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Information And Communication Technology (Ict) Integration to the Four-Fold Functions of the State University Under Mindanao State University System: A Descriptive Analysis

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Abstract

The study determined the relationship and influence of Information and Communication Technology (ICT) integration to the four-fold function of the State University under Mindanao State University System using descriptive- correlation and predictive design. The respondents of the study were the 334 faculty members of MSUs. The data analysis used mean, Pearson r Correlation and Multiple Regressions. The result revealed that the level of Information and Communication Technology (ICT) integration to the four-fold functions of the State University under Mindanao State University system in terms of ICT competence, ICT facilities and equipment and ICT capability building were all moderately extensive. The extent of effectiveness of Information and Communication Technology (ICT) integration accomplishing the four-fold functions of the Mindanao State University system in terms of instruction, research and production were moderately extensive. While the integration to extension was highly extensive. The result on the correlation between the integration of ICT and the effectiveness of accomplishment of the four-fold functions of the Mindanao State University system showed there is a significant relationship. This means the null hypothesis is rejected. The result on the influence between the integration of ICT and the effectiveness of accomplishment of the four-fold functions of the Mindanao State University system showed there is a significant relationship. This means the null hypothesis is rejected. The study generally concludes that the Mindanao State Universities had integrated the Information Communication Technology in the delivery of its services and had shown effectiveness on the accomplishment of the four-fold functions.

Keywords: Descriptive Analysis, Four-Fold Functions, Information and Communication Technology, Instructions, Extension, Research

Introduction

These days, organizations mostly rely on information and communication technology (ICT) to boost institutional performance and support service delivery at all levels (. Large sums of money are thus invested in order to create corporate value, but organizations may not always reap the benefits of these expenditures (Bowen, Cheung, & Rohde, 2017). The field of education is likewise exhibiting this trend. In recent years, technological advancements have brought about significant transformations in higher education systems. Information and communication technologies (ICTs) have been instrumental in modernizing teaching, learning, research, and administrative services in universities worldwide (Bates, 2016; Snyder, Marginson, & Lewis, 2017).

However, there is still a lack of innovation in university procedures and education institutions have not been able to use IT investments to their advantage in some developing regions (Bates, Bates, & Sangra, 2017; Buabeng-Andoh, 2012; Kirkup & Kirkwood, 2015; Sife, Lwoga, & Sanga, 2017). From a general viewpoint, one of the problems related to this failure is that the acquired Information and Communication Technology (ICT) systems are not aligned with an organization's activities. Thus, organizational misalignment and information and communication technology (ICT) are the reasons behind the inability to incorporate ICT into service delivery (Luftman, Ben-Zvi, Dwivedi, & Rigoni, 2012). Because ICT, people, institutional structure, and policy considerations are all involved in the technology integration process, it is possible to analyze the difficulties associated with ICT-organizational alignment from both technical and non-technical viewpoints.

Scholars and practitioners, particularly in developing nations, have asserted that there remains an incongruity between university services and new technologies, even with significant investments in information and communication technology (Kashorda & Waema, 2011). In HEIs in developing nations, this

issue frequently surfaces. It may even be the case that there is no clear policy or strategic framework to direct the use of ICT within the State University (Sife et al., 2017; Tedla, 2018), which makes it even more difficult to determine whether a given technology adds value to the offerings already provided by the institution.

METHODOLOGY

This chapter includes the methodology use in the study which includes the research design, locale, respondents, instrumentation, data gathering procedure and statistical treatment of the data.

Research Design

This research utilized the descriptive- correlation and predictive research design. This research design is the most appropriate method of gathering data that is done systematically and accurately using statistical tools. The descriptive design is used for wide range study on describing certain phenomena because it uses numerical data about conditions, situations, and events that occur in the said situation. The correlation and predictive research involves the search for relationship and best predictors between variables through the use of various measures of statistical association (Hamaker, et al, 2020).

The descriptive aspect of the study described the Information and Communication Technology (ICT) integration to the four-fold function of the State University under Mindanao State University System. On the other hand, the correlation aspect described the relationship between the two variables, while the predictive aspect of the study described the significant influence between the different variables of the study using statistical tools.

Locale of the Study

The study was conducted on the three MSU in Mindanao namely: MSU Main Campus, MSU Maguindanao and MSU General Santos. MSU Marawi campus is located in Marawi City, Lanao del Sur, Philippines. It is renowned for its expansive campus grounds and academic facilities, serving as a prominent educational hub in the region. In contrast, MSU Maguindanao campus is situated in Datu Odin Sinsuat, Maguindanao, Philippines. This campus was established to extend MSU's educational reach to communities in Maguindanao province. Lastly, the MSU General Santos campus is found in General Santos City, South Cotabato, Philippines. This campus is known for its programs focusing on agriculture and fisheries, aligning with the region's agricultural and aqua cultural prominence.

