

# Satisfaction in using barcode attendance for the Criminology Students of Data Center College of the Philippines, Laoag City

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## Abstract

This study determined the satisfaction in using barcode attendance for the Criminology Students of Data Center College of the Philippines. The study utilized the quantitative method of research using survey questionnaires to gather data from the 200 criminology students of Data Center College of the Philippines of Laoag City, Inc.-College of Criminal Justice Education.

Mean was used to analyze the data gathered in level of satisfaction, problem encountered and coping mechanism of the study.

The study revealed that most of the average responses tend to be in satisfaction range (4.20 – 3.41) with the corresponding statement in the survey questionnaire. In the problem encountered that they experience, most of the items fall in the range of (3.40 – 2.61) that interpreted as sometimes. However, those respondents who encountered those problems were able to cope up through problem-solving and problem-focused. In addition, the result of the study also showed that majority of problems are in the part of scanner. Meaning in order to improve the system let us focus first in the scanner because this is the first component to process that if it is not working well the whole system affected.

Based on the findings and conclusions drawn the following are recommended that the Data Center College of the Philippines need to establish a updated and upgraded barcode scanner to have a better performance attendance monitoring in the school. In terms of security of the students the SMS parent notification is recommended for the parental monitoring to avoid absenteeism and parent appearance in the guidance. Also concern in portability of the system, it is highly recommended that there is an app installed to mobile phones that connected to the system to easily monitor the attendance of the student during activities which are not happened inside the school.

Keywords: Satisfaction, Barcode attendance, Criminology Students, Attendance monitoring, Problem encountered, Coping Mechanism

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Proverbs 3:6

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## CHAPTER I THE PROBLEM

### Introduction

Nowadays, almost all schools maintain attendance records in a student information system, either electronically or manually, to keep track of students' attendance and absences. The fact that attendance records may serve as data for several reports makes them useful. Additionally, according to the Great Schools Staff (2016), a baseline component in evaluating student performance is attendance at school. The importance of attendance stems from the fact that regular attendance at school increases pupils' chances of academic success. If a significant portion of the class is frequently missing, it is challenging for the teacher and the class to develop their knowledge and progress. Students who don't attend school regularly are more likely to run into legal issues, fall behind academically, and cause other problems.

However, students may find attendance tracking to be gratingly inconvenient. Students must take their time while entering information in the logbook. Additionally, it requires spending money on supplies like logbooks and pens. Additionally, since the COVID -19 pandemic, guidelines have included the requirement for logbooks in the community. Logbooks that contain the necessary information make contact tracing in situations of suspected crimes simple. However, it takes a while for this to happen. Worse, if a carrier has used the logbook, utilizing it for contact tracing may be dangerous since the virus can transmit through it.

In this situation, barcode technology is helpful. The main piece of hardware needed for a barcode attendance system, which tracks and monitors student attendance, is a barcode scanner. A barcode is a data representation that is both aesthetically pleasing and machine readable. It is produced in a series of lines with varying line widths and entered into a computer as data (Wikipedia, 2023).

Through this Barcode Attendance (BA) can lessen the problem in attendance monitoring and the spread of virus. The Barcode scanner can work without touching the technology. As to monitoring, the conduct of tracing will be easier such that it can be done only by searching the data in the computer attached to the Barcode Attendance.

The barcode is not only for attendance monitoring. It also secures the safety of students because it will be easy to determine outsiders through this kind of technology.

Thus, this study is conducted to determine the Satisfaction of the criminology students of Data Center College of the Philippines, Laoag City on the performance of the Barcode Attendance as a way of monitoring their attendance.

### Background of the Study

A barcode reader is an input device that reads printed barcodes using light rays and converts them digitally. The data is subsequently decoded and sent to a computer. A lens, a light source, and a light sensor—which can convert optical impulses into electrical signals—make up the device. It has a decoder that examines the picture data the sensor provides before sending it to the output port. following an imaging scan. To transmit the data that has been collected, it connects to a host computer (Ghosh, 2020).

With tremendous potential and actual benefits, smartphone use has transformed many areas of life, including education. While some smartphone features, like text messaging, multimedia, and Internet access, may seem purely recreational, they can be used in educational settings to manage student attendance. By facilitating the process of academic instructors taking attendance, smartphones can save time, prevent human error, and eliminate redundant tasks when compared to the manual attendance system (Khan, 2018).

In addition to developing lesson plans, giving teaching, conducting assessments, and evaluating and recording student achievement, a teacher also has the laborious duties of monitoring. Teachers have a lot more

tasks that take up a lot of their time, particularly those that require manual labor. As a result, this study suggests an automated monitoring and attendance system for students that uses a barcode reader. Each student's profile will be available to the teacher via the barcode reader when the identification card is scanned.

The programmer and developer of the barcode attendance was a professor of Information Technology in Data Center College of the Philippines, Laoag City. The technology was first implemented at DCCP-Laoag on January 3, 2022 at the College of Criminal Justice Education (CCJE). In April 2022, the technology was adopted in the Senior High School Department as a requirement for full face-to-face learning.

In this study, the students' level of satisfaction on the use of the Barcode Attendance was determined. Problems related to its use were also identified for purposes of enhancing the attendance monitoring system.

### **Statement of the Problem**

This study sought to determine the level of satisfaction of BS Criminology students of Data Center College of the Philippines in using the Barcode Attendance.

Specially, it sought to answer the following questions:

1. What is the level of satisfaction of the DCCP BS Criminology students in using the Barcode Attendance?
2. What are the problems encountered by the students in using the Barcode Attendance?
3. What coping mechanisms are used by students in the problems encountered of the Barcode Attendance?

### **Theoretical Framework**

This study used theories to explicate the foundation of the research. The theoretical framework is the structure that can hold or support a theory of a research study. It introduces and describes the theory that explains why the research problem under study exists. Therefore, the data content of this study will be analyzed and justified using particular theories.

