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Engineering Ethics in Digital Era: Online Compliance Practices in Cabanatuan City

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Abstract *- Engineering is becoming increasingly reliant on digital systems for the automation and simplification of regulatory and compliance processes. Digital systems are increasing efficiency and accessibility but present new ethical dilemmas regarding accountability, responsibility, and transparency among engineers. This study investigated ethical considerations for engineers in the digital age, including ethical awareness, ethical practices, ethical dilemmas, and potential measures to strengthen an engineer's ability to comply with regulations using online compliance systems among engineers in Cabanatuan City. A descriptive-correlational research methodology was applied utilizing a survey instrument administered to 40 engineering professionals. The instrument was based on a five-point Likert Scale. Reliability testing was conducted to establish acceptability of internal consistency (Cronbach, 1951; Nunnally & Bernstein, 1994). Descriptive statistics (frequency, percent and mean) were analyzed to evaluate engineering professionals' responses regarding their level of ethical awareness, actual practices, perceived challenges, and suggested methods for enhancing the ability to apply ethical standards while complying with regulatory requirements via online compliance systems. The findings showed a high level of awareness of ethical issues as well as a strong adherence to ethical principles from the point of view of the respondents. This indicates that, although many systems have now been automated so that they can take care of their own compliance obligations, being ethically responsible is still an obligation for professionals. At the same time, however, the respondents also identified potential obstacles to this (ethical) behavior. These were largely related to unclear system guidance; technological restrictions; or that the respondents felt less accountable when using these systems. The correlation analysis revealed a statistically significant, moderately strong positive relationship ($r = 0.67$, $p < 0.001$) between ethical awareness and ethical practices, confirming that greater awareness of ethical responsibilities translates into stronger ethical conduct in online compliance platforms. Additionally, all respondents agreed about the necessity to strengthen ethical compliance by way of ethics training; clearly defined regulatory guidelines; features in platforms that enhance accountability; and continuous surveillance by appropriate institutions. This research supports the idea that online compliance systems should be designed to incorporate both human-centric ethical knowledge and digital governance mechanisms to ensure ethical standards are maintained. The results of this research will add to the current discourse concerning ethics in engineering practice in digitally mediated settings and provide practical advice to engineers, regulators, and developers of systems that implement online compliance.*

Keywords: *Engineering Ethics, Ethical Awareness, Ethical Practices, Online Compliance Systems, Online Compliance Platforms, Engineering Professionals*

I. INTRODUCTION

The rapid advancement of digital technology has transformed engineering compliance processes, shifting from traditional manual systems to online platforms for licensing, reporting, documentation, and regulatory transactions. In Cabanatuan City, these online compliance systems are increasingly adopted to enhance efficiency and accessibility, yet they also introduce ethical concerns that extend beyond technical performance. Issues of data integrity, confidentiality, transparency, system reliability, and accountability have become more pronounced as engineers rely on automated platforms where errors, security risks, or unclear guidelines may affect professional judgment.

Global scholarship reinforces these concerns. Recent studies highlight that digital transformation in engineering requires updated ethical frameworks that prioritize accountability, transparency, and responsible innovation, particularly in areas such as AI governance, data privacy, and algorithmic decision-making (Kamal et al., 2025). Zhao, Hwang, and Lee (2022) likewise demonstrate how digital technologies significantly associated with ethics and compliance in construction projects, highlighting risks and

responsibilities that parallel the local context. Engineering education literature further emphasizes that ethics is now a core component of engineering practice, extending beyond traditional concerns such as safety and efficiency to include responsible data handling, system reliability, and digital integrity (Tripon, 2025). Complementing these perspectives, Mirghaderi et al. (2023) argue that organizations must integrate technical safeguards with ethical governance and training to ensure transparency, accountability, and stakeholder protection in digital environments.

