Quick Response Code System Integrated ID for Construction Firms: Approach to the New Normal

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Abstract: - The manual attendance system is consuming the working hours of a worker, causing a delay in work production. It is commonly known that using a digital attendance system (Quick Response Code System) is faster and safer than using a manual approach. This study shows how much time can be saved by a QR code system for digital attendance in a construction site that aims to maximize the working hours. In this context, a Quick Response Code is a sequence of black and white squares that can be read by machines. It's usually used to save URLs and other information that your mobile camera can read. To be able to get the results, we tested the system at the construction site in San Fernando, Pampanga. We requested permission from the higher-ups, and they granted it. We tested the workers and we got good results. It is more efficient if their id's have QR code and not the manual or the biometrics that they normally use, and by using the QR code, there will be less contact, especially in this pandemic, because they have their own id.

Key Words: Construction Firm, Integrated ID, Quick Response Code.

I. INTRODUCTION

With the development of advances for distinguishing proof of the workers in an organization, they lie on manuals, written by hand, ID cards, and records. If an ID is shown, it would be a lot simpler to distinguish and follow his development. Along these lines, we executed progress utilizing QR code ID. We did our best to deliver the QR code ID card correctly. Code is input to the ID card, and data can be found by examining the QR code with the QR identity Application on your computer. The QR code is supposed to be the up-and coming age of standardized tags, and utilizing QR codes with ID cards brought positive results.

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While utilizing programming apparatuses, character cards turn out great and are appropriate for an instructive organization as they are free. The ID card will be an ideal utilization of present day innovation in agricultural nations.

According to Richard, D. & Md. Sanaul H (2014), to contain the spread of COVID-19, the work office's territorial office in the business-rich Calabarzon has fostered a Quick Response (QR) code that takes internal heat level, records contact subtleties, and permits fast following of guests and representatives. The web-based wellbeing agenda, which capacities like a computerized logbook utilizing QR codes, was carried out by the Department of Labor and Employment Regional Office No. IV-A (DOLE IV-A) to screen every one of its guests and representatives. All workers and customers of DOLE IV-A who want to enter the workplace should check the code before entering the premises. Contact following is a fundamental advance and is the factor the web-based wellbeing project is being monitored to accelerate the current manual cycles and to make it faster to stop the spread of the infection especially if the limitations were facilitated.

According to Pranjali Pandey (2021), biometrics are physical or behavioral human features used to digitally identify a person to allow access to systems, devices, or data. Fingerprints, facial patterns, voice, and typing cadence are examples of biometric identifiers.

However, in terms of accuracy, cost-effectiveness, maintenance, and future scope, QR Codes outperformed fingerprint biometrics.

These days, with the development of the populace, individuals should be distinguished and it is presently an absolute necessity for any association and friends to utilize the Identity card. Any worker identification card is meant to be their outline. It is profoundly fundamental for an organization to give an identification card to every single representative. The card was viewed as the synopsis of worker data. The task Advanced QR coded identification Card Generation is being made to diminish their work as we as a whole know individuals before utilizing the transcribed ID card. The ID is the unadulterated robotized arrangement and it will assist with creating the worker's ID card without any problem. It is an uncommon sort of programming that will be utilized to make a development identification card with a quick response code rather than the scanner tag. Programming is created on our identification card that captures the worker's photo and QR code. For example, a business card has just a QR code office and will add every one of the components in a single identification card. This product will go about as a brilliant identification card. Another significant point is, that it can track down an open-source which implies it will be accessible free of charge. QR code can be read with any QR IDENTITY application on your PC and it will show all the data of the understudies, resources, and staff.

According to Aayushi M. & Manish M. (2017) QR code is a storage of information generated by a code. Two-dimensional code is a matrix that can scan through vertical and horizontal, it will read at any angle and can be less the time consumed when scanning. Unlike the traditional barcode that can only be scanned horizontally and it takes time when it is not perfectly aligned to the scanner and that mechanism is called a 1D dimension. QR code has more storage capacity than the barcode, it can handle more data. A 7,089 numeric characters, 4,296 alphanumeric characters, 2,953 binary bits, and 1,817 Kanji characters can all be stored in a QR code. These number shows that the QR code can be more sufficient than the barcode and it can store much more information. In addition, the QR code is smaller than the barcode which where can be placed in the objects that barcode cannot be placed because of its particular size.

For example, a business card contains only a QR code for the office. In any case, this product will combine all the components into one ID card, and that ID card will be known as the shrewd ID card. The QR code can be examined and it will show the data of the laborer, including his or her health, the progress of the representative, the current status of the organization, and other individual subtleties of him/her. In addition, to foster a QR ID verification code system that will ensure the safety of critical data and information for each employee in the organization or company.

