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Digitalization of DepEd Camarines Norte: Challenges and Opportunities

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Abstract

Aim: This study described DepEd Camarines Norte in terms of mandates, number of schools, teaching and non-teaching personnel, learners, and budget; identified the challenges and opportunities in digitalization encountered along manpower, facilities (software and hardware); determined the level of readiness for digitalization along manpower, structure, processes and technology; and proposed an action plan to assist DepEd Camarines Norte's digitalization initiative.

Methodology: The study employed a descriptive survey method and used a pre-tested survey questionnaire to gather the desired primary data. Likewise, documentary analysis was used for the secondary data. It had total respondents of 210 SDO personnel and school heads from the 14 districts and were selected using purposive sampling. The data were analyzed using descriptive statistics.

Results: DepEd Camarines Norte operates under strong legal frameworks to ensure quality education, focusing on curriculum, teacher training, infrastructure, and financial management, while promoting technology and innovation aiming on digitalization efforts with its 319 schools and 185,068 learners. The budget steadily increased from Php 1.87 billion in 2017 to over Php 3.22 billion in 2024 yet combined ICT-related and DCP budget only accounted for approximately 0.668% of the total budget. Challenges identified are limited ICT funding, staff shortages, and equipment constraints. The Division shows readiness for digital adoption but needs improvements in IT staffing and infrastructure. Key opportunities include enhancing productivity through digital tools, streamlining workflows, and improving maintenance.

Conclusion: DepEd upholds quality education and services aligned with its mandates. DepEd Camarines Norte faces challenges despite adequate resources and partnerships. The budget grew, but ICT funding remains low, requiring greater prioritization. Challenges include health impacts from ICT use, limited IT staff, lack of computers and peripherals, and insufficient management support. Opportunities comprise of productivity improvements, digital focus in hiring process, online information dissemination, and better hardware maintenance. While the Division is mostly ready for digitalization, IT staffing and infrastructure need improvement. The proposed action plan outlines various activities that could potentially be taken into consideration to assist DepEd Camarines Norte achieve its digitalization objectives.

Keywords: digitalization, challenges and opportunities, level of readiness, information and communications technology

INTRODUCTION

Digitalization involves utilizing digital technologies to transform business models, generate new revenue streams, and create value. This process incorporates digital tools and systems into various corporate functions, such as management, communication, production, and customer service. Employing Information and Communications Technology (ICT), digitalization provides new management opportunities and solutions to organizational problems.

One of the objectives of the present administration in the Philippine government is to fully embrace digitalization. This is aligned with the Republic Act No. 11927 known as the "Philippine Digital Workforce Competitiveness Act". It aims to enhance the competitiveness of the Philippine digital workforce by establishing an



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inter-agency council dedicated to its development. Recognizing the rapid digitalization and technological advancements such as AI and automation across various industries, the State seeks to improve the skills of the Philippine workforce in digital technology and innovations. The State ensures that all Filipino workers have access to digital skills and competencies that meet global standards, promoting digital innovations and entrepreneurship. In collaboration with private stakeholders, the State provides the necessary infrastructure and undertake upskilling, reskilling, and training programs to prepare the workforce for employability and competitiveness in the Fourth Industrial Revolution.

Education stands to benefit significantly from digitalization, and the Department of Education (DepEd) has been an early adopter of ICT to enhance management and governance in basic education. DepEd's ICT infrastructure includes a main website (www.deped.gov.ph), DepEd E-Saliksik, regional websites, a single internally administered Domain Name System (DNS), 12 cloud-hosted, internet-capable database systems monitored by two staff members, and active social media presence on Facebook, Twitter, Instagram, LinkedIn, and TikTok. The ICT Service, led by a Director, oversees technology infrastructure, solutions development, and user support, along with regional ICT units. However, key positions such as Chief Information Officer (CIO), Chief Technology Officer (CTO), Database Administrator, Systems Administrator, and Information Security Officer are not formally designated, with their roles filled by 31 personnel across six ICT-related job titles. Additionally, while online help desks are available, they do not operate 24/7.

DepEd Order No. 016, s. 2023, titled "Revised Guidelines on the Implementation of the Department of Education Computerization Program (DCP)," outlines initiatives aimed at equipping public schools and DepEd offices with quality technology to enhance teaching, learning, governance, and operational procedures in the modern era. The objectives of the DCP encompass providing computer laboratory and smart TV packages to all public schools, furnishing necessary software, hardware, and training to DepEd personnel, establishing ICT infrastructure in schools and offices, and enhancing the ICT competencies of learners, teachers, and staff. These actions aim to ensure equitable access to technology and strengthen digital capabilities across the educational system.

The DepEd is actively promoting the Digital Rise Program as a significant initiative to address educational quality issues through digitalization. This program focuses on enhancing education through technological infrastructure, software, and capacity training for both teachers and learners, emphasizing the importance of improving digital literacy skills. Likewise, administrators and non-teaching personnel in DepEd Camarines Norte are utilizing computer systems, devices, and the internet to efficiently and accurately accomplish tasks, enhancing overall productivity within the organization.