Additional studies also support the importance of ethical governance in digital systems. The study "Assessment of the Construction Management Challenges of Mechanical, Electrical/Electronics, Plumbing, Fire Protection and Sanitary (MEPFS) Projects" emphasized that communication systems, monitoring mechanisms and technological adaptability are critical in ensuring transparency, efficiency and compliance in engineering projects (Dayrit, Manalang, Mallari, Florencondia & Pascual, 2025). Similarly, "The Impact of Digital Leadership on Enhancing Water Resources Management Efficiency: A Case Study of NIA-UPRIIS Division II" found that digital leadership strengthens accountability, coordination and organizational efficiency through the responsible use of digital technologies (Balagtas & Mallari, 2025). These findings suggest that ethical online compliance practices rely not only on technical systems but also on responsible leadership and governance.

Local studies reveal gaps in ethical preparedness. Cabual and Villar (2025) underscore the importance of regulatory awareness and compliance among engineers in Cabanatuan, highlighting the relevance of examining ethical dimensions in professional practice. Earlier research in the Philippines, such as Belino (1998) and Abellana & Yoshida (2014), identified inadequacies in ethics education and mismatches between academic training and industry needs, pointing to weak ethical foundations among engineering graduates. More recent work by Tamayo (2026) introduced a Digital-Ethical framework for faculty in state universities, emphasizing the role of ethical awareness, AI literacy, and institutional support in shaping responsible digital practices. Professional codes further reinforce this ethical imperative. The National Society of Professional Engineers (NSPE), through its Code of Ethics for Engineers, emphasizes confidentiality, competence, and ethical documentation in professional practice (National Society of Professional Engineers, 2019). Likewise, the Institute of Electrical and Electronics Engineers (IEEE) Code of Ethics highlights honesty, accountability, public welfare, and the responsible use of new technologies. All four areas apply directly to online compliance platforms, underscoring that ethical awareness and responsible decision-making applies to local or academic concerns and integral to internationally recognized standards of engineering practice. (Institute of Electrical and Electronics Engineers, 2006)

Despite these insights, there remains limited localized research on how engineering ethics is practiced within online compliance environments, particularly in terms of ethical awareness, actual ethical behavior, and challenges encountered by professionals. Addressing this gap, the present study examines engineering ethics in the digital era by assessing awareness, application, and perceived challenges among engineering professionals in Cabanatuan City. By integrating global frameworks with local realities, the study aims to provide context-specific insights that strengthen ethical compliance and promote responsible use of digital systems.

In response to this research gap, the present study examines the ethical awareness, ethical compliance practices, and ethical challenges of engineering professionals in Cabanatuan City when engaging with online compliance systems. Specifically, the study determines the level of ethical awareness in online compliance, assesses compliance practices including accuracy, honesty, accountability, responsibility, and consideration of public welfare, identifies common challenges such as data integrity, security, confidentiality, and system reliability, and analyzes the relationship between ethical awareness and compliance practices in online platforms. The findings aim to propose measures that strengthen ethical compliance in the digital era and provide evidence-based insights that can guide engineering professionals, managers, and policymakers in enhancing ethical standards within online compliance systems.

II. METHODOLOGY

2.1 Research Design

This study will utilize a descriptive–correlational research design. The descriptive component will be employed to determine the current level of ethical awareness, ethical practices, and the challenges encountered by engineering professionals in the use of online compliance systems. Through this approach, the study will present a clear profile of how ethics is observed in online compliance environments within Cabanatuan City.

The correlational component will be applied to examine the relationship between ethical awareness and ethical compliance practices. By analyzing whether higher levels of awareness are associated with stronger ethical application, the study will provide empirical evidence on how knowledge of ethics influences professional conduct in digital platforms.

The design allows the systematic collection of quantifiable data through a structured questionnaire, followed by statistical analysis to describe patterns and test relationships. This combination ensures that the study captures both the breadth of ethical issues in online compliance and the linkages between awareness and practice, thereby producing findings that are both descriptive and explanatory.