#### **The Adaptive Structuration Theory (AST)**

According to Poole (1994) this theory is used to examine how cutting-edge information technology affects organizational transformation. The theory aims to comprehend the many structures offered by cutting-edge technologies as well as the structures that really appear in human interaction with these technologies. As the foundation for human action, the AST emphasizes the social structures, laws, and resources made available by institutions and technology. According to the concept, structures in technology and structures in action are constantly entwined and shape one another. According to this argument, because it is used to track students' attendance, barcode technology is directly related to the students. Thus, the adoption or improvement of the technology will be based on how each student is satisfied. The result will serve as the foundation for how the Barcode Attendance system modifies student behavior. One of today's advancements is the barcode attendance system, which is used to track attendance. We are currently living in a technologically advanced generation, where everyone is required to adapt to the latest developments in the world. Because this theory also suggests that human behavior in dealing with technologies emerges, adaptation of the school's system may also change students' attitudes.

#### **Expectation Theory**

The Oliver (1966) Expectation Theory also supports this study. According to this hypothesis, a customer's assessment of a product's or service's performance with preset criteria of performance determines whether they are satisfied or dissatisfied. The comparison might have one of three results. When performance is

thought to be better than the established expectations, positive disconfirmation happens. Customers are likely to be satisfied when performance is judged to be exactly equivalent to expectations, or when there is zero disconfirmation. Negative disconfirmation also happens when performance falls short of expectations.

Based on this theory, the satisfaction of the respondents using the Barcode Attendance will be predetermined according to the performance of the system. Therefore, the theory will be the basis for comparing the satisfaction results from the students as to the performance of the Barcode Attendance against the manual attendance system.

**Conceptual Framework**

The Input, Process, Output (IPO) model shows the outcome and process of the study. According to ISIXSIGMA (2022), IPO is a systematic approach for documenting and visualizing all of the inputs, outputs, and process stages necessary to convert inputs into outputs. It is sometimes referred to as an I-P-O model or an I-P-O diagram, both of which relate to the method's intended visual appearance.

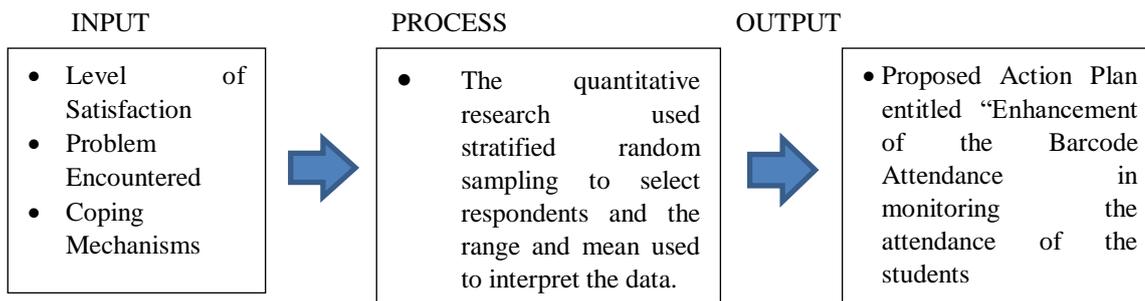


Figure 1. Paradigm of the Study

The study holds the view that attendance monitoring is an important resource to secure the safety of the students. The results of this study will be used to improve the performance of the BA. The IPO model shows the systematic method conducted by the researchers from the gathering of information to determine the level of satisfaction, problems encountered and coping mechanisms of the students which are the outcome of the study. This will be the basis of the researchers in enhancing the present Barcode Attendance monitoring system for the BS Criminology students of Data Center College of the Philippines, Laoag City.

**Significance of the Study**

The study could give benefits to the following:

**Students.** The study can provide a thorough understanding on the benefits of barcode attendance as an easy and secured type of monitoring of attendance. This study may also help the students to fully implement the barcode attendance in the school for the benefits for easy and time efficient attendance monitoring.

**Teachers.** The results of this study would benefit teachers who will adopt the barcode technology attendance in their classes by ensuring the attendance of students are perfectly monitored and secured. Additionally the teacher can now start the class immediately for not conducting announce type of attendance monitoring.

**Schools.** The results of this study can provide schools information in adapting the barcode attendance as one of the innovations in attendance monitoring. This may also improve the school facilities and to produce a globally competitive students and modernized facilities.

**LGU.** The result of this study would help the Local Government Unit to improve their problem in checking attendance in every employee.

**Future Researchers.** It is hoped that the study would serve as a reference material for those who will conduct similar and related studies in the future.

**Researchers.** As they are the ones who are next in line to achieve the same set of goals after graduating. This study's findings will serve as a basis for them to avoid such problems that encountered by the system and to produce a well enhance technology in monitoring attendance. The research study will guide the researchers to develop their critical thinking expertise, as well as effective analytical and problem solving skills.

### Scope and Delimitations

The researchers are focused to know the Satisfaction in using barcode attendance for the Criminology Students of Data Center College of the Philippines, Laoag City. This study is only limited to the Satisfaction of Criminology Students who experience and enrolled during the Academic Year 2022 to 2023 at Data Center College of the Philippines.

The participants of this study were composed of criminology students of the above-mentioned school.

### Definition of Terms

The study used the following terms which are defined to better understand this study.

**Satisfaction.** As to operation, satisfaction refers as level of pleasure and contentment of the students towards the performance of the Barcode Attendance through functionality, reliability, usability and efficiency.

**Barcode.** Is a method of representing data in a visual, machine-readable form. Initially, barcodes represented data by varying the widths, spacing and sizes of parallel lines (Wikipedia, 2023).

**Attendance.** The basis to the student can be monitor if he/she attending classes or not.

**Barcode Attendance.** The system used to record and monitor the attendance of students. The name of the system which was in the study.

**Criminology Students.** Any person who is a student of a Bachelor of Science in Criminology that focus about the causes of crime related to biology, psychology, or social factors like socioeconomic status.

**Attendance Monitoring.** Keeping track of students' time in and time out in school and it.

**Problem Encountered.** The problem in the Barcode Attendance which the student encountered during the implementation of the said system specifically to functionality, reliability, usability and efficiency.

**Coping Mechanism.** The action used when the student encountered those problems in the Barcode Attendance that makes them uncomfortable in using the said system. This also the basis in constructing recommendation to improve the system and to have a well develop Attendance Monitoring.

## CHAPTER II

### REVIEW OF RELATED LITERATURE AND STUDIES

This chapter presents the related literatures and studies to provide the reader a general overview to the satisfaction of students in the implementation of Barcode attendance.