DepEd Camarines Norte has adopted various technological advancements per directives from Central and Regional Offices. The Division uses systems and applications like the Learning Resource Management and Development System (LRMDS), a free portal for teaching and learning resources. The Budget and Accounting Section uses the Budget Monitoring System (BMS) for budget tracking and the Electronic Financial Reporting System (eFRS) for financial statements. Project L.A. (Liquidation Assistance), an Excel VBA innovation which automates financial reporting and simplifies the generation of the Summary of Expenditures (SOE), Cash Disbursement Register (CDR), and Liquidation Report (LR). The Document Tracking System (DoTS) aids the Records Section and other units in document management, while the Planning Section uses the Learner Information System (LIS) to manage learner credentials, fostering transparency and informed decision-making. The Supply Section has minimized manual processes with the Electronic Asset Inventory and Management System (e-AIMS/S) for tracking supplies and equipment, in line with COA guidelines. The HR Section employs the Automated Personnel Information Management System (APIMS) for managing personnel data accessible via a mobile app. The Procurement Tracking Management System (PTS) digitizes procurement processes, ensuring compliance with Republic Act No. 9184 and COA regulations. In addition, the Attendance Monitoring System checks the attendance of SDO personnel through biometric inputs, records those on leave or travel, and generates attendance percentages. The e-Kiosk Express facilitates client transactions by queuing them according to sequence numbers and provides automatic generation of Certificates of Appearance through standalone kiosks located at the SDO front line.

Digitalization in the Division presents both opportunities and challenges. Key issues include malfunctioning DCP packages, limited ICT knowledge among personnel, and lack of IT positions. Digital initiatives require substantial budgets, and while SDO personnel collaborated with school staff to implement projects like APIMS and e-AIMSS, challenges remain in staff readiness, system maintenance, and data security. Currently, document retrieval is manual, requiring in-person visits to the SDO. To address these, this study was conducted to assess digital readiness and develop a digitalization action plan.



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Objectives

This study aimed to describe digitalization of DepEd Camarines Norte particularly the challenges and opportunities as basis for action plan formulation.

Specifically, it answered the following questions:

1. How may the DepEd Camarines Norte be described in terms of
 - 1.1 mandates;
 - 1.2 number of schools;
 - 1.3 number of teaching and non-teaching personnel;
 - 1.4 number of learners; and
 - 1.5 budget?
2. What are the challenges in digitalization encountered by DepEd Camarines Norte in terms of
 - 2.1 manpower; and
 - 2.2 facilities;
 - 2.2.1 software; and
 - 2.2.2 hardware?
3. What are the opportunities offered by digitalization to DepEd Camarines Norte in terms of
 - 3.1 manpower; and
 - 3.2 facilities;
 - 3.2.1 software; and
 - 3.2.2 hardware?
4. What is the level of readiness of DepEd Camarines Norte for digitalization in terms of
 - 4.1 manpower;
 - 4.2 structure;
 - 4.3 processes; and
 - 4.4 technology?
5. Based on the results of the study, what action plan may be formulated to assist DepEd Camarines Norte's digitalization initiative?

METHODS

Research Design

The study utilized a descriptive-survey method to address the study objectives.

Population and Sampling

Out of 459 total number of SDO personnel and school heads as of September, 2023, 210 were selected as sample respondents. The respondents of this study were SDO personnel and school heads from 14 districts, namely Capalonga, Jose Panganiban East and West, Labo East and West, Paracale, Sta. Elena, Basud, Daet North and South, Mercedes, San Vicente-San Lorenzo Ruiz, Talisay and Vinzons and selected using purposive sampling.

Instrument

For data gathering, documentary analysis was utilized in describing DepEd Camarines Norte such as its mandates, number of schools, number of teaching and non-teaching personnel, number of learners and budget. Furthermore, survey questionnaire was used as the research instrument. Prior to the survey's actual conduct and data collection, the trial run was conducted to evaluate the questionnaire's consistency, validity, and reliability. The researcher requested through a letter for five experts to evaluate the formulated survey questionnaire by using a validation tool. The results indicated a greater internal consistency and higher agreement between items.

Data Collection

The data were collected, reviewed, and analyzed in alignment with the study objectives and in strict adherence to all research protocols.



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Treatment of Data

In the data analysis phase, the researcher employed statistical tool. Weighted mean was used to identify the challenges encountered in and opportunities offered by digitalization in terms of manpower facilities, software and hardware, the level of readiness for digitalization in terms of manpower, structure, processes and technology.

Ethical Considerations

The researchers ensured that all research protocols involving ethics in research were complied with for the protection of all people and institutions involved in the conduct of the study.

RESULTS and DISCUSSION

Description of DepEd Camarines Norte

Mandates. The DepEd is guided by mandates from the 1987 Constitution, the Education Act of 1982, and the Governance of Basic Education Act of 2001, among other laws. These mandates ensure quality and accountability across educational institutions, requiring adherence to national standards for consistency. Under Article XIV of the Constitution, DepEd oversees free, compulsory K-12 education and strives to create a relevant curriculum that meets modern educational needs, including 21st-century skills (Official Gazette, n.d.). DepEd also focuses on teacher training, digital tool integration, and curriculum innovation to support national development and respond to evolving educational demands.

Number of Schools. The data provided were for the School Year (SY) 2023-2024 which totals to 319 elementary, secondary and integrated schools.

Number of Teaching and Non-Teaching Personnel. The DepEd Camarines Norte comprised 6,143 teaching, 270 teaching-related and 251 non-teaching personnel.

Number of Learners. The total enrollment across all classifications and levels of education was 185,068 learners.