2.2 Population and Sample of the Study

The population of this study consisted of engineering professionals in Cabanatuan City who are directly involved in compliance processes within the construction industry. These include civil engineers and electrical engineers whose professional responsibilities require interaction with online compliance platforms.

Given the absence of an exact population size for engineering professionals actively engaged in online compliance in the locale, the researchers employed purposive sampling. This sampling technique was deemed appropriate to ensure that only qualified respondents with relevant experience in construction and exposure to online compliance systems were included in the study.

A total of forty (40) respondents were selected to participate, representing diverse roles within the construction sector. This sample size was considered adequate to capture varied perspectives while maintaining focus on individuals most directly engaged in ethical decision-making in online compliance environments. The selection of respondents was guided by their professional qualifications, years of experience, and frequency of exposure to online compliance systems, thereby ensuring the validity and reliability of the data gathered.

Table 1. Distribution of Respondents

Professional Role	Frequency (n)	Percentage (%)
Civil Engineer	35	87.50
Electrical Engineer	5	12.50
Total	40	100

2.3 Research Instruments

The primary instrument used in this study was a structured survey questionnaire developed by the researchers to assess ethical awareness, ethical practices, data integrity, ethical challenges, and measures to strengthen compliance in digital environments. The questionnaire was divided into five parts, each aligned with the research questions: (1) Ethical Awareness, (2) Ethical Compliance Practices, (3) Data Integrity, Security, and Confidentiality, (4) Ethical Challenges in Online compliance, and (5) Strengthening Ethical Compliance.

The instrument employed a five-point Likert scale (5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, 1 – Strongly Disagree) to quantify respondents' perceptions and experiences. This scaling method was chosen to capture the degree of agreement or disagreement with each statement, thereby allowing for statistical analysis of trends and relationships.

To evaluate the reliability of the research tool's measurement properties with respect to the survey instrument's internal consistency, Cronbach's alpha was examined. Cronbach's alpha has been frequently utilized in assessing the internal consistency of Likert scale surveys. The level at which an individual item correlates with other items in a set (Nunnally & Bernstein, 1994) is assessed via this method. For most research applications, an acceptable threshold for this measure is 0.7 or greater. The overall

reliability result indicates that the research instrument is suitable for use in analyzing engineers' ethical awareness and ethical practices in a digital environment.

The questionnaire also included a Respondent Profile section to gather demographic data such as years of experience in construction, and frequency of exposure to online compliance systems. These variables provided additional context for interpreting the results and identifying patterns across different respondent groups.

2.4 Data Analysis

The data gathered from the accomplished questionnaires were encoded and organized for statistical processing. Appropriate quantitative statistical tools were employed to analyze and interpret the responses of the participants. Frequency count and percentage distribution were used to summarize the demographic profile of the respondents. Weighted mean and standard deviation were utilized to describe the level of ethical awareness, ethical practices in a digital environment, ethical issues encountered, and strategies for improving ethical compliance among engineers.

Pearson's product moment correlation coefficient (Pearson's r) was employed to determine the existence, direction, and strength of the relationship between ethical awareness and ethical practices in a digital environment. Although the data were collected using a five-point Likert scale, the composite mean scores derived from multiple items were treated as interval-level data. This practice is widely accepted in social science research when Likert-scale items are aggregated, thereby allowing the application of parametric statistical techniques such as Pearson's correlation coefficient. Pre-analysis screening was conducted to ensure that the data were suitable for correlation analysis.

Table 2. Descriptive Ranges for Weighted Mean Interpretation

Strongly Agree	4.21-5.00
Agree	3.41-4.20
Neutral	2.61-3.40
Disagree	1.81-2.60
Strongly Disagree	1.00-1.80

2.5 Scope and Limitations

This study focuses on engineering professionals in Cabanatuan City and examines their ethical awareness, practices, and challenges in online compliance systems through a structured questionnaire. It is limited to localized respondents selected through purposive sampling, and findings are based on self-reported data which may be subject to bias. Broader contexts, advanced compliance technologies, and long-term monitoring are beyond the scope of this research.

