also known as the Unified Theory of Acceptance and Use of Technology suggests employees' retention can be influenced by Industry 4.0 adoptions, mediated by training and competency development (Fahim et al., 2023). Moreover, the implementation process of adopting technology in Industry 4.0 entails a wider range of all associated technologies, which requires lots of adjustments in the work process, changes in the industrial scale, or worldwide cultural change, making them more complex compared to past technology deployment procedures. Saghafian et al., (2021) stated that technology evolves at an exponential rate, and the nature of innovations is more disruptive than in past ages. Technological evolution influenced different disciplines and sectors due to its rapid advancement. Dealing with the issues and disputes of the present and future eras, they must understand what they have learned from previous technical achievements.

This study examines these dynamics within the CALABARZON Area in the Philippines, a region known for housing a significant portion of the country's electronics industry. CALABARZON presents a compelling case for studying employee advancement competency and technology adoption. Firstly, the region's thriving electronics sector necessitates a highly skilled workforce that can adapt to the industry's rapid advancements.

Secondly, the concentration of numerous electronics companies in CALABARZON allows for a more controlled study, enabling researchers to compare and contrast employee development practices across various organizations. Finally, focusing on a region within the Philippines provides valuable insights into a developing economy's approach to bridging the skills gap within the electronics industry, potentially offering valuable lessons for similar regions around the world.

In addition, the relationship between employee advancement competency and technology adoption in the current era has been recognized and acknowledged as well, however, such a relationship based on empirical research for proofing is still limited. It also shows on some documents and learning proposed action plans to continuously improve the competence of employees and staff in advancement including education and understanding as of Wahab et al. (2021), only a few and not a majority have included the adoption of technology in their plan of actions such as Elizondo & Reyes (2023) and Ra et al. (2019). It is mainly because they aimed to conduct more empirical research to find the relationship and correlation between employee competency advancement and technology adoption in the Electronic Industry.

The study on employee advancement competency and technology adoption within CALABARZON's electronics industry holds significant value for various stakeholders. Researchers may gain deeper insights into the specific challenges and opportunities faced by this region's workforce in the face of rapid technological change. This can inform the development of targeted training programs and upskilling initiatives tailored to the electronics industry's needs. For employees, the study's findings may illuminate valuable career development pathways. By understanding the specific skillsets and adaptability valued by employers, individuals can make informed decisions about their learning and development goals. For company owners, the research may offer practical guidance on fostering a culture of continuous learning and technology adoption. This can translate to a more skilled and adaptable workforce, ultimately boosting productivity and innovation within their organizations. Finally, future researchers may benefit from a deeper understanding of the CALABARZON study. This will serve as a valuable benchmark for comparative studies, allowing researchers to explore similar dynamics in other electronics hubs around the globe.

Objectives of the study - The study aimed to determine employee competency advancement and technology adoption in Electronic Industry. Specifically, it will determine the degree of employee competency advancement in terms of technological skills, soft skills, and personal attributes; aimed to assess the level of technology adoption in terms of usefulness, ease of use, and organizational support; test the significant relationship of employee competency advancement to technology adoption; and to propose an action plan that Electronic Industry can implement to improve employee competency advancement and technology adoption.

2. Methods

Research Design - A descriptive research design was utilized and used in this study to gather an accurate, adequate, and precise interpretation of the findings. As stated by McCombes (2022), this is a method for gathering information about a topic by observing or surveying a population or phenomenon. It aims to describe the characteristics, frequencies, and patterns of the subject, rather than explaining why things happen.

Participants of the Study - The researcher surveyed employees from three electronic industries in the CALABARZON area. The total number of employees in the three electronic industries in the Calabarzon area is 703. The study employed and utilized the purposive sampling technique which is indeed useful to determine the required sample of respondents. To acquire the minimum sample target of the study, the researcher used the Raosoft Calculator to determine the sample size with a margin error of 5% and with a 95% confidence level, and a total of 249 sample sizes were formed.