Budget. The combined budget for ICT-related initiatives and the DCP accounts for approximately 0.668104% or 0.67% of the total Division budget from FY 2017 to May 31, 2024. This small percentage indicates limited investment in digital initiatives, which may not adequately address the growing demand for technology integration in the Division.

Challenges in Digitalization Encountered by DepEd Camarines Norte

Manpower. Table 1 shows the challenges in digitalization encountered along manpower. It further reveals that all of the respondents agree on the 9 out of 10 indicators, which results to an overall weighted mean of 2.92, interpreted as mostly challenging. In terms of manpower, the highest indicator is health issues from overusing ICT such as eye strain, headaches, neck and back pain, and sleep deprivation, which can negatively affect work performance and overall health, with a weighted mean of 3.30 construed as extremely challenging. On the other hand, the lowest weighted mean is the indicator declaring lack of support from main leaders/top management with a weighted mean of 2.50. The employees agree and it is inferred as mostly challenging for them.

The impact on well-being and job performance could include decreased productivity due to physical discomfort and mental fatigue, persistent health problems which can lead to increased absenteeism and job dissatisfaction due to the stress and discomfort associated with excessive ICT use. Strom (2021) found that daily technology use in schools increases student screen time, leading to potential health risks and learning impairments, with excessive screen exposure linked to negative health effects and learning deficits.

Table 1
 Challenges in Digitalization Encountered by DepEd Camarines Norte along Manpower

Indicators	Weighted Mean	Interpretation
1. Employees have inadequate knowledge and skills for digitalization initiatives which includes competencies and capabilities	2.83	MC
2. Resistance among employees in the use of ICT or utilization of new digital tools (negative attitude or due to age, position and years in service; relies on the old and manual processes/transactions; lack of engagement; inflexibility in adoption of digitalization)	2.81	MC



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3. Tendency to overwork (increased the splitting of the working tasks and working day and distorted the limit between personal and work life; struggle to disconnect from work even when inside the home)	3.02	MC
4. Non-availability of specialized or specific ICT positions with specifically defined competencies	3.13	MC
5. Lack of support from main leaders/top management	2.50	MC
6. Dependence on technology that can lead to lack of critical thinking and problem-solving skills, as well as a reduced ability to complete tasks without the aid of technology	2.81	MC
7. No provision of training programs for employees regarding digital literacy, bridging ICT skills gap and digitalization updates on a regular basis	2.90	MC
8. Employees are not aware of the new implemented system/application for streamlining of business processes or transactions (no proper information dissemination to the concerned personnel)	2.79	MC
9. Increasing demand for seamless processes, quick response times, and optimal service	3.12	MC
10. Health issues from overusing ICT such as eye strain, headaches, neck and back pain, and sleep deprivation, which can negatively affect work performance and overall health	3.30	EC
Over-all Weighted Mean	2.92	MC

Rating Scale:

3.25 – 4.00 (Strongly Agree)	-	<i>Interpretation:</i>
2.50 – 3.24 (Agree)	-	Extremely Challenging (EC)
1.75 – 2.49 (Disagree)	-	Mostly Challenging (MC)
1.00 – 1.74 (Strongly Disagree)	-	Mostly Not Challenging (MNC)
		Not Challenging at All (NCA)

On the other hand, it appears that the majority believe that it is less challenging when top management or other leaders provide the necessary support. Velinov et al. (2020) affirmed that the traits of the top management team (TMT), and in particular the senior management's understanding of and proficiency with digitalization, are crucial for fostering success in global marketplaces and ensuring the long-term viability of an organization.

Facilities. Tables 2 and 3 present the challenges encountered along facilities, categorized into software and hardware.

- **Software.** In terms of software, the majority of employees agree on the indicators provided with an overall weighted mean of 3.05, interpreted as mostly challenging. This means that the employees indeed view software facilities as a one of the challenges in digitalization. Referencing from the table below, the first indicator which acquired the highest weighted mean is the inability to procure or develop needed programs/systems/applications due to limited resources, equivalent to 3.24, inferred as mostly challenging. The indicator stating that no internet connection was established due to high rate or location obtained the lowest weighted mean which is equal to 2.74, deemed to be mostly challenging.

Table 2
Challenges on Digitalization Encountered by DepEd Camarines Norte along Software Facility

Indicators	Weighted Mean	Interpretation
1. No internet connection established due to high rate or location	2.74	MC
2. Disruption of internet access or signal receptions for telecommunications	3.13	MC
3. Slow loading of the web-based system/application due to poor performance of the server	3.23	MC
4. Cybersecurity threats or virus threats in the use of programs or applications installed in the computers or via web-browsing	3.14	MC
5. Non-availability of the required software/program	3.06	MC
6. Difficulties in familiarization due to updates in Operating System of computers (e.g., Windows) and complex interfaces of programs/applications	3.07	MC
7. No established data security and privacy (data security protects information from unauthorized access, use, disclosure, disruption, modification, or destruction; data privacy is the right to control)	3.12	MC
8. Unable to procure or develop needed programs/systems/applications due to limited resources	3.24	MC
9. The agency's website is not maintained regularly	2.91	MC
10. Do not use online data storage for backup purposes	2.83	MC



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Over-all Weighted Mean	3.05	MC
<i>Rating Scale:</i>		
3.25 – 4.00 (Strongly Agree)	-	<i>Interpretation:</i>
2.50 – 3.24 (Agree)	-	Extremely Challenging (EC)
1.75 – 2.49 (Disagree)	-	Mostly Challenging (MC)
1.00 – 1.74 (Strongly Disagree)	-	Mostly Not Challenging (MNC)
		Not Challenging at All (NCA)

Due to budgetary constraints, the majority of employees asserted that it is usually challenging when unable to acquire or develop needed programs/systems/applications. Kuang et al. (2023) emphasized that all facets of corporate development are impacted by the global issue of financing constraints. As such, financial limitations must be taken into account while designing the research program on how digitalization affects company performance.