2.6 Ethical Considerations

The study adhered to ethical standards throughout its conduct. Participation was voluntary, with informed consent obtained from all respondents prior to data collection. No personal identifiers were recorded, and all responses were kept strictly confidential. The data were used exclusively for academic purposes and managed in compliance with the Data Privacy Act of 2012 (Republic Act No. 10173) of the Philippines (Republic Act No. 10173, 2012) Zho.

III. RESULTS AND DISCUSSION

The results and a discussion of the data collected through surveys with engineering professionals in Cabanatuan City on ethical awareness, ethical practice, ethical challenge and how ethics can be enhanced in online compliance systems will be discussed in this chapter. Quantitative surveys use descriptive statistical methods to express findings by means of frequency and percent, mean, and standard deviation to show patterns in response. Additionally, in correlation studies, researchers investigate relationships among variables when they have no control over the variables (Creswell, 2014).

The data were collected by using a structural questionnaire with measurements that utilized a five-point Likert scale which ranged from "Strongly Agree" to "Strongly Disagree". Descriptive ranges for interpreting mean scores were found within the methodology section. Statistical results presented in this chapter, along with all other statistical results described in this chapter, are based upon responses from forty (40) engineering professionals.

3.1 Demographic Profile of the Respondents

The demographic data for participants in this study provides some background information that can help explain how the study's results should be interpreted. It is very common in all types of survey research for researchers to describe the demographic profiles of their participants because it helps to clarify who your participants were, and therefore where the results fit into a well-defined profession (Creswell, 2014). As such, the demographics used in this study; i.e., professional role, number of years of experience, and amount of time exposed to a online compliance system relate directly to both ethical awareness and professional practices in digital environments.

3.1.1 Years of Experience

Table 3. Years of experience of Respondents (n = 40)

Years of Experience	Frequency (n)	Percentage (%)
1-3 years	17	42.50
4-6 years	7	17.50
7-10 years	13	32.50
10+ years	3	7.50
Total	40	100

Most respondents were in the 1–3 years group (42.50%), followed by 7–10 years (32.50%). This indicates that the dataset reflects both early-career and mid-career perspectives on ethical practice and online compliance.

3.1.2 Exposure to Online Compliance System

Table 4. Exposure to Online compliance Systems (n = 40)

Exposure	Frequency (n)	Percentage (%)
Rarely	10	25
Occasionally	19	47.50
Frequently	11	27.50
Total	40	100

Almost half of the respondents reported occasional exposure (47.50%), while 27.50% had frequent exposure. This supports that many respondents have regular encounters with online compliance processes, strengthening the relevance of their responses to online compliance practice.

3.2 Reliability of the Research Instrument

The internal consistency of the survey questionnaire was evaluated using Cronbach's alpha to determine the reliability of the instrument. Cronbach's alpha is a commonly used reliability statistic for Likert-type scales and indicates how consistently a set of items measures a particular construct (Cronbach, 1951; Nunnally & Bernstein, 1994).

Table 5. Cronbach's Alpha Reliability Coefficients

Construct	Number of Items	Cronbach's Alpha
Ethical Awareness	5	0.81
Ethical Practices	5	0.82
Ethical Challenges	5	0.80
Strengthening Ethical Compliance	5	0.86
Overall Instrument	20	0.94

All constructs obtained Cronbach's alpha values exceeding the acceptable threshold of 0.70, indicating satisfactory to excellent internal consistency. The overall instrument yielded a Cronbach's alpha of 0.94, which reflects excellent reliability. These results confirm that the questionnaire consistently measured the ethical constructs examined in the study.

3.3 Ethical Awareness in Online Compliance System

Ethical awareness refers to respondents' understanding and recognition of ethical responsibilities and ethical risks while using online compliance systems.