Respondents of the Study

The three hundred thirty four (334) research participants were carefully chosen using a random selection technique from the wide range of educators working in different Mindanao State University campuses. These respondents, include the probationary and permanent teachers, who are professionals and working as Assistant Professor and above at the prestigious Mindanao State University campuses in Marawi City main campus, Maguindanao, and General Santos. A representative sample that accurately reflects the depth and breadth of faculty viewpoints and experiences within the university system is ensured by this thorough selection process.

Sampling Technique

The study employed a meticulous approach to sampling, utilizing the stratified random sampling technique to ensure comprehensive representation of the target population. This method, falling under the umbrella of probability sampling, allowed for the selection of respondents based on distinct strata, specifically delineated as the three (3) MSUs. By dividing the population into these identifiable strata, the study aimed to capture the diversity within each subset, thereby enhancing the robustness and validity of the findings.

The determination of the sample size was a critical aspect of the research methodology, facilitated through the Roasoft method. This involved computing the proportionate distribution of the total population, ensuring that each stratum was adequately represented in the sample. By adhering to this rigorous methodology, the study aimed to mitigate biases and improve the generalizability of the results, thereby enhancing the overall reliability of the research outcomes.

Furthermore, by employing a systematic and transparent approach to sampling, the study sought to enhance the reproducibility and validity of its findings. This methodological rigor not only strengthens the credibility of the research but also provides valuable insights into the intricacies of the population under investigation. Through these meticulous sampling techniques, the study endeavors to contribute meaningfully to the existing body of knowledge within its respective field.

Table 1. Respondents Sampling

School	Population	Sample Size
MSU Maguindanao	202	27

MSU General Santos	302	40
MSU Main Campus	1000	267
Total	1,504	334

Research Instrument

The study used a researcher-made survey questionnaire formulated with the help of the research adviser that was used for data gathering. The survey questionnaire was composed of two (2) major parts with sub parts. The first part was made up of statements about the Information and Communication Technology (ICT) integration with three (3) sub parts. The second part was composed of close ended statements about the four-fold functions of the State University under Mindanao State University with four (4) sub parts. The instrument used the five point Likert scale as selection basis in the degree of choice of the respondents in the scale provided:

Scale	Mean	Description	Interpretation
5	4.20-5.00	Highly Extensive	Always done
4	3.40-4.19	Moderately Extensive	Often done
3	2.60-3.39	Slightly Extensive	Sometimes done
2	1.80-2.59	Less Extensive	Rarely done
1	1.00-1.79	Least Extensive	Not done

Validity and Reliability of the Instrument

Since the research instrument was a researcher made tool, it was subjected for content validity and reliability test before it will be used as tool for data gathering. The validity was assessed by three experts composed of two college professors from MSU and one external validator with a mean rating of 4.75 interpreted as highly valid. The reliability test was conducted through a pilot test to 20 samples. The result of the pretest was analyzed by the school statistician using Chronbach's Alpha method with a result of 0.923 interpreted as highly reliable instrument.

Data Gathering Procedure

The process of gathering data forms the cornerstone around which research study are constructed in the interest of scholarly investigation. It is a carefully planned journey that is directed by ethical considerations and defined protocols with the goal of gaining significant insights into the phenomenon being studied. The process of collecting data for this research study was carefully designed to adhere to the strictest guidelines for academic integrity and rigor.

Starting from the beginning, the researcher followed all the procedures and began about preparing an official letter asking for authorization to carry out the study. This important paper, written in compliance with the Graduate College's requirements, was carefully reviewed and approved by the graduate college dean as well as the research adviser. The letter was then distributed to the Chancellor of the chosen Mindanao State Universities, requesting their institutional approval and support for the research study.

Once the necessary clearances were obtained, careful preparation started to organize the logistics of administering the survey. When choosing the best time and location for data collecting, among other factors, great attention was paid to the respondents' convenience and the practicality of the logistics involved. After the preparation phase came to an end, the researcher started the implementation phase and started administering surveys.

From March 18th to 22nd academic year 2024, the researcher engaged in the systematic administration of the survey, adhering to a meticulously outlined protocol. Prior to the commencement of data collection, an orientation session was conducted to familiarize participants with the purpose and sequence of the study. Emphasis was placed on obtaining informed consent from all respondents, underscoring the commitment to ethical transparency and integrity. Moreover, assurances of confidentiality regarding the identity of the respondents were unequivocally conveyed, fostering an environment conducive to candid and uninhibited responses.