Having no internet connection due to high rate or location is inferred as another difficulty but in a lesser degree. This is because some schools are in the remote areas or even on islands while majority are in the central town areas. Esteban and Cruz (2021) found a digital divide among students during the pandemic, influenced by residence, income, and parental education. Similarly, Abdulrahman and Onuoha (2019) noted high internet costs as a barrier for students accessing e-libraries, highlighting affordability challenges.

• **Hardware.** Table 3 shows that the employees agree on the 9 out of 10 indicators of challenges on digitalization along hardware facilities. These ten indicators indicated below obtained an overall weighted mean of 3.09, regarded as mostly challenging. In addition, the highest weighted mean equivalent to 3.32 is the insufficiency of ratio of available computers/laptops to the personnel, interpreted as extremely challenging. On the other hand, the indicator stating the non-availability of commonly used peripherals such as wired or wireless mouse, keyboard, speakers and printers gained the lowest weighted mean of 2.69, understood as mostly challenging.

Table 3
 Challenges on Digitalization Encountered by DepEd Camarines Norte along Hardware Facility

Indicators	Weighted Mean	Interpretation
1. Failure to review warranty terms resulting in unexpected repair costs	3.01	MC
2. The available ICT equipment is not in optimum condition	3.20	MC
3. Insufficient ratio of available computers/laptops to the personnel	3.32	EC
4. Hardware exposure to harsh environmental conditions, such as temperature and humidity causing damage	3.17	MC
5. There are no available external data storage devices for backup purposes	2.89	MC
6. Tend to experience load shedding (deliberate shutdown of electric power in a part or parts of a power-distribution system, generally to prevent the failure of the entire system when the demand strains the capacity of the system)	3.14	MC
7. Lack of scalability (procuring hardware that does not easily scale with the institution's growth, leading to future limitations)	3.14	MC
8. General slowdown due to low specifications of hardware	3.20	MC
9. Non-availability of peripherals (wired or wireless mouse, keyboard, speaker and printers)	2.69	MC
10. Failure to incorporate robust security features in the hardware, leading to potential vulnerabilities	3.15	MC
Over-all Weighted Mean	3.09	MC

<i>Rating Scale:</i>		
3.25 – 4.00 (Strongly Agree)	-	<i>Interpretation:</i>
2.50 – 3.24 (Agree)	-	Extremely Challenging (EC)
1.75 – 2.49 (Disagree)	-	Mostly Challenging (MC)
1.00 – 1.74 (Strongly Disagree)	-	Mostly Not Challenging (MNC)
		Not Challenging at All (NCA)

On the other hand, another minor problem agreed by the employees is the unavailability of peripherals such as wired or wireless mouse, keyboard, speaker and printers. This is interpreted as a minimal issue for the employees as computer peripherals are commonly provided upon delivery of ICT equipment.

Opportunities Offered by Digitalization to DepEd Camarines Norte

Manpower. Table 4 discloses that employees strongly agree on 9 out of 10 indicators which produced an overall weighted mean of 3.41, interpreted as extremely favorable. The highest indicator with a weighted mean of 3.50 known as extremely favorable is the improvement of productivity in work performance. Meanwhile, the redevelopment



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of hiring process with an emphasis on relevant digital capabilities that fit with the strategy acquired the lowest weighted mean of 3.23, taken as mostly favorable.

Table 4
 Opportunities Offered by Digitalization to DepEd Camarines Norte along Manpower

Indicators	Weighted Mean	Interpretation
1. Redeveloping the hiring process with an emphasis on relevant digital capabilities that fit with the strategy	3.23	MF
2. Improving operational efficiency by automating processes and operations while reducing human errors	3.38	EF
3. Reducing turnaround time in transactions	3.37	EF
4. Improving productivity in work performance	3.50	EF
5. Enhancing connectivity between employees and clients related to transactions	3.45	EF
6. Improving work-related communication among employees	3.45	EF
7. Providing flexibility in working hours	3.36	EF
8. Improving learning and development programs in relevance to digitalization	3.44	EF
9. Requesting of additional specific ICT positions with specifically defined competencies	3.44	EF
10. Enhancing client satisfaction and experience	3.45	EF
Over-all Weighted Mean	3.41	EF

Rating Scale:
 3.25 – 4.00 (Strongly Agree) -
 2.50 – 3.24 (Agree) -
 1.75 – 2.49 (Disagree) -
 1.00 – 1.74 (Strongly Disagree) -

Interpretation:
 Extremely Favorable (EF)
 Mostly Favorable (MF)
 Mostly Not Favorable (MNF)
 Not Favorable at All (NFA)

Meanwhile, the employees agree that redeveloping the hiring process with an emphasis on relevant digital capabilities that fit with the strategy could be mostly favorable. This agreement indicates employees understood the value of digital skills in the modern workplace and the possible effects of recruiting people with these talents on the efficiency and productivity of the agency.