Instruments - The study collected the necessary data using two sets of questionnaires as the major mechanism. The descriptive statements have been presented for the items per instrument, and respondents indicate the frequency with which each statement applies on a four-point Likert scale as a 3.50 – 4.0 scale means

strongly agree, 2.50 – 3.49 rate means agree, 1.50 – 2.49 scale means disagree and, 1.00 – 1.49 rating means strongly disagree. A self-made questionnaire was used by the researcher in data gathering based on the objectives of the research. The questionnaire was composed of two parts. Part I contains the assessment of Employee Competency Advancement which consists of technology skills (5 items), soft skills (5 items), and personal attributes (5 items). In part II, the questionnaire measures the assessment of technology adoption which contains usefulness (5 items), ease of use (5 items), and organizational support (5 items). To evaluate and determine the survey questionnaire's efficacy and effectiveness a pilot test was undertaken. 30 samples were subjected to a reliability test using Cronbach's alpha through SPSS 28. Table 1 provides the reliability test results for all the variables utilized in this research study.

Table 1*Reliability Test Result using Cronbach Alpha and its Interpretation*

Indicators	No. of Items	Cronbach Alpha	Remarks
Technological Skills	5	0.872	Good
Soft Skills	5	0.911	Excellent
Personal Attributes	5	0.926	Excellent
Usefulness	5	0.934	Excellent
Ease of Use	5	0.873	Good
Organizational Support	5	0.940	Excellent

Procedure - To obtain the necessary data, the researcher used a survey questionnaire and wrote a letter of request addressed to the company to conduct the study. The questionnaires were distributed by the researcher to the participants of the study by sending them hard copies to their company and using Google forms that were sent through emails and other communication platforms that the respondents have. The responses from the collected survey items were tallied and sent to the university statisticians to undergo statistical analysis.

Ethical Considerations - Ethical considerations were practiced throughout the study process to warrant and ensure that any information and data that was gathered was solely used particularly intended for research purposes, hence maintaining research's quality and integrity were in place. The researcher also sought approval for ethical clearance and consent from the companies through letters and communication to make sure that the target respondents were prepared to answer the appropriate research questions. It also safeguarded the respondent's confidentiality and anonymity by not asking for their names when they answered the questionnaires. The researcher guaranteed that the respondents would answer the survey questionnaires voluntarily and according to their will. Finally, it will also ensure that none of the study's respondents will be hurt or harmed, and their safety and security are top priority.

Data Analysis - The weighted mean and rank were utilized to determine the degree of employee competency advancement in terms of technology skills, soft skills, and personal attributes; and further assess the level of technology adoption in terms of usefulness, ease of use, and organizational support. The outcome of the Shapiro-Wilk Test showed that the p-values of all variables were less than 0.05 indicating that the data set was not regularly and normally distributed. As a result, Spearman rho was used as part of the non-parametric tests to determine the significant relationship. All analyses were performed using SPSS version 28.

3. Results and discussion

Table 2 depicts the summary assessment of Employee Competency Advancement. A score of 3.33 on the composite mean indicates that the respondents agree. This implies that respondents recognize the value of technology in enhancing both hard skills and soft skills essential for communication, collaboration, and critical thinking. In the study of Terstena et al. (2020), respondents are comfortable using current technologies, and there is a desire for further development in strategies complex technical and soft issues, fostering a culture of information and knowledge-sharing, collaboration through technology could be an area for exploration.

Table 2*Summary Table on Employee Competency Advancement*

Key Result Areas	Composite Mean	VI	Rank
Technology Skills	3.32	Agree	3
Soft Skills	3.34	Agree	1.5
Personal Attributes	3.34	Agree	1.5
Grand Composite Mean	3.33	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Among the items cited, soft skills and personal attributes ranked first with a mean score of 3.34 and verbal interpretation of agree. This implies that respondents believe technology can enhance these soft skills, with collaboration tools and data analysis potentially improving communication, project management, and critical thinking. However, the score falls short of "Strongly Agree," hinting at the potential for further development in leveraging technology for soft skill growth. In the study of Tahar et al. (2020), respondents value both technical and soft skills, viewing technology as a tool to strengthen them. Yet, there might be opportunities to further develop soft skills through targeted training or fostering collaboration and knowledge sharing through technology.