The performance and output of an employee differ from another based on their morale. When the employee morale is high, the productivity level of the employee is also high, which means that morale is directly proportional to performance (Mishra and Jena, 2020). According to Killingsworth and Gilbert, as cited by Pattnaik et al., the mind is always thinking about the past and the future and it can directly affect the employee, so the organization needs to create a welcoming workplace to ensure that the company's employee morale is always high. An employee that works in a remote workplace impacts performance. Thus, experiencing isolation and lack of interaction can affect employee morale, which can make the employee's cognitive and performance lower. However, having a supervisor present for the employee can lead to better productivity because it allows the employee to interact, and it can create a path to align their organizational goals.

II. METHODOLOGY

2.1 Research Design

The researchers monitored the methods of how a particular Construction company does its attendance within the province of Pampanga, to see if it is time consuming to operate. The researchers then studied the factors causing delays in attendance using related literature and created a questionnaire survey to assess the selected workers.

Experimental research is the type of research that is to be used. It manipulates one variable and randomizes other variables. It had a control variable, which is the time it takes to complete an attendance queue. The researchers used this method to investigate if implementing a QR code embedded I.D. can help to minimize the time it takes to fill out an attendance form.

2.2 Population

The objective of this study is to minimize the amount of time it takes to fill out an attendance sheet in a construction firm within

the vicinity of San Fernando, Pampanga. The data was gathered through a survey/questionnaire to determine the cause of the delays in signing the attendance. The survey was done in such a way that construction employees could fully comprehend the questions asked, ensuring the accuracy of the data acquired. The construction workers who utilized pen and paper to sign their attendance were the respondents of this study.

2.3 Research Instrument

The researchers surveyed the respondents as a research tool that gathered data needed for the study. The survey guide questions were formed and can be answered using the options provided. The attached questionnaires were then validated by the research consultant and psychometrician to qualify for conduction.

2.4 Data Collection Procedure

Before gathering data, aspects like the consent of the particular firm and the researcher's health were taken into consideration before regulating the questionnaire under the province of Pampanga. The study was conducted at six companies with a target of 150 construction workers. Before conducting preliminary visits, the researchers asked for the approval of a letter to the school officials to make the data collection formal and valid. Then, two preliminary visits were made before the data collection from the construction company to inform and formally ask permission from the company head. The first visit was to check with the construction company whether they were using the pen and paper method in signing-out workers' attendance. Through this, we can confirm that the companies were suitable for the study. The second preliminary visit was to formally present the letter to the CEO of the company, and a detailed discussion was had regarding the study and finalized the dates for when the survey would be conducted, how long it would take, regarding the confidentiality of the answers that they will be providing to the researchers, the medium that we are going to use in collecting the data, and lastly, the discussion about informed consent. The researchers made use of the Filipino/English language to communicate efficiently with the respondents.

2.5 Data Analysis Procedure

After the system had been programmed, utilization was then conducted. An identification card (ID) with an embedded QR code has been given to the selected respondents. The program was utilized in gathering the necessary data for the study.

2.6 Program Development

2.6.1 Designing Stage

At this point, IT professionals have a solid idea of what a program should produce and what data they will need in the process. This stage was designed using a variety of applications and tools. The Figma Design Tool is a piece of software that is used to design the exterior of the web system. Figma is a web-based graphics editing and UI design application. It's used to create all types of graphic design work on the web platform. As for visual database design, MYSQL Workbench is used. The database's structure is primarily designed to be user friendly. It is made up of the worker's information, salary, and time in and out. The program's design is modifiable throughout the system, making it flexible for any alterations.

2.6.2 Developing Stage

The researchers utilized Visual Studio Code as a code and text editor during the development stage of the web program. MySQL Workbench is in charge of the DBMS (Database Management System) that stores data in hard drive files. MySQL is a well-known open-source database that aids in the development of system applications. The program is written in the PHP (Hypertext Preprocessor) programming language. It's a widely used computer language that's included in HTML. The script is employed in the development of dynamic web pages.

2.6.3 Testing Stage

Testing is the final phase after designing and developing, and it is used to acquire experimental data at particular construction sites. During the test, Windows 10 with the Linux subsystem was used. The system was extensively tested to ensure that it functions as intended, with the least amount of delay in its implementation. The test run also includes a check for any potential bugs that need to be fixed straightaway. Laragon is a recommended web server for a PHP development environment that is both fast and powerful. To run the application, the

Computer needs to have at least two cores, 4 gigabytes of RAM, and a 1.8 GHz CPU. The data processed by the QR Code system can be visualized through the monitor. The researchers provided a TEAKLAD Mini Desktop QR Code Reader Mobile Payment Barcode Scanner in order for the QR Code to be read.