#### **Developing of a Class Attendance Monitoring System Using Barcode with SMS Notification**

According to Guevarra & Corpuz, (2023) Many people adopt the latest technological trend because of its benefits. One of these is the attendance tracking system, which has been created in various ways across the world to address student absence. Incorporating technological innovations is essential to spurring students' interest, awareness, and motivation in problem-solving, especially in their daily lives. Software Development Methodology was used as the research method in the study.

As a result and discussions, to system features and functions of the development system are the following: the system can add, edit, and delete student information, subjects, course year level, and school events. It also scans student identity barcode and sends SMS notification using smart broadband stick. Next, the system testing or using barcode by scanning of the barcode printed in the students ID using a barcode scanner. According to authors, barcode identification technologies which is popular nowadays. A secured and accurate barcode technology model is needed for the implementation of the system.

Lastly, the SMS notification which uses smart broadband stick. It has a sim card number with global sytem for Mobile Communications (GSM) network to directly send notification to parents regarding the time and date when their child enters a class or participates in an activity at school. According to authors, the integration of this system with SMS is very useful as it can directly notify the parents regarding their childrens attendance problems. This eliminates the need for parents to visit the school to check on their child's attendance or absence.

#### **ISO/IEC 25010**

Based on ISO 25000 (2011), A method for evaluating the quality of a product is built around the quality model. Which quality traits will be considered when assessing a software product's qualities is determined by the quality model

The extent to which a system fulfills the explicit and implicit demands of its many stakeholders and so adds value is referred to as its quality. Functional appropriateness, performance efficiency, compatibility, usability, dependability, security maintainability, and portability make up the eight quality attributes that make up the ISO/IEC 25010 product quality model (ISO 2500, 2011).

#### **Events Attendance Monitoring System Using Biometrics and SMS**

Based on this paper (2023) The Isabela State University Echague Campus's Institute of Information and Communication Technology is now having issues keeping track of students' attendance during school-related events. The majority of the time, the university and the institute themselves force students to participate in all events. But from the beginning till now, the student body organization has struggled to keep track of the students' attendance. Before the event or activity begins, the presidents of each class need pupils to sign their names on a sheet of paper as verification of their presence. The registration area's long student lines affect the timeliness and accuracy of tracking attendance. The researchers were able to design an event monitoring

system using biometrics with SMS as a solution to the challenges caused by the incorrect reports of attendance monitoring and unreliable monitoring of students' attendance.

### **Developing and Implementing a Barcode Based Student Attendance System**

It is a widely recognized truth that for efficient planning, administration, and organization-wide operation, all organizations, whether educational or commercial, must accurately record the attendance of their pupils or employees (Sheikh, et al., 2019).

The system is assessed while ensuring customer satisfaction. Using a local host server with Mozilla Firefox and Internet Explorer, tests were done on the suggested setup. Twenty students from Iman Abdurrahman Bin Faisal University's (IAU) college of Applied Studies and Community Service were asked to utilize the prototype as part of the assessment process. The prototype's functionality and user interface were initially explained to the pupils. The system was then tested by the students, who then responded to a survey comprised of ten items designed to determine their degree of satisfaction. The suggested system's usefulness was also assessed. According to the outcome, a sizable number of users concur that the system is beneficial, practical, and accomplishes the main goal of the project (Sheikh, et al., 2019).

### **Barcode Recognition System**

A barcode is a surface that has information visually represented as bars and spaces. Numbers, letters, and symbols like the dot, colon, and others are included into the various lengths of the bars and spaces. Information is represented by various combinations of these alphanumeric characters. (Saad & Hashim, 2013).

Barcodes are typically rectangle-shaped symbols made up of thin or thick parallel lines running perpendicular to one another. These offer ways for quick and automated data entry into the computer. Barcodes have been employed for the past ten years in a variety of settings, including retail merchandise and technological equipment. The product's reference number is located on the barcode's lines. Computers should keep this data in order to store each product independently and count business sales and buy amounts. When employing a laser scanning equipment to read barcodes on items, the system generates a signal that is then processed by software in the computer. The choice of product is then made using this information. Companies can sell their products quickly and with confidence thanks to this method. Nowadays, a variety of barcode variants are employed in the industrial sector. The technical parameters of a certain type of barcode, such as the character set, check sum requirements, and barcode's width, are defined by its symbology. There are four different types of barcodes: 2D barcodes, alpha-numeric barcodes, and industry standards for barcodes and labels. (Saad & Hashim, 2013)..

### **Mobile Barcode-Based Examination Attendance System**

In the paper of Khan, et. al, (2018), they introduced automatically record student examination attendance, they devised a barcode-based automatic examination attendance system for cellphones. There is limited research on a system that is especially created for recording student examination attendance, despite the fact that numerous existing methods (Sudha et al. 2015) have been proposed employing cellphones for automated student attendance. The primary distinction between Khan, et al. Al's method differs from the current systems in that it uses a smartphone instead of an additional piece of hardware called a barcode reader, which significantly lowers the cost. In contrast to other student attendance systems, their experiment demonstrated that the suggested student examination attendance system is more effective at gathering student attendance data during exams.

29 distinct test scenarios were used to evaluate the system, and all of them were successful. All of the system's procedures were walked through during performance testing. To confirm the system's dependability

and functioning, experiments were carried out. To imitate the procedure for recording attendance during the test, eleven (11) trials were run. A scanning time of 5 seconds on average was recorded (Khan et al, 2019).

Additionally, no paper was used for the procedure (attendance sheet, exam slip). As a result, printing and paper costs can be eliminated. Additionally, a labor-intensive, error-prone human data input may be eliminated with the help of automated inspection. When compared to a manual attendance method, the database proved more trustworthy. This demonstrates how the traditional paper-based attendance system is outperformed by the mobile barcode-based examination system by using less time, energy, and resources. This system's drawback is that it is simple to cheat if a student also scans a friend's or classmate's card. Their next goal is to add a biometric and GPS module, which will remove this restriction (Khan et al, 2019).

### **Usability of a Barcode Scanning System as Means of Data Entry on a PDA for Self-report Health Outcome Questionnaires: A Pilot Study in Individuals Over 60 years of Age**

In the paper of Boissy, et al (2006) Self-report health status surveys have been used to collect patient-reported outcome metrics throughout the medical and paramedical fields. This pilot study's goal was to assess the usability of a PDA-based barcode scanning system with a text-to-speech synthesizer in people over 60 in order to electronically gather data from self-report health outcome surveys.