Facilities. Tables 5 and 6 show the opportunities offered by digitalization under software and hardware facilities.

- **Software.** For software facility, the weighted mean of all indicators equaled to 3.44, interpreted as extremely favorable. The employees strongly agree on the ten indicators, and made the highest weighted mean of 3.59 on making it easier for them to disseminate information online. In contrast, the weighted mean of the indicator which gained the lowest is equivalent to 3.35. This relates to the adequate reviewing and understanding of warranty. As majority of the employees strongly agree on the aforementioned indicators, both are interpreted as extremely favorable for the software facility.

Employees find online information dissemination highly favorable, valuing the efficiency, convenience, and accessibility it provides. Negi and Sain (2023) highlighted ICT as essential for efficient information dissemination, storage, and communication. ICT tools streamline content creation, online publishing, quick information retrieval, and remote access, allowing users to access resources anytime, anywhere, thus saving time and effort.

Table 5
 Opportunities Offered by Digitalization to DepEd Camarines Norte along Software Facility

Indicators	Weighted Mean	Interpretation
1. Easier information dissemination via online	3.59	EF
2. Needed files can be easily shared by accessing online	3.54	EF
3. Proper planning of procurement of the required software specifications	3.45	EF
4. Establishment of proper communication channels between end-users and IT support for issue resolution	3.41	EF
5. Provision of security features to prevent agency's exposure to data breaches and compromise sensitive information	3.41	EF
6. Development of adequate mechanisms for users to provide feedback on the software to address issues and missed opportunities for improvement	3.39	EF
7. Modernization of the legacy processes by developing a system/application maximizing the in-house programmers	3.43	EF



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8. Future engagement with network operators, internet service providers, and infrastructure providers	3.38	EF
9. Provision of post-implementation support and maintenance of the implemented system/application	3.42	EF
10. Adequate reviewing and understanding of warranty terms	3.35	EF
Over-all Weighted Mean	3.44	EF

Rating Scale:

3.25 – 4.00 (Strongly Agree)	-	Extremely Favorable (EF)
2.50 – 3.24 (Agree)	-	Mostly Favorable (MF)
1.75 – 2.49 (Disagree)	-	Mostly Not Favorable (MNF)
1.00 – 1.74 (Strongly Disagree)	-	Not Favorable at All (NFA)

Interpretation:

Another indicator which obtained the lowest weighted mean but still interpreted as extremely favorable is the adequate reviewing and understanding of warranty terms of the software installed. Learning the terms of the warranty demonstrated that the DepEd Camarines Norte is committed to using software resources in an ethical and responsible manner.

• **Hardware.** Table 6 displays the indicators under hardware facility which has an overall weighted mean of 3.44 construed as extremely favorable. The indicator which gained the highest weighted mean is the arrangement for maintenance schedules to prevent hardware deterioration and eventual failure, equals to 3.49. Meanwhile, the indicator which garnered the lowest weighted mean is the adequate reviewing and understanding of warranty terms resulting to 3.38. The level of agreement rated by the employees is strongly agree which is applicable to both indicators, thus, inferred as extremely favorable.

Employees highly favor regular maintenance schedules to prevent hardware deterioration, seeing them as essential for reliable, long-lasting equipment and a smoother, more efficient work environment with fewer ICT disruptions.

Table 6
 Opportunities Offered by Digitalization to DepEd Camarines Norte along Hardware Facility

Indicators	Weighted Mean	Interpretation
1. Improvement in planning for physical infrastructure, such as servers, network connections, power supply, cooling, and rack space	3.47	EF
2. Arrangement for maintenance schedules to prevent hardware deterioration and eventual failure	3.49	EF
3. Enhancement in documentation of hardware configurations and maintenance procedures for efficient problem resolution	3.47	EF
4. Sufficient planning for hardware failures and data loss to avoid extended downtimes	3.40	EF
5. Effective monitoring for hardware performance for early issue detection	3.42	EF
6. Proper planning of procurement of the required hardware specifications	3.42	EF
7. Incorporation of robust security features in the hardware to prevent potential vulnerabilities	3.40	EF
8. Adequate reviewing and understanding of warranty terms	3.38	EF
9. Future engagement with network operators, internet service providers, and infrastructure providers	3.44	EF
10. Improve regulatory compliance related to safety, quality, distribution, or other industry-specific regulations	3.45	EF
Over-all Weighted Mean	3.44	EF

Rating Scale:

3.25 – 4.00 (Strongly Agree)	-	Extremely Favorable (EF)
2.50 – 3.24 (Agree)	-	Mostly Favorable (MF)
1.75 – 2.49 (Disagree)	-	Mostly Not Favorable (MNF)
1.0 – 1.74 (Strongly Disagree)	-	Not Favorable at All (NFA)

Interpretation:

Similar to software facility, adequate reviewing and understanding of warranty terms of hardware garnered the lowest weighted mean but still believed to be an advantageous opportunity.

Level of Readiness of DepEd Camarines Norte for Digitalization

Manpower. Table 7 shows the level of readiness along manpower which has five indicators wherein four of those are regarded as mostly ready. The knowledge of personnel is adequate for adoption of digitalization obtained



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the highest weighted mean of 2.97, inferred as mostly ready. In contrary, the sufficiency of IT staff to respond to digital changes garnered the lowest weighted mean of 2.44, interpreted as mostly not ready. The overall weighted mean for manpower readiness is 2.78 or mostly ready.