III. Results And Discussion

3.1 Survey Questionnaire Response

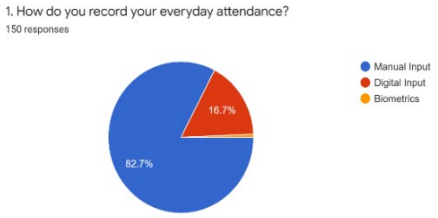


Fig.1. Pie Chart Showing Percentages of Respondent's Medium Used to Record Attendance

The pie chart shown above consisting 150 respondents, 82.7% (124) respondents answered "Manual Input", 16.7% (25) respondents answered "Digital Input" and 0.6% (1) respondent answered "Biometrics". According to the evidence present, most of the respondents use manual input in their everyday attendance.

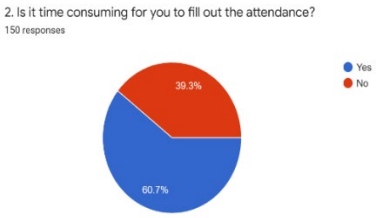


Fig.2. Pie Chart Showing Percentages of Time Consumed to Fill-out Attendance

The pie chart shown above consisting 150 respondents, 60.7% (91) respondents answered "Yes" and 39.3% (59) respondents answered "No". According to the evidence present, majority of the respondents agreed that filling out the attendance is a time-consuming task.

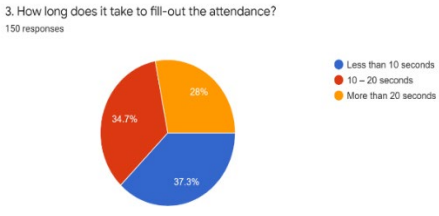


Fig.3. Pie Chart Showing Percentages of Time to Fill out Attendance

The pie chart shown above consisting 150 respondents, 37.3% (56) respondents answered "Less than 10 seconds", 34.7% (52) respondents answered "10-20 seconds" and 28% (42) respondents answered "More than 20 seconds". Within the given data, the majority of the respondents still takes more than 10 seconds to fill-out the attendance.

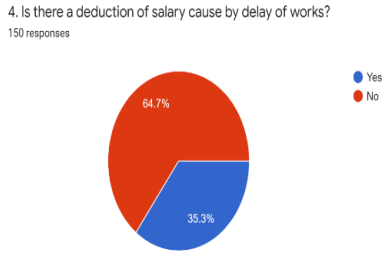


Fig.4. Pie Chart Showing Percentages of Respondent's Salary Deduction Due to Delay of Works

The pie chart shown above consisting 150 respondents, 64.7% (97) respondents answered that there was no deduction of salary cause by delay of works and 35.3% (53) respondents answered that there was a deduction of salary cause by delay of works.

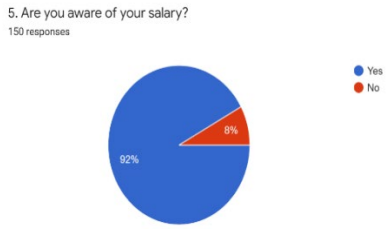


Fig.5. Pie Chart Showing Percentages of Respondent's Salary Awareness

The pie chart shown above consisting 150 respondents, most of the respondents consisting of 92% (138) respondents answered that they were aware of their salary and 8% (12) respondents answered that were not aware of their salary.

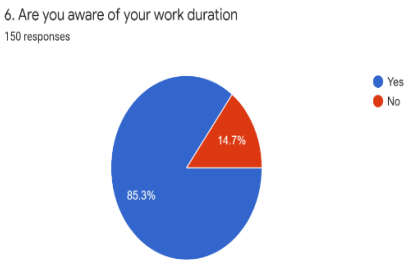


Fig.6. Pie Chart Showing Percentages of Respondent's Work Duration Awareness

The pie chart shown above consisting of 150 respondents, 85.3% (128) respondents answered "Yes", 14.7% (22) respondents answered "No". According to the evidence present, most of the respondents aware of their work duration.

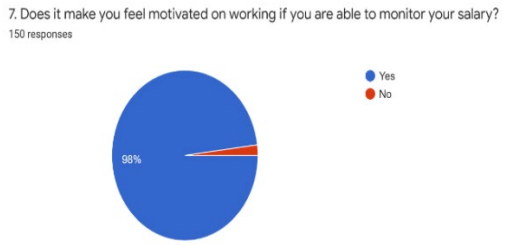


Fig.7. Pie Chart Showing Percentages of Respondent's Morale having Salary Transparency

The pie chart shown above consisting of 150 respondents, 98% (147) respondents answered "Yes", 2% (3) respondents answered "No". According to the evidence present, most of the respondents feel motivated on working if they are able to monitor their salary.