Table 6. Ethical Awareness of Engineering Professionals Regarding Online Compliance System

Statement	Weighted Mean	Verbal Description
1. I am aware of the ethical responsibilities expected by engineers when using online compliance systems.	4.23	Strongly Agree
2. I understand how engineering codes of ethics	4.20	Agree

apply to digital or online transactions.		
3. I am familiar with ethical issues related to handling digital data in compliance systems.	3.93	Agree
4. I recognize that ethical responsibility remains important even when processes are automated.	4.40	Strongly Agree
5. I am aware that ethical violations can occur during online compliance activities.	4.23	Strongly Agree
Composite Mean	4.20	Agree

Table 6 presents the respondents' level of ethical awareness in relation to online compliance systems. The composite mean of 4.20 with a verbal description of "Agree" indicated that engineering professionals generally possess a high level of awareness regarding ethical responsibilities in online compliance practice. Among the indicators, the statement "I recognize that ethical responsibility remains important even when processes are automated" obtained the highest weighted mean of 4.40, interpreted as "Strongly Agree". This suggests that respondents understand that automation does not eliminate professional accountability and ethical obligations.

Most participants expressed a strong sense of how their ethical obligations apply to online compliance. The highest level of consensus is based on an understanding that as automation enters many of the compliance processes (and others), an individual's professional accountability should continue to exist.

While it appears most respondents are aware of ethical concerns associated with the use of digital data, the relatively low mean for familiarizing oneself with ethical issues related to handling digital data suggests there could be a knowledge gap; while some individuals were knowledgeable about general ethical issues relative to digital data, fewer have developed the level of knowledge necessary regarding specific digital data ethics concerns. Training programs specifically addressing the ethics of digital data may help fill this gap.

3.4 Ethical Compliance Practices in Online Compliance Platforms

Ethical practice reflects the actual behaviors and professional conduct respondents report while engaging in online compliance—such as accuracy, honesty, responsibility, and public welfare considerations.

Table 7. Ethical Compliance Practices of Engineering Professionals in Online Compliance Platforms

Statement	Weighted Mean	Verbal Description
1. I ensure that all information I submit through online compliance systems is accurate and complete.	4.35	Strongly Agree
2. I follow ethical standards even when online systems have minimal supervision.	4.40	Strongly Agree
3. I take personal responsibility for mistakes made during online submissions.	4.40	Strongly Agree
4. I act honestly and ethically when using online compliance platforms.	4.38	Strongly Agree
5. I consider public safety and welfare when completing engineering compliance requirements online.	4.48	Strongly Agree
Composite Mean	4.40	Strongly Agree

The table 7 shows the respondents' ethical practices in online compliance systems. The composite mean of 4.40 with a verbal description of "Strongly Agree" indicates that respondents highly practice ethical behavior when engaging in online compliance activities. The highest weighted mean of 4.48 was obtained by the statement "I consider public safety and welfare when completing engineering compliance requirements online," which reflects the respondents' strong commitment to the fundamental ethical principle of prioritizing public welfare in engineering practice.

The results also reveal a strong consensus with regard to the frequency at which respondents engage in ethically correct

behavior when performing online compliance activities, including but not limited to verifying the accuracy and completeness of their submissions, as well as assuming accountability for errors. Additionally, it is significant that respondents stated they would be willing to place a very high priority on protecting public health and welfare while complying with online compliance requirements, suggesting that the core ethics of professionalism are still evident in digital settings.

3.5 Ethical Challenges in Online Compliance Systems

Ethical challenges refer to perceived difficulties that hinder ethical compliance in digital systems—such as unclear guidelines, technical issues, data accuracy concerns, and reduced accountability due to automation.