Table 7
Level of Readiness of DepEd Camarines Norte for Digitalization Along Manpower

Indicators	Weighted Mean	Interpretation
1. The knowledge of personnel is adequate for adoption of digitalization	2.97	MR
2. There are enough trainings/workshops for employees to enhance their skills and competencies	2.73	MR
3. There is sufficient IT staff to respond to digital changes	2.44	MNR
4. Employees' attitudes and behaviors are prepared to the changes brought by digitalization	2.96	MR
5. Additional digital job roles and responsibilities are defined clearly	2.79	MR
Over-all Weighted Mean	2.78	MR

Rating Scale:

3.25 – 4.00 (Strongly Agree) -

2.50 – 3.24 (Agree) -

1.75 – 2.49 (Disagree) -

1.00 – 1.74 (Strongly Disagree) -

Interpretation:

Fully Ready (FR)

Mostly Ready (MR)

Mostly Not Ready (MNR)

Not Ready at All (NRA)

While personnel knowledge is mostly ready for digitalization, limited IT staffing suggests challenges in managing workload, skill diversity, and consistent support for digital initiatives.

Structure. The indicator which obtained the highest weighted mean states that working units/sections are functionally divided, equivalent to 3.10. Meanwhile, the lowest weighted mean of 2.91 was gained by the indicator which says that there is a presence of an in-house working unit for digitalization initiatives. The overall weighted mean for structure is 3.01, all ratings are interpreted as mostly ready.

Table 8
Level of Readiness of DepEd Camarines Norte for Digitalization Along Structure

Indicators	Weighted Mean	Interpretation
1. Mutual relations between departments and employees are prepared for changes due to digitalization	3.05	MR
2. Working units/sections are functionally divided	3.10	MR
3. The workflow inclines with the digital shift	3.01	MR
4. There is a presence of in-house working unit for digitalization initiatives	2.91	MR
5. The span of control by different management levels aligns with the digitalization changes	2.98	MR
Over-all Weighted Mean	3.01	MR

Rating Scale:

3.25 – 4.00 (Strongly Agree) -

2.50 – 3.24 (Agree) -

1.75 – 2.49 (Disagree) -

1.00 – 1.74 (Strongly Disagree) -

Interpretation:

Fully Ready (FR)

Mostly Ready (MR)

Mostly Not Ready (MNR)

Not Ready at All (NRA)

It is evident that working units/sections are functionally divided as agreed by the majority of the employees, obtaining the highest weighted mean deemed as mostly ready. This implies that employees are aware of and understand the organizational structure that establishes roles, obligations, and responsibilities among various departments or units, enhancing personnel's general preparedness and efficiency in performing their duties.

While regarded as mostly ready, the presence of in-house working units for digitalization initiatives obtained the lowest weighted mean. This suggests that while employees generally agree on the organization's readiness, there are concerns about the effectiveness or scope of in-house IT personnel in supporting digitalization efforts.

Processes. Table 9 illustrates the level of readiness along processes wherein the highest indicator affirms that implemented automation adheres to the agency's mandates, with a weighted mean of 3.09. While the lowest weighted mean was garnered by the indicator declaring that there are enough automated systems implemented, equivalent to 2.86. The overall weighted mean of the five indicators is 2.98. All of these figures are interpreted as mostly ready.



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Table 9
 Level of Readiness of DepEd Camarines Norte for Digitalization Along Processes

Indicators	Weighted Mean	Interpretation
1. There is a proper identification of the business processes needed to be digitalized	3.00	MR
2. There are enough automated systems implemented	2.86	MR
3. The implemented automation adheres to the agency's mandates	3.09	MR
4. The service strategies of employees correspond to the goals of digitalization	3.03	MR
5. The existing manual transactions are identified and subject for automation	2.92	MR
Over-all Weighted Mean	2.98	MR
<i>Rating Scale:</i>		<i>Interpretation:</i>
3.25 – 4.00 (Strongly Agree)	-	Fully Ready (FR)
2.50 – 3.24 (Agree)	-	Mostly Ready (MR)
1.75 – 2.49 (Disagree)	-	Mostly Not Ready (MNR)
1.00 – 1.74 (Strongly Disagree)	-	Not Ready at All (NRA)

Almost all employees agree that the implemented automation adheres to the agency's mandates. This indicates a strong alignment between digitalization initiatives and the agency's mission, goals, and regulatory requirements.

Considering the agreement of employees that there are enough automated systems implemented and deemed as mostly ready, this indicator still obtained the lowest weighted mean. Although most employees agree that automated systems are adequate, there may still be issues with usability, functionality, or quality. Employees' satisfaction and readiness could be impacted if systems are not user-friendly or hard to navigate.

Technology. The indicators for the level of readiness along technology was shown in Table 10. Four indicators have an interpretation of mostly ready and the other one is mostly not ready. The highest weighted mean equivalent to 2.98 is the indicator which says that the agency's website provides transparency and relevant information, inferred as mostly ready. On the other hand, the lowest weighted mean of 2.49 was gained by the indicator which states that there is adequate ICT infrastructure, taken as mostly not ready. The overall weighted mean for the level of readiness along technology is 2.77, understood as mostly ready.