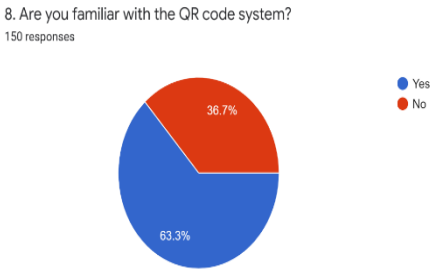


Fig.8. Pie Chart Showing Percentages of Respondent's QR Code System Familiarity

The frequency distribution table show, majority of the respondents answered "Yes" with a 150 respondents 63.3% (95) of them answered "Yes" and 36.7% (55) answered "No". Based on the percentage given, most of the participants were familiar with the QR code system.

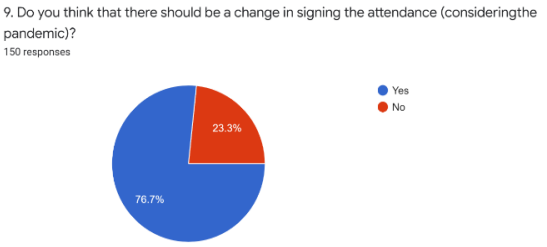


Fig.9. Pie Chart Showing Percentages of Respondent's Desire to Modification Signing Attendance

The pie chart shown above consisting of 150 respondents, 76.7% (115) respondents answered "Yes", 23.3% (35) respondents answered "No". According to the evidence present, most of the respondents think that there should be a change in signing the attendance.

3.2 The Programmed Quick Response Code Integrated ID Attendance System

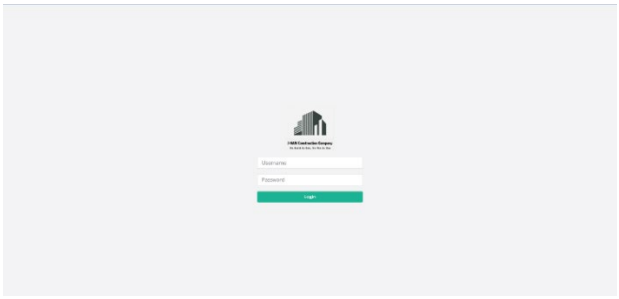


Fig.10. Home Screen of the Attendance System

The figures following display the interface that the user sees in the QR Code Integrated Attendance System functioned by the researchers. Figure 3.10 shows the initial page of the system. This tab contains the construction corporate icon and is linked by HTTP basic authentication. The system was created in such a way that the displayed features and icons are modifiable.

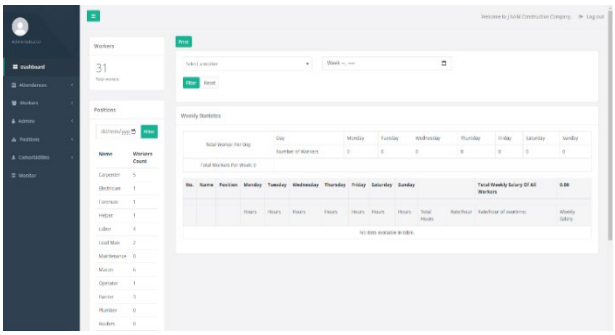


Fig.11. Side Panel of the Attendance System

The user may pick certain data on the Dashboard Screen, which is displayed on the system's side panel, by filtering the day, week, and worker in the filter button. This screen has options for minimizing the side panel, printing, and logging out. This screen centers on the listed manpower's weekly statistical data, such as: daily number of workers; weekly number of employees; daily number of hours of workers; weekly rendered hours of workers; the standard and overtime rate of the worker's salary; and the total weekly salary of all workers. The system is designed to display the overall number of registered personnel on the system, the list of registered positions, and the daily

manpower headcount. Also in this section, the system has options for minimizing the side panel, printing, and logging out.