A sample of 24 community-dwelling older persons, aged 63 to 93 (7 males, 17 women), were used to assess the system's usefulness. Participants were given a quick tutorial on how to operate the barcode scanner before being randomly allocated to one of two sets of 16 questions to be answered with a pen or a barcode wand scanner. Directed interviews, a usability questionnaire, and performance-based metrics (task times, mistakes, and error causes) were used to evaluate usability (Boissy, et al, 2006).

Overall, participants said learning and using barcode scanning was simple and enjoyable. When utilizing pen input, participants (20/24) completed the 16 survey questions a little bit more quickly. For a sample of 16 questions, the mean response time using the barcode scanner was 31 seconds longer than traditional pen input ( $p = 0.001$ ). About one-third of initial scans needed a second scan to effectively capture the data entry, indicating that the scanning system's response was less than ideal. The system's responsiveness may be explained by a variety of elements, including the placement of the scanning mistakes, the kind of barcode utilized as a response field on the paper version, and the barcode scanner's optical properties.

The study's findings shed light on the viability, usefulness, and efficacy of employing a barcode scanner to enter data electronically on a PDA for older persons. The responsiveness of the system is a hurdle to the widespread deployment of such a system, even though research participants considered their interaction with the barcode scanning system to be pleasurable and learned to use it proficiently. The system's responsiveness should be markedly improved by optimizing the information's graphical display on paper. (Boissy, et al, 2006).

### **Efficacy of Scan Attendance Manager Application Using Quick Response Code in Dagohoy National High School, Bohol, Philippines**

The Galgo's research (2020) was to evaluate the instructors' perceptions on the effectiveness of the Scan Attendance Manager Application utilizing Quick Response Code at Dagohoy National High School in Dagohoy, Bohol, Philippines, during the 2019–2020 school year. It used a survey approach with a descriptive-comparative study design. The Scan Attendance Manager, which teachers may use to effortlessly track class attendance by just scanning the QR code included into each student's ID, was found to be a dependable program. This program, which is recommended for usage, delivers effective data output from identifying absent pupils to producing reports. There is no need to worry about producing the reports because the data generated by the SAM program is unquestionably correct, as all teacher-respondents fully concur. Additionally, it was determined that the Scan Attendance Manager software may be utilized for a variety of

activities given that attendance has to be tracked for classes as well as other settings. Furthermore, since only the instructors had access, there was no need to worry about confidentiality because the attendance data report was safely kept in the SAM database.

The research design for the study was descriptive-comparative. Descriptive in the sense that the researcher had to explain the effectiveness of the Scan Attendance Manager software as seen by the instructors at Dagohoy National High School throughout the 2019–2020 academic year.

Data showed that in the months (June 2019–October 2019) before using the SAM app, the general percentage average showed that the majority of the classes with a frequency of 27 (54%) had a very satisfactory attendance that falls between the scale of 85–89 percent; this was followed by 18 (36%) classes with an outstanding attendance within the range of 90–100 percent; and the remaining 5 (10%) classes had a satisfactory attendance within the range of 80–84 percent. The overall percentage average for the months (November 2019 – March 2020) following the use of the SAM app, on the other hand, revealed that all 50 (100%) courses had exceptional attendance that fell within the range of the scale of 90–100%. According to the data, it was determined that by utilizing the Scan Attendance Manager app with Quick Response Code, the class attendance may be increased since it alerts parents with real-time reports, which keeps them interested. J.L. Epstein claims. Also, Sheldon, S.B. In general, adolescents that have involved parents report fewer lost school days (2004). Students are more likely to attend class and participate more actively when parents and teachers are in constant contact.

The Scan Attendance Manager was found to be a dependable tool that instructors could easily use to check on students' attendance by just scanning the QR code affixed to each student's ID. This program, which is recommended for usage, delivers effective data output from identifying absent pupils to producing reports. There is no need to worry about producing the reports because the data generated by the SAM program is unquestionably correct, as all teacher-respondents fully concur. Additionally, it was determined that the Scan Attendance Manager software may be utilized for a variety of activities given that attendance would need to be tracked in addition to tracking attendance in the classroom. Additionally, the attendance data report was safely kept in the SAM database, and since only the instructors have access, there is no reason for them to be concerned about privacy. (Jesson & Galgo, 2020).

### **Using Automated Contact Tracing System App with QR Code to Monitor and Safeguard Parishioners against COVID-19 at St. Anthony of Padua Parish**

The White Rock Beach Resort Hotel is close to the St. Anthony of Padua Parish, which is located in the center of Barangay Matain, Subic, Zambales. It is governed by Rev. Father Arwin Ebueng Ysonza and is under the jurisdiction of the Most Reverend Bishop Bartolome G. Santos, Jr.-led Diocese of Iba, Zambales. Nine barangays make up DD. Iba, which has a population of about 10,000. (Mobo & Garcia 2020).

Only 50% of a facility's capacity was permitted for large gatherings during the COVID-19 epidemic. At the time, this was required by the Modified General Community Quarantine (MGCQ) safety measurement protocols. However, the implementation of these quarantine protocols caused a problem for churchgoers because it took about 30 minutes to log in, causing many to miss nearly half of the Mass celebration. As a result, Mobo and Garcia (2020) suggested a solution that can help by employing an Automated Contact Tracing solution Mobile App with QR Code that can complete the transactions in a much speedier manner. These transactions may be completed in under a minute by creating a QR Code and scanning it. The Local Inter-Agency Task Force (IATF) on Covid-19 of Subic, Zambales established safety protocols, such as appropriate social distance when entering and leaving the church and recording their names, temperatures, and locations, which can be diligently implemented properly and save a lot of paper, through customization. With the use of a mobile app that scans and creates QR Codes for parishioners, it may quickly produce a real-time report that can be turned into an excel sheet and delivered via email.

Focus group discussions and a survey questionnaire circulated in September 2020 were used in the research. The functioning of the aforementioned upgraded system, which is capable of resolving the current pandemic crisis, was demonstrated to the responders. During the pilot testing of the improved method, 28 people responded. Men and women between the ages of 18 and 70 made up the samples. For this kind of issue, a descriptive study approach and frequency-based statistical analysis were applied.

The Automated Contact Tracing System with QR Code was put into use for the benefit of the parishioners since it allowed for the easy tracking of their actual attendance, checking in and out, and the creation of excel form reports (Mobo & Garcia, 2020).