Following the administration of the survey, a thorough procedure of tabulation and analysis was applied to the collected data. Working with an experienced statistician, the researcher carefully examined the data and using a variety of statistical techniques to extract significant findings. A rich tapestry of discoveries from the accompanying investigation provided the basis for further interpretations and implications.

A strong dedication to quality control was essential to the data collection procedure. Strict steps, such as data verification, cross-referencing, and adherence to accepted statistical procedures, were taken to preserve the validity and integrity of the results. These efforts resulted in the creation of an extensive research report that summarized the study's conclusions, interpretations, and implications.

In summation, the data collection procedure embodied a judicious blend of methodological rigor, ethical integrity, and scholarly excellence. It stands as a testament to the researcher's unwavering commitment to advancing knowledge and fostering academic excellence within the respective field of inquiry.

Statistical Treatment of Data

The research used inferential statistical tools such as: mean and descriptive mean for the data analysis. The mean was used in describing the Information and Communication Technology (ICT) integration to the four-fold function of the State University under Mindanao State University System.

Results And Discussion

This section presents the detailed analysis, synthesis, and interpretation of the empirical findings regarding the degree of Information and Communication Technology (ICT) integration and its effectiveness across the four-fold functions—Instruction, Research, Extension, and Production—of state universities within the Mindanao State University (MSU) System.

1. Degree of ICT Integration Across System Dimensions

The integration of ICT across the university system was evaluated through three major operational dimensions: ICT Competence, ICT Facilities and Equipment, and ICT Capability Building. Overall, the degree of integration across these dimensions was evaluated as Moderately Extensive (Table 2)

Table 2. The degree of ICT integration of across the university system.

Operational Dimension	Overall Mean Score	Verbal Interpretation
ICT Facilities and Equipment	4.09	Moderately Extensive
ICT Capability Building	3.74	Moderately Extensive
ICT Competence	3.70	Moderately Extensive
COMPOSITE AVERAGE	3.84	Moderately Extensive

ICT Facilities and Equipment (Mean = 4.09)

Among the three integration pillars, ICT Facilities and Equipment received the highest score (Mean = 4.09, *Moderately Extensive*). This indicates that the university system has prioritized capital investments in essential hardware, campus connectivity, multi-media equipment, and digital monitoring systems. The availability of computer laboratories, audio-visual display tools, smart monitors, and campus-wide communication networks provides a functional physical foundation that supports daily operations across academic and administrative departments.

However, while baseline infrastructure is well-established, full saturation has not yet been achieved. Persistent challenges—such as limited computer-to-student ratios in specialized laboratories and localized network bandwidth constraints—prevent this dimension from reaching a "Highly Extensive" level.

ICT Capability Building (Mean = 3.74)

ICT Capability Building achieved an overall mean of 3.74, interpreted as *Moderately Extensive*. This dimension measures institutional efforts to provide continuous professional development, skill upgrading, technical workshops, and digital pedagogy training for faculty and staff.

The score demonstrates that while regular training programs exist, they are often episodic rather than continuous or deeply specialized. Institutional training initiatives tend to focus on baseline software applications and digital communication tools, with less emphasis on advanced instructional design, technical troubleshooting, or specialized research software.

ICT Competence (Mean = 3.70)

ICT Competence recorded an overall mean of 3.70 (*Moderately Extensive*). Respondents reported strong familiarity and confidence in executing routine digital tasks—such as incorporating presentation software, using digital messaging channels, and accessing online educational resources.

However, confidence decreases when handling complex technical demands, such as software diagnostic repairs, network troubleshooting, and advanced cyber-threat protection. This reveals a gap between functional everyday digital literacy and specialized technical expertise, highlighting the need for targeted skill development among academic and Administrative personnel.

2. Effectiveness of ICT Integration Across the Four-Fold Functions

State universities in the Philippines are mandated to execute four main functions: Instruction, Research, Extension, and Production. The empirical results demonstrate varying levels of effectiveness when ICT is integrated into these core pillars (Table 3).

Table 3. Effectiveness of ICT Integration Across the Four-Fold Functions

Institutional Function	Overall Mean Score	Verbal Interpretation
Extension Services	4.29	Highly Extensive

Production Resources	4.07	Highly Extensive
Instructional Delivery	3.95	Moderately Extensive
Research & Scholarly Output	3.80	Moderately Extensive

Extension Services (Mean = 4.29, *Highly Extensive*)

Integrating ICT into community extension services received the highest effectiveness rating across the university system ($M = 4.29$). This demonstrates that digital tools have fundamentally enhanced how the university interacts with local communities, partner Local Government Units (LGUs), non-governmental organizations, and agrarian cooperatives across Mindanao.