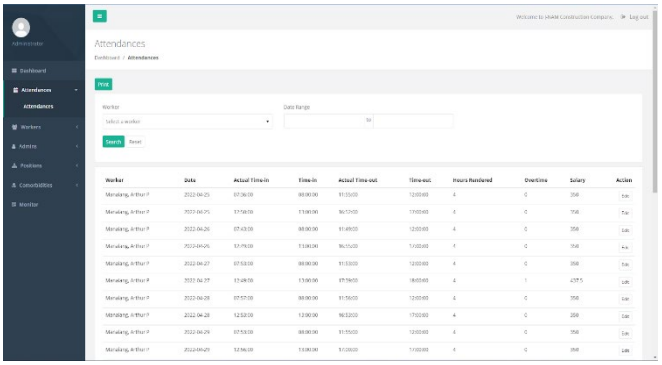


Fig.12. Side Panel for Workers Side Panel Screen

Under the attendance side panel screen, workers' attendance history is monitored along with their dynamic and static time in-and-out. On the one hand, a static system is one in which the output at any point in time is dependent on the input sample at the same time. It focuses on the present and fixed monitored data. A dynamic system, on the other hand, is one in which the output at any point in time is dependent on the input sample at that point in time as well as at subsequent points in time. It focuses on past and future input based on a specified basis. It is a memory that allows the system to automatically compute the daily salary of the workers based on the number of hours worked and the rate per hour. With the data obtained, the admin is capable of printing the presented information for daily tracking. The system also includes an edit option for an instance where there is an existing problem with attendance tracking.

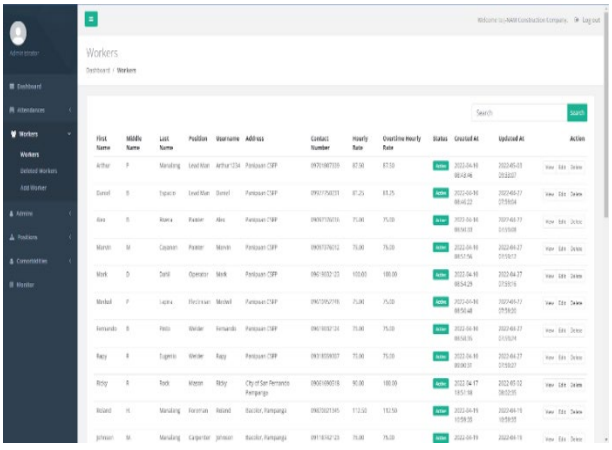


Figure 13.1 Side Panel for Workers – Workers

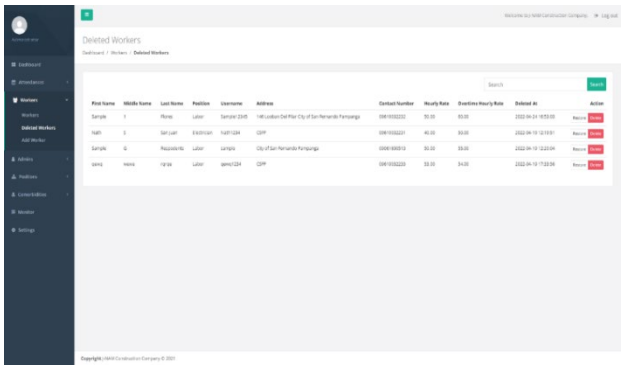


Figure 13.2 Side Panel for Workers – Deleted Workers

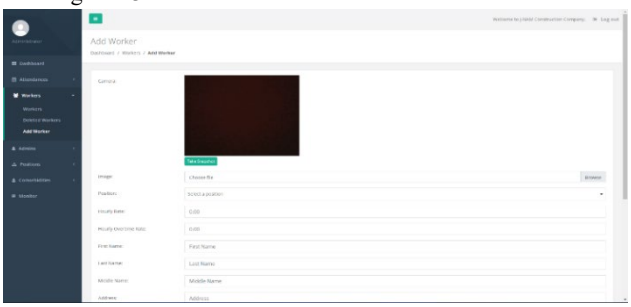


Fig.13.3. Side Panel for Workers – Add Worker

The workers' list is displayed on the workers' side panel, which also contains the workers' database. Its functions are classified into three categories: (1) Workers (*Figure 13.1*), (2) Deleted Workers (*Figure 13.2*), and (3) Add Workers (*Figure 13.3*). The system is partitioned by function for each portion rather than all around as one, which provides a more user-friendly approach. The database of workers in *Figure 13.1* comprises data such as complete name, position, username, address, contact number, hourly rate, overtime hourly rate, status, time when profile was established, and time when profile was updated. This helps as information is stored in the system with its own given privacy as the admin has the only access to this section. Moreover, other functions such as viewing, editing, and deleting workers and search tools are included for their added flexibility. As the view tool is accessed, the generated quick response code, which serves as the worker's ID, is presented. The system has a filter option for selecting a range of dates to filter worker attendance. As it is capable of listing its history for the purpose of printing out receipts needed, information about the workers is editable in *Figure 13.2* as it helps to adjust errors and update the data. The deleted cell, as shown in Figure *13.3*, is designed to store information about the deleted workers in the system. Deleted cells are useful in terms of restoring data for efficiency as they are also equipped with a search tool.