## CHAPTER III RESEARCH METHODOLOGY

This chapter presents and discusses the research method and design, the respondents, sampling procedures, data gathering instruments, the data gathering procedures, and treatment of data used in the study.

### Research Method

The research design of this study used quantitative method. Quantitative research method involves measuring variables with a numerical system, evaluating these data with any of a number of statistical models, and presenting correlations and associations between the variables researched (Library City University of Seattle, 2023).

The source of data for this study came directly from the respondents through the use of survey questionnaire.

### Population and Locale of the Study

The respondents of the study are composed of 200 BS Criminology students from the second year, third year, and fourth year who were enrolled during the implementation of the barcode attendance monitoring system at Data Center College of the Philippines, Laoag City, Academic Year 2021-2022.

The respondents were selected through stratified random sampling. According to The Economic Times (2023), with this sampling technique, strata—smaller subgroups of the population—are divided into. With this sampling technique, every student in the population has the potential to be included in the sample. Hence, the Slovin's formula was used:

$$n = \frac{N}{1 + Ne^2}$$

### Data Gathering Tool

The researchers used semi-structured questionnaire to gather necessary data and information from the respondents. The items were based on the ISO/IEC 25010 which is considered as the cornerstone of a product quality evaluation system. The questionnaire is composed of three sections: first part asked questions to determine the level of satisfaction of the respondents in using barcode attendance. The second part gathered data on the problem/s encountered in using barcode attendance. The third elicited on the coping mechanism used by the students on the problem's encountered in using the barcode attendance.

### Data Gathering Procedure

The researchers seek the number of criminology students enrolled from Academic Year 2022 to 2023 at the Registrar Office by a letter. Before the administration of the questionnaires, the researcher formulated the questionnaires used in this study along with the letter to conduct study and letter to the respondents and submitted it to the adviser for checking and approval. After approval of such, the letter to conduct study was given to the Dean of Criminology Department for the approval and after approval the researchers distributed copies of the questionnaire to the respondents. After giving them ample time to answer, all accomplished were retrieved, analyzed and interpreted by the researchers.

**Treatment of Data**

The data gathered in this study was used the mean to determine the number of the respondent who responds to the particular items that requires choices in the 5-point Likert scale.

The responses on the level of satisfaction in using the barcode attendance were coded and interpreted as follows:

Value	Range	Descriptive interpretation	Verbal Interpretation
5	5.00-4.21	Very Satisfied	Very Satisfied to all functions of the system
4	4.20-3.41	Satisfied	Satisfied to all functions of the system
3	3.40-2.61	Neutral	The functions of the system was neutral
2	2.60-1.81	Dissatisfied	Dissatisfied to all functions of the system
1	1.80-1.00	Very Dissatisfied	Very Dissatisfied to all functions of the system

Meanwhile, the responses on the problem/s encountered in using the barcode attendance and coping mechanism used by the students on the problem/s encountered in the barcode attendance they were coded and interpreted as follows:

Value	Range	Descriptive Interpretation	Verbal Description
5	5.00-4.21	Always	The problem occurred everyday.
4	4.20-3.41	Often	The problem occurred 7-9 times a day.
3	3.40-2.61	Sometimes	The problem occurred 4-6 times a day.
2	2.60-1.81	Rarely	The problem occurred 1-3 times a day.
1	1.80-1.00	Never	The problem never occurred.

**CHAPTER IV  
PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA**

This chapter presents the data gathered, the results of the statistical analysis done and interpretation of findings. These are presented in tables following the sequence of specific research problems regarding to the Satisfaction in using barcode attendance for the Criminology Students of Data Center College of the Philippines, Laoag City.

**Level of Satisfaction in Using the Barcode Attendance**

The level of satisfaction in using barcode attendance was presented in four characteristics: the Functionality, Reliability, Usability and Efficiency

**Functionality**

- The degree to which a system provides the correct results with the needed degree of precision

Table 1. The level of satisfaction on the functionality of the barcode attendance

Variables	Mean	Verbal Interpretation
Functionality		
1. The registration platform is available anytime.	3.53	Satisfied
2. The system can scan bar code correctly.	3.54	Satisfied
3. The system performs the tasks required (monitoring attendance).	3.63	Satisfied
4. The verifying monitor runs properly.	3.57	Satisfied
5. The system prevents unauthorized access.	3.78	Satisfied
6. The interface looks good.	3.64	Satisfied

**Legend:**

Value	Range	Descriptive interpretation
5	5.00-4.21	Very Satisfied
4	4.20-3.41	Satisfied
3	3.40-2.61	Neutral
2	2.60-1.81	Dissatisfied
1	1.80-1.00	Very Dissatisfied

Table 1 shows that all items answered satisfied by the respondents as to the functionality of the barcode attendance. Results show that the system’s ability to “prevent unauthorized access received” the highest satisfaction rate of 3.78 which verbal interpreted as Satisfied, followed by the “good appearance of the interface” garnered the mean of 3.64 that falls under the range of Satisfied, then “the system’s performance of the tasks required” got a mean of 3.63 which interpreted as Satisfied. With these results, it can be deduced that generally, the respondents are satisfied with how the attendance system serves its purpose well.

This corroborates with the study of (Boissy, Jacobs, & Roy, 2006) which presented insights regarding the feasibility, usability and effectiveness of using a barcode scanner with older adults as an electronic data entry method on a PDA. The participants in this study found their experience with the barcode scanning system enjoyable and learned to become proficient in its use, the responsiveness of the system constitutes a barrier to

wide-scale use of such a system. And also the study entitled Attendance Monitoring support the result which stated that humans are prone to error but these machines are not and thus, it becomes reliable to use biometric machines instead of any other method or technology.

This implied that the respondents are satisfied in the performance of the system in terms of functionality that it can process well the intended functions of each component of the system. Thus, the barcode attendance has a big improvement in terms of attendance monitoring.