Meanwhile, technology skills, ranked last with a mean score of 3.32 and verbal interpretation of agree. This implies that the respondents are at the baseline level of comfort using current technologies for their roles. Respondents want to learn more or improve in specific areas like troubleshooting complex problems or staying updated with the latest tech trends. It's interesting to note that while technology skills are important, they ranked lower than soft skills and personal attributes, highlighting the value placed on well-roundedness. In the study of Imjai et al. (2024), a workforce comfortable with technology, but with room for growth. Targeted training or upskilling initiatives could help them maximize their technical capabilities and stay competitive in the ever-changing technological landscape.

Table 3*Summary Table on Level of Technology Adoption*

Key Result Areas	Composite Mean	VI	Rank
Usefulness	3.37	Agree	1
Ease of Use	3.33	Agree	3
Organizational Support	3.36	Agree	2
Grand Composite Mean	3.35	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 3 presents the assessment summary on the Level of Technology Adoption. The composite mean of 3.35 indicates that they agree in general. This implies that respondents generally agree that the technology is useful and easy to use, and they are receiving sufficient organizational support. This implies that overall, the technology adoption is positive. According to the study of Lachvajderova et al., (2023), feedback from employees can be target improvements. This might involve enhancing training programs or providing more resources for specific aspects of the technology. Ultimately, focusing on these areas can ensure a smoother transition of the new technology, maximizing the benefits, and leading to a more positive user experience for employees.

Among the cited items, usefulness, ranked first with a mean score of 3.37 and verbal interpretation of agree. This implies that respondents generally find the new technology valuable and relevant to their work. In the study of Supramaniam and Singaravelloo (2021), the technology might not fully address all user needs, or there could be a disconnect between its capabilities and how employees currently perform their tasks. By analyzing employee feedback and exploring areas where usefulness could be enhanced, the organization can ensure the technology delivers to its full potential.

Organizational support ranked second with a mean of 3.36 and verbal interpretation of agree. This implies

that respondents generally feel adequately supported by their organization in adopting and using the new technology. In the study of Hamburg (2020), training materials might need to be more tailored to address knowledge gaps or technical support channels could be made more accessible to ensure employees receive timely help when needed. By focusing on these areas, the organization can strengthen its support system and ensure a more seamless technology adoption process for everyone. Meanwhile, ease of use, ranked third with a mean score of 3.33 and verbally interpreted as agree. This implies that the respondents find the new technology learnable and relatively intuitive to navigate. In the similar study of Anthargam et al., (2021), the technology might have certain functionalities that require clearer instructions, or the interface could benefit from some simplification. By focusing on these areas and addressing any usability hurdles, the organization can ensure a smoother adoption process and maximize employee productivity with the new technology.

Table 4*Relationship Between Employee Competency Advancement and Technology Adoption*

Variables	rho	p-value	Interpretation
Technology Skills			
Usefulness	0.765**	< .001	Highly Significant
Ease of Use	0.743**	< .001	Highly Significant
Organizational Support	0.720**	< .001	Highly Significant
Soft Skills			
Usefulness	0.821**	< .001	Highly Significant
Ease of Use	0.812**	< .001	Highly Significant
Organizational Support	0.795**	< .001	Highly Significant
Personal Attributes			
Usefulness	0.788**	< .001	Highly Significant
Ease of Use	0.809**	< .001	Highly Significant
Organizational Support	0.775**	< .001	Highly Significant

** . Correlation is significant at the 0.01 level

As seen in the table, the computed rho-values ranging from 0.720 to 0.821 indicate a strong to very strong direct relationship among the sub-variables of employee competency advancement and technology adoption. There was a statistically significant relationship between employee competency advancement and technology adoption because the obtained p-values were less than 0.01. Moreover, the employees become more proficient in their skills (competency advancement), and they are also more likely to adopt new technologies whereas the employees that use new technologies may be exposed to new skills and knowledge, resulting in overall competency improvement. They might have a stronger foundation for understanding and learning new technology concepts. As a result, employees' competency development can lead to technology adoption, which can further improve employee capabilities.

As stated by Abdekhoda et al. (2019) external variables such as relative advantages, complexity, organizational competency, management support, compatibility competitive pressure, and support from a trading partner all appeared to have a major impact on technology adoption. Therefore, to achieve successful technology implementation, a wide range of various elements like perceived ease of use, perceived usefulness, technological information, organizational setting, and environmental context shall be included. Mubarak and Petraite (2020) mentioned that digital technologies such as the Internet of Things, block chain, and cyber-physical systems are causing a paradigm shift in how corporate activities are carried out and innovations are created. Industry 4.0 technologies, when combined with traditional organizational competencies, have the potential to be a significant success element in highly technologically driven markets. When Industry 4.0 technologies are integrated with human-centric trust, they generate trust, which can help a company improve its open innovation performance.