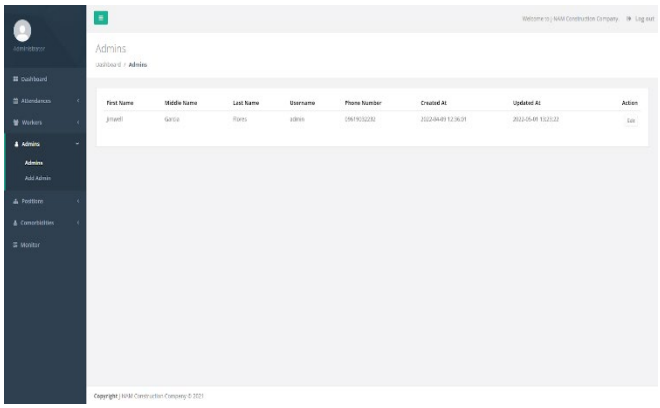


Fig.14.1 Side Panel for Admins – Admins

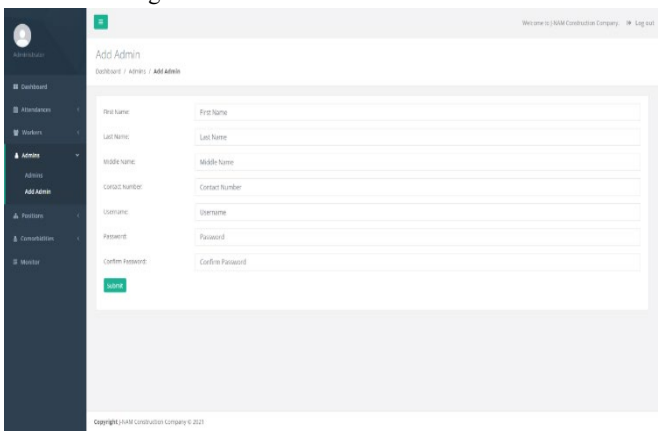


Fig.14.2 Side Panel for Admins – Add Admin

An Admin has complete control over the system and is capable of organizing and altering system variables. In this section, *Figure 14.1*, general information such as complete name, username, phone number, time the profile was created, and time the profile was updated is displayed. It provides access to the editing tool, which aids in data replacement or update. *Figure 14.2* is the interface for adding a new administrator.

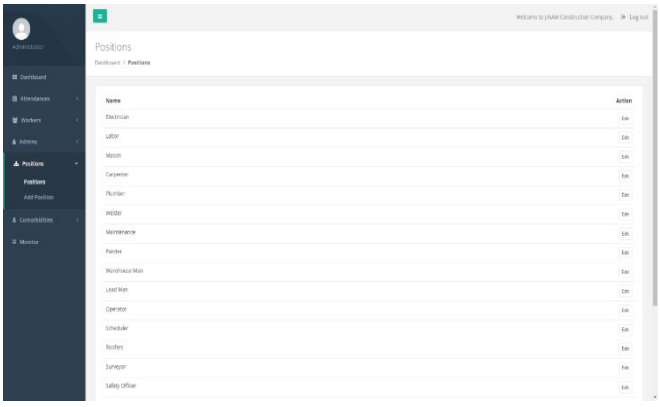


Fig.15.1 Side Panel for Positions - Positions

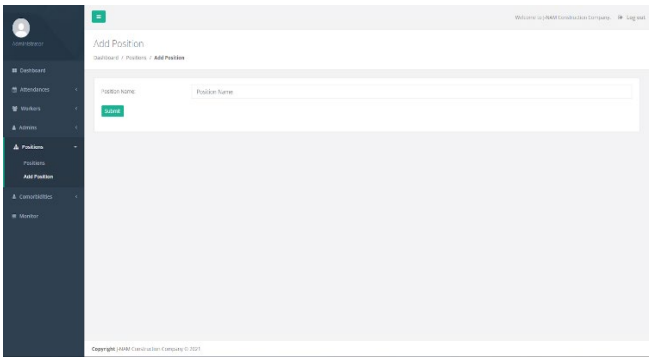
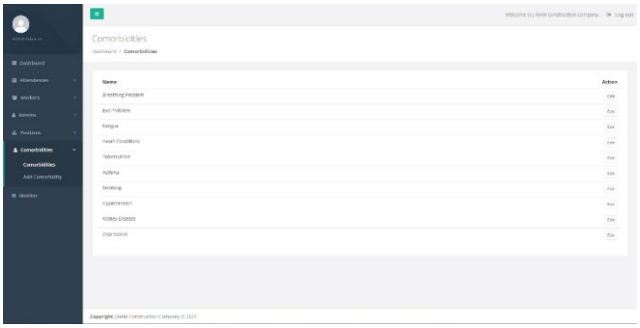


Fig.15.2 Side Panel for Positions – Add Positions

The system provides two sub-options when you click the positions in the side panel: Positions (*Figure 15.1*) and Add positions (*Figure 15.2*). The section includes all available posted positions on a certain construction company. Where the administrator has the capability to change or update the existing position.