Table 8. Ethical Challenges Encountered by the Engineering Professionals Regarding Online Compliance Systems

Statement	Weighted Mean	Verbal Description
1. I encounter ethical concerns related to data accuracy in online compliance platforms.	3.70	Agree
2. Technical issues in digital systems sometimes affect ethical compliance.	4.08	Agree
3. Unclear system guidelines make ethical decision-making more difficult.	4.20	Agree
4. The use of automated systems can reduce personal accountability in compliance processes.	4.05	Agree
5.Maintaining ethical standards is more challenging in online compliance than in manual processes.	3.90	Agree
Composite Mean	3.99	Agree

The table 8 presents the ethical challenges encountered by respondents in online compliance systems. The composite mean of 3.99 with a verbal description of "Agree" indicates that respondents generally experience ethical difficulties and concerns while using online compliance platforms. The statement "Unclear system guidelines make ethical decision-making more difficult" obtained the highest weighted mean of 4.20, suggesting that ambiguity in digital system procedures can significantly affect ethical judgement and decision-making among engineering professionals.

The majority of respondents agree that there are ethical challenges associated with online compliance. Greater agreement among items concerning ambiguous system rules and technical complications hindering compliance indicates that ethics in the workplace cannot solely be the individual's responsibility. Ethics requires both the individual to take responsibility as well as for the organization to provide clarity through systems and to provide adequate support. There was an indication from this study that automation could possibly lead to reduced accountability, therefore, the perception exists that when systems automate users will utilize the platform so heavily they will lose their sense of responsibility, unless organizations implement measures or provide guidance to promote user accountability.

3.6 Relationship Between Ethical Awareness and Ethical Compliance Practices in Online Compliance Platforms

Pearson correlation analysis was conducted to determine the relationships between ethical awareness and ethical compliance. The results are presented in Table 9.

Table 9. Correlation Between Ethical Awareness and Ethical Compliance Practices in Online Compliance Platforms

Variable Pair	Pearson r	p-value	Interpretation
Ethical Awareness ↔ Ethical Compliance Practices	0.67	< .01	Moderately Strong Positive, Significant

The relationship between ethical awareness and ethical practices was examined using Pearson's correlation coefficient. Results revealed a correlation value of $r = 0.67$ with a p-value = 0.000002 at $n = 40$, indicating a statistically significant and moderately strong positive relationship between the two variables. This suggests that higher levels

of ethical awareness among engineering professionals are associated with stronger adherence to ethical practices in online compliance environments.

The findings imply that awareness of ethical responsibilities does not remain theoretical but translates into actual professional conduct. Respondents who demonstrated greater recognition of ethical principles were more likely to report accuracy, accountability, and responsibility in their online compliance activities. This supports the notion that ethical awareness serves as a foundation for ethical practice, reinforcing the importance of continuous ethics training and awareness-building initiatives to sustain professional integrity in digital systems.

3.7 Strengthening Ethical Compliance in Online Compliance Platforms

This section presents respondents' recommended measures to strengthen ethical compliance, combining human-centered interventions and system-level improvements.

Table 10. Strategies for Strengthening Ethical Compliance in Online Compliance Platforms

Statement	Weighted Mean	Verbal Description
1. Engineers should receive regular ethical training related to online compliance systems.	4.35	Strongly Agree
2. Online compliance platforms should include features that promote ethical accountability.	4.43	Strongly Agree
3. Clear ethical guidelines should accompany all online compliance systems.	4.33	Strongly Agree
4. Regulatory bodies should actively monitor ethical practices in online compliance.	4.28	Strongly Agree
5. Improving ethical awareness leads to more responsible use of digital platforms.	4.48	Strongly Agree
Composite Mean	4.37	Strongly Agree

The table 10 illustrates the respondents' perceptions regarding measures to strengthen ethical compliance in digital systems. The composite mean of 4.37 with a verbal descripting of "Strongly Agree" indicates strong support among respondents for initiatives aimed at improving ethical practices in online compliance platforms. The highest weighted mean of 4.48 was obtained by the statement "Improving ethical awareness leads to more responsible use of digital platforms" highlighting the respondents' belief that increased ethical awareness contributes significantly to responsible digital behavior.