Table 10
 Level of Readiness of DepEd Camarines Norte for Digitalization Along Technology

Indicators	Weighted Mean	Interpretation
1. There is adequate ICT infrastructure	2.49	MNR
2. The existing programs/systems/applications deliver its usability and responsiveness to the end users	2.86	MR
3. The facilities provide ease of access	2.87	MR
4. The agency's website provides transparency and relevant information	2.98	MR
5. There is a conduct of regular security audits and security implementations to the different areas of ICT infrastructure	2.67	MR
Over-all Weighted Mean	2.77	MR
<i>Rating Scale:</i>		<i>Interpretation:</i>
3.25 – 4.00 (Strongly Agree)	-	Fully Ready (FR)
2.50 – 3.24 (Agree)	-	Mostly Ready (MR)
1.75 – 2.49 (Disagree)	-	Mostly Not Ready (MNR)
1.00 – 1.74 (Strongly Disagree)	-	Not Ready at All (NRA)

Majority of the personnel believe that the DepEd Camarines Norte's website provides transparency and relevant information, having the interpretation of mostly ready. This implies that the website functions as a useful medium for dissemination of information, promoting transparency, and facilitating in the communication between the agency, employees and its stakeholders.

Most employees perceive ICT infrastructure as mostly not ready, reflecting a lack of readiness and ranking lowest in adequacy. Issues such as limited funding, competing priorities, and resource constraints hinder improvements, making it harder for the organization to leverage technology. Grochow (2015) emphasized that infrastructure projects, including maintenance, require prioritization of costs, risks, benefits, and capacities.



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Proposed Action Plan to Assist DepEd Camarines Norte’s Digitalization Initiative

Table 11 presents the action plan to assist the DepEd Camarines Norte’s digitalization initiatives in the challenges encountered.

Table 11
Brief Overview of the Proposed Action Plan to Assist the DepEd Camarines Norte’s Digitalization Initiatives in the Challenges Encountered

Issues/Concerns	Objectives	Actions to be Taken	Agency Involved	Indicative Budget	Timeframe	Projected Outputs
A. Manpower						
Health issues from overusing ICT such as eye strain, headaches, neck and back pain, and sleep deprivation	To mitigate the health issues associated with overusing ICT and improve overall employee well-being and performance	Implement a comprehensive wellness program focused on addressing the health impacts of prolonged ICT use which includes ergonomic assessments and adjustments to workstations, scheduling regular breaks for employees to rest their eyes and stretch, practice proper posture and be aware of the importance of work-life balance	SDO Medical Section ICT Unit SGOD-Physical Facilities Unit Accounting and Budget Sections SDO and school personnel Department of Health Local Government Units - Health Units	SDO Medical personnel will collaborate with LGU Health Units and other medical practitioners to facilitate services	4 hours every six months	Reduction in health complaints Awareness of healthy digital practices Healthy personnel
B. Facility (Software)						
Unable to procure or develop needed programs/systems/applications due to limited resources	To address the challenge of limited resources for procuring or developing software programs, systems, and applications required for digitalization efforts	Prioritize software needs through a thorough assessment, explore cost-effective options such as open-source software, and leverage cloud-based solutions Establish partnerships with technology firms and academic institutions for provision of	SDO ICT Unit, Bids and Awards Committee (BAC), Accounting and Budget Sections SDO ICT Unit Department of Information and Communications Technology (DICT)	₱ 550,000.00 Issuance of Memorandum of Agreement or Understanding or Contract	Annual Annual	Secured and implemented the necessary software solutions Provided required software and technical needs



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assistance in SDO and school software and personnel technical expertise SGOD – Social Mobilization and Networking (SocMob)

B. Facility (Hardware)

Insufficient ratio of available computers/laptops to the personnel	To provide adequate supply of needed ICT equipment	Conduct an inventory audit to determine the current ICT equipment gap	SDO ICT Unit Schools'/Districts' ICT Coordinators SDO and school personnel	Services provided by the SDO ICT Unit	Annual	Ensured that each employee has the necessary ICT equipment to perform their duties effectively
		Procure the necessary ICT equipment	SDO ICT Unit BAC Accounting and Budget Sections Schools'/Districts' ICT Coordinators SDO and school personnel	₱ 1,500,000.00	Annual	
		Establish rotational upgrade schedule to ensure that hardware remains up-to-date and functional	a SDO ICT Unit Schools'/Districts' ICT Coordinators SDO and school personnel BAC Accounting and Budget Sections	₱ 1,821,600.00	Annual	Optimal performance of issued ICT equipment

Basis of indicative budget: Expenditure projections based on previous year spending and expected changes in costs

Table 12 details the actions to be taken to acknowledge the opportunities offered by digitalization.