Fig,16.1 Side Panel for Comorbidities - Comorbidities

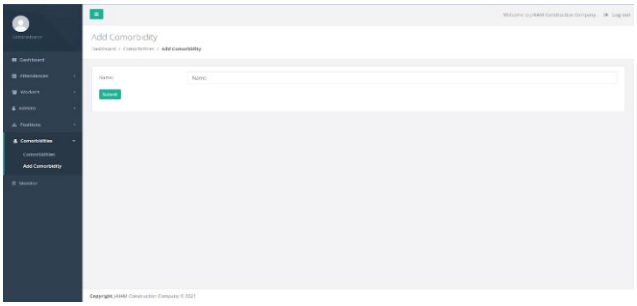


Fig.16.2 Side Panel for Comorbidities – Add Comorbidity

Considering the system is designed to be flexible, the comorbidities section offers an add comorbidities option (see *Figure 16.2*). Comorbidities that are listed in the system may be located in the comorbidities sub-option, as shown in *Figure 16.1*. It is helpful for administrators to distinguish between medical conditions that are present in their employees at the same time, as it provides preventative control for potential risks that may occur during work hours.

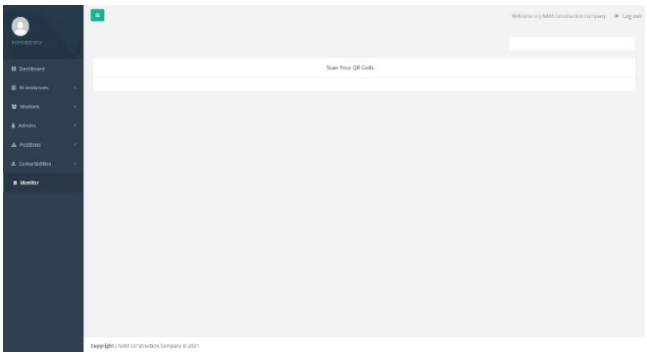


Fig.17. Side Panel for Monitor

Figure 17 displays the system's front screen when it is operating. When an individual's quick response code is scanned, the data of the workers, including their corresponding time in-and-out and anticipated salary, is presented briefly on this screen. It is intended to be shown for a few quick seconds for the purpose of data privacy and time efficiency.

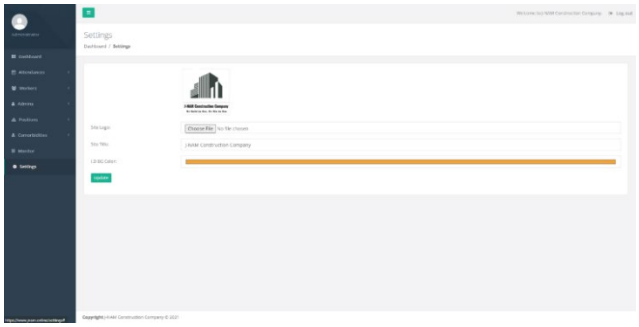


Fig.18. Side Panel for Settings

The admin has the ability to change the site logo, site title, and color theme of the generated ID. The function is located on the system's side panel, as displayed in *Figure 18.* This function is valuable for the flexibility of the system in terms of expanding the scope of available companies suited for the running of the system.

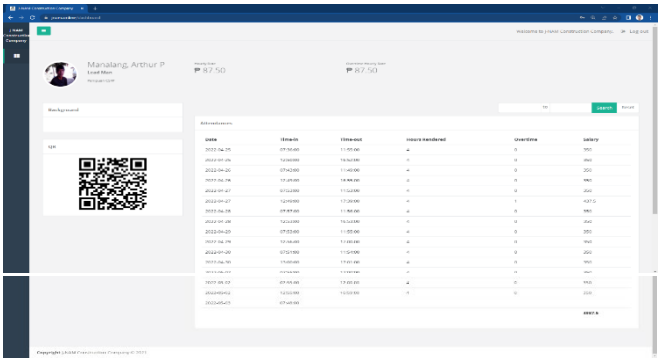


Fig.19. Home screen for Worker Point of View

Figure 19 displays the point of view of the worker after the system scans the personal QR code of the worker. On the screen, information including the worker's unique generated QR code may be viewed. The date filter is another built-in feature of the system that allows individual workers to filter their attendance days. The system is set up such that the presence of worker is logged and visible in the data.