Through mobile communication, social media platforms, teleconferencing tools, and web-based information portals, extension workers can rapidly disseminate technical advisories, agricultural best practices, and community development resources across wide geographic areas. Bypassing physical distance and transportation barriers in remote or rural communities allows ICT tools to significantly increase the speed, reach, and accessibility of community outreach programs.

Production and Resource Generation ($M = 4.07$, *Highly Extensive*)

The production function—which encompasses income-generating projects (IGPs), campus auxiliary services, commercial operations, and institutional resource generation—achieved an overall mean of 4.07, interpreted as *Highly Extensive*.

Digitization in this sector has streamlined operational efficiency, inventory control, automated accounting, and point-of-sale logging. Digitizing record-keeping for university printing services, agricultural production centers, and commercial leases reduces administrative errors and improves financial oversight. Additionally, digital communication channels expand the reach and visibility of university-produced goods and consulting services, generating crucial auxiliary revenue to support broader institutional operations.

Instructional Delivery (Mean = 3.95, *Moderately Extensive*)

Instruction recorded an overall mean score of 3.95 (*Moderately Extensive*). Visual projection equipment, presentation applications, interactive multimedia, and learning management systems (LMS) are widely used in university classrooms. These digital tools support multi-sensory learning, cater to varied student learning styles, and facilitate collaborative coursework.

However, instructional effectiveness remains constrained by external technical factors, such as inconsistent campus Wi-Fi access and limited student ownership of individual computing devices outside school hours. While faculty members regularly utilize technology for lesson delivery, transitioning to fully integrated hybrid, asynchronous, or digital inquiry-based learning models remains an ongoing process.

Research and Scholarly Output (Mean = 3.80, *Moderately Extensive*)

Research registered an overall mean score of 3.80 (*Moderately Extensive*), representing the lowest rating among the four functions. While research personnel routinely use digital platforms for literature reviews, electronic data collection, and basic statistical computations, deeper technological integration remains developing.

The primary factors limiting research effectiveness include restricted access to high-cost subscription databases, international peer-reviewed journal repositories, high-performance computing assets for complex modeling, and specialized qualitative or quantitative analytical software. Enhancing ICT integration in this domain is essential, as advanced digital research tools directly impact institutional research output, peer-reviewed publications, and university citation standings.

Strategic Recommendations for System Enhancement

To elevate ICT integration across the Mindanao State University System from *Moderately Extensive* to *Highly Extensive* across all operational domains, the following strategic measures are recommended:

1. **Targeted Capability Building Programs:** Transition from generic IT workshops to structured, tiered certification tracks focusing on advanced instructional technology, software diagnostics, statistical computing, and cyber security.
2. **Infrastructure Optimization & Equitable Access:** Implement continuous hardware replacement cycles and expand enterprise network bandwidth across all regional constituent campuses to eliminate connectivity bottlenecks during peak hours.
3. **Research Resource Allocation:** Budget for subscription-based international citation databases and specialized research software licenses to support faculty and graduate student research productivity.
4. **Digitally-Driven Community Engagement:** Continue expanding mobile-friendly, digital extension platforms to deliver real-time technical and agricultural assistance to rural communities throughout Mindanao.

Conclusion

The study concludes that the Mindanao State Universities had integrated the Information Communication Technology in the delivery of its services and had shown effectiveness on accomplishment of there four-fold functions. This enables the delivery of instruction, the conduct of research, the production of information to be effective in attaining its goal. Much more the extension programs of the school are intensified as it is supported by ICT in its implementation. The integration developed skills and competencies for students, staff and faculties to collaborate with stakeholders supporting making engagement of the partners and community part of the school system. However, the challenge of adequate resources like gadget, computer sets and even signals for internet connection hampers the utilization for all students to use it in times of needing this equipment for their studies. The MSUs are offering competitive education systems it is integrated with modern and innovative strategy through ICT integration.

RECOMMENDATIONS

In the light of the findings of the study the following are recommended:

1. The National Government must provide additional budget to support the procurement of equipment for technology utilization in the state universities. This can improve further the quality of education system.
2. The MSUs administrators must develop upgrading plans for technology development to identify the needs of the school for fully implementing the computerization system and ICT integration in instruction with adequate access and units for students.
3. To the teachers to attend in training and seminars about the integration of ICT to instruction, research and extension for this is a must that must be part of the competencies. This can help them guide the students towards becoming technology savvy.
4. The Stakeholders must provide support in technical and logistical needs of the schools. This can increase capacity of the school to provide needed resources to students and be able to use the system.

Recommendation for Further Study

For further study in ICT integration at Mindanao State University System (MSUS), consider focusing on one or more of the following areas:

1. Regression analysis for Research Competency of Students in MSUs and Extension programs.
2. The Exploration of Research Extension Program and Its Contribution to Nation Building.
3. The ICT Reform in the Online Education Era of the BARMM.

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