Table 12

Brief Overview of the Proposed Action Plan to Assist the DepEd Camarines Norte's Digitalization Initiatives in the Opportunities Offered

Issues/Concerns	Objectives	Actions to be Taken	Agency Involved	Indicative Budget	Timeframe	Projected Outputs
A. Manpower Recognizing the improvement of productivity and work performance across the agency	To continuously improve productivity and work performance of employees	Assess the current workflows to identify areas where digital tools can streamline processes	SDO ICT Unit Accounting and Budget Sections Section Heads SDO and school personnel	Services provided by the SDO ICT Unit	Semi-annual	More enhanced operational efficiency
		Provide regular ICT proficiency related training programs (face-to-face and online)	SDO ICT Unit BAC Accounting and Budget Sections DICT SDO and school personnel	₱ 733,500.00	3 days per year	Proficient and productive employees in ICT utilization



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Schools' and Districts' ICT Coordinator

B. Facility (Software)

Acknowledging the favorable opportunity of easier information dissemination via online	To constantly facilitate easier and more efficient information dissemination via online platforms	Maximize the use of MS Outlook and Teams	Develop a centralized online portal and virtual private network (VPN) where all important information, updates, and resources can be easily accessed by employees	SDO and school personnel	SDO ICT Unit BAC Accounting and Budget Sections SDO and school personnel	Already provided	₱ 180,000.00	Daily	Annual	Established quick access to necessary information, leading to better-informed decision-making and enhanced coordination
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B. Facility (Hardware)

Granting the possible positive impact of arrangement for maintenance schedules to prevent hardware deterioration and eventual failure	To establish a proactive maintenance schedule for hardware to achieve longevity and reliability of the agency's ICT infrastructure	Implement a comprehensive maintenance plan and inventory	Implement a comprehensive maintenance plan and inventory	SDO ICT Unit Schools'/ District's ICT Coordinators	Services provided by the SDO ICT Unit			Annual		Reduced failures and downtime of hardware Prolonged lifespan of ICT equipment
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Basis of indicative budget: Expenditure projections based on previous year spending and expected changes in costs

Table 13 outlines the action plan to assist the DepEd Camarines Norte's digitalization initiatives in the level of readiness along manpower, software and hardware facilities.

Table 13
 Brief Overview of the Proposed Action Plan to Assist the DepEd Camarines Norte's Digitalization Initiatives in the Level of Readiness

Issues/ Concerns	Objectives	Actions to be Taken	Agency Involved	Indicative Budget	Timeframe	Projected Outputs
A. Manpower Insufficient IT staff to respond to digital changes	To provide necessary human resources to support digitalization efforts	Recruit additional IT personnel with the necessary skills and expertise (casual or JO)	SDO ICT Unit HRM Personnel Selection Board HRM Unit	₱ 1,940,000.00	Annual	Increased IT staffing levels and capabilities
		Hire IT students from various colleges/schools as part of their on-the-job training	SDO ICT Unit HRM Unit SUCs, Private Schools	Partnership issuance MOA/Contract	– of	Every six months



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B. Structure

Boosting in-house digitalization initiatives	To strengthen the in-house working unit	Provide training programs	target	SDO ICT Unit HRM Unit Concerned SDO personnel Schools'/Districts ' ICT Coordinators DICT	₱ 2,261,000.00	5 days every year	Highly skilled and organized in-house working unit
		Develop a cross-functional digitalization sourcing various sections/units/schools with expertise	a cross-team from various sections/units/schools with expertise	SDO ICT Unit Concerned SDO personnel Schools'/Districts ' ICT Coordinators	Services provided by the SDO ICT Unit and other concerned personnel	Annual	Formation of a team with diverse expertise

C. Processes

Enhancing automated systems implemented	To optimize automated systems already implemented	Integrate additional features or functionalities	or	SDO ICT Unit SDO personnel External service providers	₱ 100,000.00	Semi-annual	Improved performance and functionality of the automated systems
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D. Technology

Inadequate ICT infrastructure	To establish the necessary ICT infrastructure	Conduct assessment of current infrastructure capabilities and limitations	current	SDO ICT Unit	Services provided by the SDO ICT Unit	Annual	Enhanced ICT infrastructure capabilities
		Procure the needed software and hardware	and	SDO ICT Unit BAC Budget and Accounting Sections	₱ 1,500,000.00	Annual	

Basis of indicative budget: Expenditure projections based on previous year spending and expected changes in costs

Conclusions and Recommendations

DepEd, under legal frameworks, ensures quality education by mandating curriculum, teacher training, and infrastructure management, while promoting transparency and continuous improvement through digitalization efforts. DepEd Camarines Norte, comprising 319 schools and serving 185,068 learners, faces challenges despite steady budget increases from Php 1.87 billion to over Php 3.22 billion between FY 2017 and May 2024. Although ICT-related funding increased, it still accounted for only 0.67% of the total budget, indicating a need for prioritization.

Excessive ICT use presents health challenges, compounded by limited resources and inadequate computer availability. However, opportunities for enhanced productivity and improved hiring processes through digital initiatives are noted. While staff knowledge of digital adoption is adequate, insufficient IT personnel and inadequate ICT infrastructure hinder progress. Overall, despite strengths, critical issues in staffing and infrastructure must be addressed to achieve digitalization goals.

DepEd Camarines Norte may strengthen legal adherence, issue new digitalization orders, and allocate more resources to accommodate growing schools. Hiring additional non-teaching staff and teachers, prioritizing school facilities, and increasing the budget for ICT-related expenditures are recommended.

To promote health, training on screen hygiene and ergonomic workstations is suggested, along with routine health check-ups. Collaborations for software enhancement and regular assessments for hardware needs are also needed.



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Opportunities include offering productivity-focused workshops, optimizing online communication, and maintaining hardware through systematic schedules. Boosting IT staffing through hiring and training is crucial, alongside implementing automated systems and enhancing cybersecurity.

Support for the action plan is essential for achieving digitalization goals. Future research may focus on developing policies and standards to facilitate digitalization objectives.

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