3.3 Limitation of the System

The main focus of the system is to create an online QR-code-based identification card that will be used in signing attendance. The system was primarily developed to reduce the amount of physical interaction of workers due to the pandemic. If ever power interruption occurs, manual attendance (pen and paper) will be utilized to compensate the problem. Due to the system being digital, external factors are not included.

3.4 Advantages and Disadvantages of the System

The main advantage of the system is versatility. Since the system uses QR codes, it can be scanned anytime, anywhere using mobile phones. There is no need to write vital details down; employees simply scan and attendance will be automatically recorded. It also reduces paper and material consumption, and it does not require an understanding of how to code. Another advantage is that it stores a large amount of information, including the employee's profile, where they can monitor their work hours and salary anytime and anywhere using smartphones. It is also a healthy way of getting an employee's attendance by minimizing physical contact.

But on the other hand, it also has disadvantages like some other systems. One of those is the lack of familiarity with QR codes among employees, and the initial cost of this system and other devices needed like computers, smartphones, and scanners is often expensive.

IV. Conclusion And Recommendation

The result shows that some of the companies use manual attendance which causes delays in their working hours and especially to the social distancing protocol as the pandemic is still going on. Other companies use digital input for attendance, which can make it an easier way to fill out the attendance worker. Manual attendance affects the working hours of a worker, even if a little bit of time is consumed by the input of attendance. It can cause a line of workers that also needs to fill up. Most workers are aware that their salary depends on the work duration of a worker. It includes overtime and under time. It shows that workers will appreciate it if they are in control of their everyday salary. In that case, workers can feel more

motivated when they are capable of seeing their pay, not just knowing it.

The QR-based uniform design promotes a smooth flow of collaboration among employees and decreases information processing and transmission delays. They can just scan their mobile devices upon arrival. They don't have to write in a manual form, so it only takes a few seconds to sign in for the individual attendance.

Better production in works increases the percentage chance of economic growth of the company. It will maximize the capacity of every worker to do their job efficiently and allowing them to produce more works that will be done on time or will be done early than the expected time. By means of that, the company will pay less and have more profit if the total working days reduce because of the reduction of delay and fast production in working hours.

The potential involvement of a third party is one of the potential difficulties that may arise during the implementation phase of the system. The process of migrating the data from the pre-method to the new method, the ensurement of data integrity is at risk due to the possible existence of data loss. Because the system is new to the user, particularly those who are unfamiliar with digital transition, one of the difficulties in implementation is adjusting and adopting to implementing new changes. Setting up communication between users and administrators may not go as well as intended. Some users may be satisfied with the current pen-and-paper method and may not prefer to switch to the new digital platform. Preparation for the adjustments is critical, as it includes a discussion of the efficiency of the system for the users.

Lack of usable gadget won't affect the implementation of the system because the main source of the device that is going to use is being provided by the company. The QR code will be embedded in the ID card and will not be worried about the device. About the update of the attendance and salary, the admin will provide a printed copy of their attendance record and for every signing in and out the workers have a visual to their attendance and salary on the monitor provided. That is why it doesn't affect much about the implementation of the system.

The majority of the workers were familiar with the QR code system. It shows workers had an idea of the function of the system and that they could easily adopt the use of the QR code system. Most employees believe that there should be a change in signing attendance, particularly in these times of pandemics. With these, the researchers made a program that can help in dealing with the delay of work due to signing manual attendance.

The researcher devised a program that allows workers to easily sign in and out with less time spent than manual attendance. The program also shows the everyday salary of the workers when they sign in and out to the monitor. With this program, it can also allow the admin to monitor every worker's status, such as health. Recommendation

Due to the ongoing pandemic, construction sites were adjusting and were required to follow health protocols such as wearing PPE and gathering information about or data on the construction workers. In addition, the different schedules of workers were one of the reasons that the scope was limited to volunteered participants. The testing of the program was conducted only on residential and commercial construction sites.

In the future, researchers will find more testing sites not only here in Pampanga to see the differences due to the increasing diversity of participants and the ongoing situation at the site. In addition, they can consult specialists for feedback to broaden their knowledge and to know if they need to update something in the system. And, do not limit the study only to commercial and residential property. Furthermore, educate the workers about the QR code because most of them are not knowledgeable about it for the reason that they still use the old system for getting their attendance. To create a back-up (battery, power bank, etc.) incase sudden interruption occurs that affects the efficiency of the system and to allow the system to operate continuously. To create a medium within the system that allows the admin and the workers to communicate. Lastly, to further develop the system to accommodate the site requirements and the trends for the convenience of the users.

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