### Reliability

- The extent to which the system executes its declared functions within a particular time period under certain conditions

Table 2. The level of satisfaction on the reliability of the bar code attendance

Variables	Mean	Verbal Interpretation
<b>Reliability</b>		
1. The student can verify the scanned data in the monitor.	3.63	Satisfied
2. The system can monitor the attendance of the students.	3.85	Satisfied
3. The system can recover the data or information if the system malfunctions.	3.66	Satisfied

#### Legend:

Value	Range	Descriptive interpretation
5	5.00-4.21	Very Satisfied
4	4.20-3.41	Satisfied
3	3.40-2.61	Neutral
2	2.60-1.81	Dissatisfied
1	1.80-1.00	Very Dissatisfied

Table 2 shows the level of satisfaction of respondents as to reliability. Three (3) questions were asked which garnered answers that fall in the satisfaction range of 4.20 – 3.41. The highest mean reported was the “the system can monitor the attendance of the students” which accumulated the mean of (3.85). The second highest reported was “the system recovers the data or information if the system will malfunction” which accumulated the mean (3.66). The lowest number reported was “the student can verify the scanned data in the monitor” which accumulated the mean of (3.63). This means that the respondents trust the way the attendance system’ task of monitoring students’ attendance since it is performing consistently and satisfactorily well.

As to reliability, this study is supported by Khan, Chua, Wee and Wong’s (2018) where they introduced an automatic examination attendance system on smartphones based on the barcode to automatically capture student examination attendance and they found that an average of 5 seconds per scanning is obtained through eleven trials in simulating the attendance taking process during the examination.

The result shows that the respondents satisfied by the consistency in good quality of the system that the innovation from manual attendance monitoring to digital type is better.

**Usability**

- The degree to which specific users may use the program to accomplish specific goals in a given location with effectiveness, efficiency and satisfaction

Table 3. The level of satisfaction on the usability of the barcode attendance

Variables	Mean	Verbal Interpretation
<b>Usability</b>		
1. The user understands how to use the system easily.	3.86	Satisfied
2. The system can record student’s information.	3.71	Satisfied
3. The barcode is perfectly designed in mobile phones	3.85	Satisfied
4. The system is easy to operate.	3.7	Satisfied

**Legend:**

Value	Range	Descriptive interpretation
5	5.00-4.21	Very Satisfied
4	4.20-3.41	Satisfied
3	3.40-2.61	Neutral
2	2.60-1.81	Dissatisfied
1	1.80-1.00	Very Dissatisfied

It can be gleaned from Table 3, that the highest reported indicator of the system’s usability is “the user understands how to use the system easily” which garnered the mean of (3.86). The second to the highest being “the barcode is perfectly designed in mobile phones” which garnered the mean of (3.85). While third to the highest reported was “The system can record student’s information” which garnered the mean of (3.71). This means that the respondents are satisfied with the system because they understand its use and they can easily use or operate it using their mobile phones.

This collaborates the study of Boissy, Jacobs and Roy (2006) which stated there that the participants found barcode scanning easy to learn, easy to use and pleasant. As a result of their study they found their participants enjoying and learned to become proficient in using barcode scanning system.

As to the result, emphasized the difference of manual and automated attendance monitoring that they satisfied in the performance of the system in terms of usability that they can easily learn how to use that merely placing the barcode in front of the scanner they are now present.

### Efficiency

- The performance of the system in relation to the amount of resources used under specified conditions.

Table 4. The level of satisfaction on the efficiency of the bar code attendance

Variables	Mean	Verbal Interpretation
Efficiency		
1. The system responds fast to scanning the code entered by the user.	3.76	Satisfied
2. The system is efficient in recording the data of students.	3.65	Satisfied
3. The system shows well-organized information of the students.	3.74	Satisfied
4. The system can save the information of the students.	3.86	Satisfied

#### Legend:

Value	Range	Descriptive interpretation
5	5.00-4.21	Very Satisfied
4	4.20-3.41	Satisfied
3	3.40-2.61	Neutral
2	2.60-1.81	Dissatisfied
1	1.80-1.00	Very Dissatisfied

In Table 4, the respondents' level of satisfaction of the attendance system's efficiency is shown. Efficiency is indicated by the system's ability to "save the personal information" which garnered the highest mean (3.86). Another indicator of efficiency is the "fast response to scanning" the code entered by the user which received the 2nd highest mean (3.76). The third indicator of efficiency that received a mean of 3.74 is the system's ability to "show well-organized information of students". It can therefore be deduced that the student-respondents are generally satisfied with the present attendance system.

In terms of efficiency, the findings of this study are supported by the study of Yakub, Hambali, Adedeji and Adeniji (2016) which revealed that students are able to participate in the class attendance only by swiping their identity card through the barcode reader. They can view their attendance percentage which will motivate them to control their class attendance reputation.

This implied that the system can give convenient to every student because of respondents which satisfied in the performance of the system in terms of efficiency that the objective of the system is to improve the way we check attendance.

In summary, the characteristic of Usability garnered the highest mean of 3.78 which interpreted as Satisfied and the characteristic of Efficiency garnered the second to the highest mean of 3.75 which interpreted as Satisfied. Meanwhile, the lowest with a mean of contact the highest mean of 3.86 interpreted as satisfied. Meanwhile the characteristic Functionality garnered the lowest mean of 3.62, still interpreted as Satisfied. The result of the one (1) to two (2) months of implementation of the Barcode Attendance shows that the system is capable to monitor the attendance of students or its purpose.

**The problems encountered in using the barcode attendance**

While the barcode enrollment system received a consistent satisfactory rating in general, certain problems were encountered by the users

**Functionality**

- The degree to which a system provides the correct results with the needed degree of precision.

Table 5. Frequency of the occurrence of functionality problems

Variables	Mean	Verbal Interpretation
<b>Functionality</b>		
1. The system missed to scan barcodes.	3.21	Sometimes
2. The system scanned the barcode two times leading to misinformation.	3.08	Sometimes
3. The system cannot record accurate users’ information.	2.96	Sometimes
4. The system logs.	3.12	Sometimes
5. The scanner is not able to record exactly the information of the students.	2.97	Sometimes
6. The system does not send confirmation if that code is already scanned.	2.99	Sometimes
7. The scanner can only scan barcode at a distance of 2-4 inches.	3.96	Sometimes

**Legend:**

Value	Range	Descriptive Interpretation	Verbal Description
5	5.00-4.21	Always	The problem occurred everyday.
4	4.20-3.41	Often	The problem occurred 7-9 times a day.
3	3.40-2.61	Sometimes	The problem occurred 4-6 times a day.
2	2.60-1.81	Rarely	The problem occurred 1-3 times a day.
1	1.80-1.00	Never	The problem never occurred.