Furthermore, according to Elizondo and Reyes (2023) transformation program combines production processes, digital technologies, and systems to create intelligent decision-making methods and procedures for drastically altering an organization's value of chains and business models. These methods can help organizations implement different strategies, and improve their operation's productivity, quality, flexibility, cost savings, and customer' satisfaction. Nonetheless, implementing 14.0 approaches is a journey of substantial for organizations,

because ambiguity, unawareness, as well as high-cost investments dictate their judgments on whether to embrace it. Hence, enterprises, particularly for those people who work, engage and interact with industrial systems. As a result of the adoption of new advanced technologies, employees encounter difficulties and challenging change management in their workplaces as this is associated with human-technology interaction, and they are asked to trust, accept, and believe in the implementation of these technologies.

Table 5

Proposed Action Plan to Improve Employee Competency Advancement and Technology Adoption

Key Results Area and Objectives	Strategies/Activities	Expected Outcome	Responsible Persons
Employee Competency Advancement in terms of Technology Skills Improve overall employee competency in technology skills to ensure staff can effectively perform their job duties and adapt to new technologies.	<ol style="list-style-type: none"> 1. Develop and deliver training programs on in-demand technical skills. 2. Offer online courses, and workshops on specific software, programming languages, or technical skills relevant to the employees' needs. 3. Provide access to online communities, forums, or professional development resources relevant to the technologies used by the organization 	Improved efficiency and accuracy in completing tasks and reduced reliance on external support for technical issues.	HR Department
Level of Technology Adoption in terms of Ease of Use Enhance user experience by ensuring the technology is easy to learn, navigate, and use.	<ol style="list-style-type: none"> 1. Develop clear and concise user guides and tutorials in multiple formats (written, video, interactive) and Implement context-sensitive help features within the technology. 2. Offer a variety of support channels for users to get help, such as live chat, email support, or a searchable knowledge base 3. Create easy-to-use channels for users to provide feedback and suggestions for improvement. This could be through surveys, in-app feedback forms, or suggestion boxes. 	Increased employee confidence and satisfaction using the technology	Systems Development Team, User Experience (UX) Specialist, Training & Development Team
Level of Technology Adoption in terms of Organizational Support Strengthen employee confidence and comfort level by ensuring adequate resources and support are available	<ol style="list-style-type: none"> 1. Establish a dedicated support channel (e.g., helpdesk, online portal) for user inquiries and troubleshooting. 2. Develop clear and standardized procedures for using the technology 3. Provide training programs that are tailored to the specific needs of different user groups within the organization 	Increased employee satisfaction with the technology adoption process.	IT Department

A proposed action plan was formulated that tackles both employee competency development and technology adoption. It includes strategies like training programs for in-demand tech skills, user guides and tutorials in various formats, a dedicated support channel for inquiries, and context-sensitive help features within the technology itself. These initiatives aim to improve overall employee competency, user experience with the new technology, and employee confidence and satisfaction throughout the adoption process.

4. Conclusion and Recommendation

An intermediate employee competency advancement in terms of technological skills, soft skills, and personal attributes was observed in the electronic industry. Early adopters in terms of usefulness, ease of use, and organizational support were observed in the electronic industry. At hand is a highly significant relationship between employee competency advancement and technology adoption. A proposed action plan was formulated to improve employee competency advancement and technology adoption in the Electronic Industry. The HR Department may develop programs to effectively strengthen foundational technology skills and consider incorporating soft skill development opportunities. The IT Department may focus on improving the perceived usefulness of the technology for users while ensuring continued ease of use and adequate organizational support. The company may consider evaluating the applicability and assessing the proposed action plan to improve

employee competency advancement and technology adoption in the Electronic Industry. Future researchers may explore a specific technology skill gap, investigate the "why" behind the importance of soft skills and personal attributes, and investigate factors influencing perceived usefulness through correlation studies

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