Respondents showed strong support for a variety of enhanced approaches to create an environment of accountability, including Regular Ethics Training, Clear Ethical Guidelines and Platform Features which promote Accountability.

Further, respondents also indicated that they would like regulatory agencies to monitor their activity on the platforms.

The results from this survey indicate that supporting ethics and online compliance can be achieved through two primary avenues;
(1) Competence and Awareness-Building, and
(2) System Design and Governance Mechanisms, which provide clarity in expectations of users.

IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

4.1 Summary of Findings

This study has looked at Engineering Ethics within the Digital Age by evaluating ethical awareness, ethical practice, ethical challenges and means of improving/developing the ability to adhere to ethical standards by engineers in Cabanatuan City using survey-based descriptive statistics.

Likert-type scales are one type of scale for assessing attitude/perception using structured response. (Koo & Yang, 2025)

The key findings are summarized below:

1. Ethical Awareness was high, with a composite mean of 4.20 (Agree), indicating that respondents generally recognize ethical responsibilities in online compliance, particularly the continued importance of ethics despite automation.
2. Ethical Practices obtained a composite mean of 4.40 (Strongly Agree), reflecting strong self-reported ethical conduct such as accuracy, honesty, accountability, and prioritization of public welfare in online compliance.
3. Ethical Challenges were also acknowledged (composite mean 3.99, Agree), especially challenges related to unclear guidelines, technical issues, and perceived accountability risks in automated environments.
4. The Correlation Analysis between Ethical Awareness and Ethical Practices yielded a Pearson's r of 0.67 ($p = 0.000002$), indicating a statistically significant and moderately strong positive relationship. This confirms that higher ethical awareness among engineering professionals is associated with stronger ethical practices in online compliance environments.
5. Strengthening Ethical Compliance received strong support (composite mean 4.37, Strongly Agree), emphasizing ethics training, clearer guidelines, accountability features, and active monitoring as key measures.

4.2 Conclusions

Based on the findings, the following conclusions are drawn:

A. Engineering professionals in Cabanatuan City demonstrate high ethical awareness in online compliance environments, particularly acknowledging that ethical responsibility remains essential even when processes are automated.

B. Respondents report strong ethical practices in online compliance, showing that professional integrity and responsibility are maintained in online compliance activities.

C. Ethical challenges remain present in online compliance systems, with respondents recognizing that unclear guidelines, technical issues, and automation-related accountability concerns can hinder ethical compliance.

D. The correlation analysis confirmed a statistically significant and moderately strong positive relationship ($r = 0.67$, $p < 0.001$) between ethical awareness and ethical practices. This demonstrates that greater awareness of ethical responsibilities directly supports stronger ethical conduct in online compliance, reinforcing the importance of awareness-building as a foundation for professional integrity.

E. Respondents strongly believe ethical compliance can be strengthened through combined interventions—training and awareness development, clearer system guidelines, accountability-supporting platform design, and consistent regulatory monitoring.

4.3 Recommendations

To strengthen ethical compliance in digital systems, the following recommendations are proposed:

1. For Engineering Professionals: Participate in regular ethics training that focuses specifically on online compliance risks (data handling, integrity, confidentiality, and accountability in automated workflows).
2. For Regulatory Bodies: Provide clearer and standardized online compliance guidelines and reinforce monitoring mechanisms to reduce ambiguity and improve accountability.
3. For System Developers/Platform Implementers: Integrate accountability features such as clearer instructions, confirmation checkpoints, and traceable submission logs to support ethical compliance behavior in the platform itself.
4. For Organizations/Project Managers: Reinforce compliance checklists and ethical reminders during digital submissions to ensure professionals maintain personal responsibility even when systems are automated.
5. For Future Researchers: Include age as a demographic variable and expand respondents to more engineering disciplines to strengthen generalizability and allow subgroup comparisons across experience and exposure levels.

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