Table 5 shows the problems encountered by the user-respondents categorized under functionality, and the corresponding frequency of the occurrence of such problems. The highest reported was “the scanner can only scan barcode within 2-4 inches” which garnered the mean of (3.26) that interpreted as Sometimes. The second to the highest reported was “the system missed to scan barcodes” which garnered the mean of (3.21) that interpreted as Sometimes. The third to the highest “the system logs” which garnered the mean of (3.12) that interpreted as Sometimes. This signifies that occasionally, the barcode attendance malfunctions as manifested in the finding that there are times when it can only recognize or scan the barcode at a distance between two to four inches. Another function error is that at certain times it misses to scan barcodes. Other evidences of malfunctioning as experienced by the user-respondents include logging of the system, failure to record accurate user information, and its inability to send confirmation if the code is already scanned.

### Reliability

- The extent to which the system executes its declared functions within a particular time period under certain conditions.

Table 6. Frequency of the occurrence of reliability problems

Variables	Mean	Verbal Interpretation
<b>Reliability</b>		
1. The system cannot scan barcode correctly.	3.10	Sometimes
2. The monitor cannot show the scanned information of the students.	2.92	Sometimes

#### Legend:

Value	Range	Descriptive Interpretation	Verbal Description
5	5.00-4.21	Always	The problem occurred everyday.
4	4.20-3.41	Often	The problem occurred 7-9 times a day.
3	3.40-2.61	Sometimes	The problem occurred 4-6 times a day.
2	2.60-1.81	Rarely	The problem occurred 1-3 times a day.
1	1.80-1.00	Never	The problem never occurred.

Table 6 presents two (2) problems experienced by the user-respondents as to the reliability of the barcode attendance system: “the system cannot scan barcode correctly” garnered the higher mean of 3.10 which interpreted as Sometimes; and “the monitor cannot show the scanned information of the students” which garnered a mean of 2.92 and interpreted as Somtimes. From such results, it can be deduced that the present barcode attendance system is not quite reliable since there are rare occasions when it cannot scan the barcode correctly and cannot show the scanned information of students.

### Usability

- The degree to which specific users may use the program to accomplish specific goals in a given location with effectiveness, efficiency and satisfaction.

Table 7. Frequency of the occurrence of usability problems

Variables	Mean	Verbal Interpretation
<b>Usability</b>		
1. The system cannot function when there is power interruption.	3.17	Sometimes
2. The user experiences difficulties in scanning the barcode.	3.33	Sometimes

#### Legend:

Value	Range	Descriptive Interpretation	Verbal Description
5	5.00-4.21	Always	The problem occurred everyday.
4	4.20-3.41	Often	The problem occurred 7-9 times a day.
3	3.40-2.61	Sometimes	The problem occurred 4-6 times a day.
2	2.60-1.81	Rarely	The problem occurred 1-3 times a day.
1	1.80-1.00	Never	The problem never occurred.

The problems relating to the usability of the system is shown in Table 7. Of the two problems indicated, the higher reported mean (3.33) was on the “difficulty in scanning the barcode”. Which interpreted as Sometimes While the second problem (with a mean of 3.17) which sometimes occurred indicated that “the system cannot be used when there is power interruption”. The weighted mean of 3.25 further infers that the system problems are sometimes occurred which means that it needs to be improve in some cases.

**Efficiency**

- The performance of the system in relation to the amount of resources used under specified conditions.

Table 8. Frequency of the occurrence of efficiency problems

Variables	Mean	Verbal Interpretation
Efficiency		
1. The system cannot record the information of the students.	2.92	Sometimes
2. The scanner is slow in reading barcode.	3.06	Sometimes

**Legend:**

Value	Range	Descriptive Interpretation	Verbal Description
5	5.00-4.21	Always	The problem occurred everyday.
4	4.20-3.41	Often	The problem occurred 7-9 times a day.
3	3.40-2.61	Sometimes	The problem occurred 4-6 times a day.
2	2.60-1.81	Rarely	The problem occurred 1-3 times a day.
1	1.80-1.00	Never	The problem never occurred.

Table 8 shows the frequency of the occurrence of problems relating to the barcode attendance system’s efficiency, both of which are verbally interpreted as sometimes, just like the rare occurrences of other problems shown in the preceding tables and discussions. “the scanner is slow in reading barcode” got the higher mean of (3.06) which interpreted as Sometimes, while the second problem reported which was “the system cannot record the information of the students” garnered a mean of 2.92 which interpreted as Sometimes. This means that the system is not 100% efficient since it is sometimes slow in reading barcodes and there are also rare instances when it can not record the information of students.

All in all, the characteristic Usability garnered the highest mean of 3.25 which interpreted as Sometimes and the characteristic Functionality garnered the second to the highest mean of 3.18 which interpreted as Sometimes. Meanwhile, the lowest with a mean of 2.99 is Efficiency, still interpreted as Sometimes. As to the specific problems the top three encountered by the users of the system are: a. on its usability wherein users sometimes experienced difficulties in scanning the barcode; b. on its functionality, where the scanner could only scan the barcode within 2-4 inches distance; and c. the system sometimes missed to scan barcodes.

The study of Saad and Hashim (2013) confirms these problems encountered by the users when it identified some difficulties like: a. the so many types of barcodes; b. not all of the encoding barcode information were used; and finally, c. there were three barcodes that have been selected to be read by the system: EAN 13, Code 39 and code 128.

The theory where this study rests is the adaptive structuration theory, which, according to Poole (1994), is related to this study because of the use of barcode as a technology provided to monitor the attendance of the students. The theory will be the basis of how the barcode attendance system will change the actions of the students upon encountering those problems during the implementation of the barcode attendance.

### Coping Mechanisms used by students on the problems encountered in the barcode attendance

- The students response on the coping mechanism that they've used while encountered such problems to the barcode attendance.

Table 9. The coping mechanisms used by students on the problems encountered in the barcode attendance.

Variables	Mean	Verbal Interpretation
The students increased the brightness of their cellphones.	3.36	Sometimes
The students re-scanned the bar code to record the correct information.	3.75	Often
The students verified the scanned information in the monitor of the system.	3.75	Often
The students waited for the system to function.	3.57	Often
The students registered manually in the computer.	3.62	Often
The students registered again in the registration platform to get more accurate information.	3.62	Often

#### Legend:

Value	Range	Descriptive Interpretation	Verbal Description
5	5.00-4.21	Always	The problem occurred everyday.
4	4.20-3.41	Often	The problem occurred 7-9 times a day.
3	3.40-2.61	Sometimes	The problem occurred 4-6 times a day.
2	2.60-1.81	Rarely	The problem occurred 1-3 times a day.
1	1.80-1.00	Never	The problem never occurred.

In Table 9, it can be obtained that the highest mean went to those problems that have to do with rescanning the barcode to record the correct information and verifying the scanned information in the monitor of the system which gathered the highest mean of (3.75). This is verbally interpreted as Sometimes, meaning these problems are, in most instances, encountered by the users. For the problem that gathered the second highest mean (3.62), respondents revealed they registered manually in the computer and they registered again in the registration platform to get more accurate information. Lastly, the question "The students increased the brightness of their cellphones" gathered the mean of (3.36) which is interpreted as neutral.

In summary, the coping mechanism garnered the weighted mean of 3.61 which interpreted as Often means that even there are problems encountered by the students that shown in the tables 5-8 with a verbal interpretation as Sometimes there are solutions given by the students to lessen the problem that they've encountered.

According to the study of Saheed, Hambali, Adedeji and Adeniji (2016) support the result of the coping mechanism which they insight the barcode of the students must be accurate in terms of width and darkness in order to ensure the accurate data. And this study save time required to generate accurated results from the student's attendance.

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This final chapter restates the problem, summarizes the methodology and findings, draws conclusions and offers recommendations.

#### SUMMARY

According to our study regarding the level of satisfaction in using barcode attendance for the BS Criminology students, the problems encountered in using the barcode attendance and the coping mechanisms used by the students in the problems encountered in using the barcode attendance.

Tables 1 to 4 show the respondents' level of satisfaction in using the barcode attendance. Given that responses ranged from 1=Strongly Dissatisfied to 5=Strongly Satisfied, the results demonstrated that most of the average responses tend to be in satisfaction range (4.20 – 3.41) with the corresponding statements in the survey questionnaire.

As to Functionality, the highest reported was on the fact that the system prevents unauthorized access. This garnered a mean of (3.78) while the lowest reported was in that the registration platform is available any time which accumulated the mean of (3.53).

As to Reliability, there were only three questions asked which yielded responses that all fell under the satisfaction range of 4.20 – 3.41. The highest mean (3.85) reported was on the item "The system can monitor the attendance of the students," while the lowest garnered mean of 3.63 was on the observation "The student can verify the scanned data in the monitor." As to Usability, the highest reported was "The user understands how to use the system easily" which garnered the mean of (3.86) and the lowest was the "The system is easy to operate" which garnered the mean of (3.70).

As to the level of satisfaction in using the barcode attendance the greater satisfaction reported was on the observation "The system can save information of the students" which garnered the highest mean of (3.86) while "The registration platform is available anytime" was reported garnering the lowest satisfaction with a mean of (3.53).

Tables 5 to 8 present the problems encountered by the respondents which were described in terms of functionality, reliability, usability, and efficiency. Functionality was reported to have garnered the highest mean (3.26) in terms of the issue "The scanner can only scan barcode within 2-4 inches" and the lowest was the "The system cannot record accurate user's information" which garnered the mean of (2.96).

As to Reliability, the highest mean was recorded on the issue "The system cannot scan barcode correctly" with a mean of (3.10) while the lowest was the "The monitor cannot show the scanned information of the students" which garnered the mean of (2.92).

Meanwhile, the system is not perfectly user-friendly as it yielded the highest mean of (3.33) in Usability observation "The user experienced difficulties in scanning the barcode" while it yielded the lowest mean (3.17) in the observation "The system cannot function when there is power interruption."

As to Efficiency, the problem identified to have the highest mean of 3.06 was "The scanner is slow in reading barcode" while the lowest is "The system cannot record the information of the students" which garnered the mean of (2.92).

The descriptive statistics for the program design components are shown in Tables 4, 5, 6, 7, and 8. Given that responses ranged from 1=Never to 5=Always, the results demonstrated that most of the average responses tend to be in sometimes with the corresponding statements in the survey instrument. While the measures themselves have no intrinsic value, they do allow for statistical comparison and analysis. Across the sample, greater occurrence was reported for the statement "The user experiences difficulties in scanning barcode"

(M=3.33) and lesser occurrence was reported for the statement “The system cannot record the information of the students” (M=2.92).

Table 9, on the other hand, shows the coping mechanism used by the students with the highest reported mean (3.75) in the items “The students rescanned the barcode to record the correct information” and “The students verified the scanned information in the monitor of the system.” The lowest mean was recorded in the mechanism “The students increased the brightness of their cellphones” with the mean of (3.36).

## CONCLUSION

Generally, the BS Criminology students are satisfied in using the barcode attendance. This satisfaction is quantified by the mean (4.20-3.41). This implies that using the barcode attendance system as a means of monitoring attendance of students has big benefits to students over the traditional way of recording and monitoring student’s attendance and including the fact that the process is time efficient and stores data in electronic mode instead of paper. It is an efficient method of storing the attendance in the computer rather than wasting paper used for recording student attendance. The barcode-based student attendance system can be easily accessed by students upon entering the premises the fact that all students by now are connected to their gadgets which serves as there shadow that no students going out without gadget so by using their gadgets instead of cards are now more effective in terms of their comport zone. This proves to be useful for real-time attendance monitoring as one of the improvements and innovations in this generation. However, there are problems or issues reported by the students.

## RECOMMENDATIONS

Based on the findings and conclusions drawn the following are recommended that:

- Upgrade the barcode scanner in the sense that it can efficiently read barcode to lessen the problems about scanning and to avoid the overall malfunction of the system.
- Provide video instruction on how to use the system properly which to be posted in the facebook page for the information of every students.
- For the easy to use and reach, it is recommended that the barcode must be in the back part of the ID of each student occupying the one half of it for clearer reading of barcode scanner.
- To ensure more the safety of the students, it is recommended that system must provide SMS to the parent whenever their child entered the school.
- For the system to be more useful, it is recommended that mobile phones of instructors or authorizes students must possessed an APPS that can scan codes which also appear in the system during outside activities.
- The Data Center College of the Philippines of Laoag City, Inc.-CCJE to adapt the action plan.

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