Implementation of Computerized Maintenance Management System (CMMS) in Ready-made Garments Factories by Using Odoo Maintenance Module

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Abstract:

Garment factories include a variety of machines and equipment. The breakdown of any machine or equipment leads to disruptions in the production process and loss of productivity. Consequently, the maintenance system emerges as a pivotal factor in the realm of garment manufacturing to enhance the life cycle of equipment. Maintenance is the action to retain or to fix or to restore an item in a state in which it can perform its function. Maintenance is divided into two main procedures; preventive and corrective. Maintenance management is a collection of activities designed to formulate maintenance objectives, strategies, and responsibilities. The escalating volume of accessible information and a rising demand for immediate access to it for decision-making underscore the essential role of a computerized maintenance management system (CMMS) in supporting maintenance management. Odoo Maintenance refers to the maintenance management functionalities provided by the Odoo Enterprise Resource Planning system, its open-source business management software that integrates various applications to streamline and automate different aspects of a business.

In this paper, CMMS was implemented using Odoo Maintenance in one of the ready-made garment factories instead of using traditional worksheets and reports for maintenance, as it had a clear impact in creating databases for the factory's maintenance management, communicating easily between the maintenance team, and dividing the equipment according to different categories. Create preventive and corrective maintenance requests and track the procedures performed on each piece of equipment, display the maintenance calendar for the equipment, and create various maintenance reports and graphs that are easy to analyze.

Keywords:

Ready-made Garments Factories; Maintenance management; Computerized Maintenance Management System; Odoo Maintenance Module.

Introduction

Garment factories typically include a variety of machines and equipment. The breakdown of any of these machines or equipment can lead to disruptions in the production process, resulting in a loss of productivity.

To get a perfectly finished product at the end of the production, it is essential to ensure the functionality of machines and equipment you use for the manufacturing process.

The major strategic goals of garment manufacturing companies would be to increase more productivity while reducing expenditures, and higher profitability. The core process of garment manufacturing companies is the production process, so maintenance is an important input into it. The efficiency of the factory is contingent upon the machines operating with optimal effectiveness.

To mitigate such issues, proper maintenance is essential to enhance the life cycle of these machines and equipment. Consequently, the maintenance system emerges as a pivotal factor in the realm of garment manufacturing.

Research Problem

Despite the diversity of machines and equipment in ready-made garment factories, there are deficiencies in traditional maintenance systems through the following:

- ❖ Create databases for maintenance management in ready-made garment factories.
- ❖ Divide equipment into different categories.
- ❖ Create and track preventive and corrective maintenance requests.
- ❖ Track the maintenance procedures performed on the equipment.
- ❖ Create a maintenance calendar for equipment to assist maintenance teams.
- ❖ Create various maintenance reports and graphs that are easy to analyze.

Research Importance

❖ The escalating volume of accessible information and a rising demand for immediate access to it for decision-making underscore the essential role of a computerized maintenance management system (CMMS) in supporting maintenance management.

Research Aim

❖ The aim of this work is to implement a Computerized Maintenance Management System (CMMS) using Odoo Maintenance in a garment factory.

Maintenance

Over time, the meaning of maintenance has suffered many transformations. In the past, maintenance has been described as a "necessary evil." When component in a process machine breaks down, it is replaced. Now, Maintenance is considered a complex management process that links many organizational processes like production, quality, environment, risk analysis and safety. *(Z. Stamboliska et al, 2015, Isabel Lopesa, et al. 2016)*.

Maintenance is the action to retain or to fix or to restore an item in a state in which it can perform its function by the combination of all technical managerial, administrative, and supervision actions (*Mirka Kans, 2008*).

Equipment maintenance and reliability are relevant factors that have a strong impact on organization's ability to provide quality and timely services to customers (*Muchiri P, et al. 2016*).

Types of Maintenance

There are different actions upon which maintenance is performed, and there are different classifications of types of maintenance, maintenance is divided into two main procedures, preventive and corrective (*Michael Wienker, et al. 2016*).

Preventive maintenance

Examining the state of a machine or instrument's operation is one of an industry's main responsibilities. All operational needs are efficiently managed by effective preventive maintenance *(Ali Rastegari, Volvo GTO Mohammadsadegh Mobin, 2016)*.

Preventive maintenance is a process primarily designed to extend the life of an asset by controlling or preventing excessive depreciation or unexpected failure.

Preventive maintenance is of two basic types: Calendar-based maintenance and usage-based maintenance. Therefore, preventive maintenance is the maintenance of equipment servicing done at regular intervals. (*Michael Wienker, et al. 2016*).

Preventive maintenance is based on periodic inspection, maintenance, servicing cleaning or replacement of parts to prevent sudden system failure *(Alok Kumar Sarker, 2019)*.

The expense associated with breakdown maintenance typically exceeds that of preventive maintenance. Preventive maintenance offers several benefits, including keeping equipment in optimal condition to avert significant issues, prolonging the lifespan of equipment, detecting and addressing minor issues before they escalate, facilitating well-trained technicians, minimizing rework and scrap, reducing process variations, enhancing equipment safety, optimizing inventory levels of parts, and substantially decreasing unplanned downtime. (Gaurav Gera, 2012. Alok Kumar Sarker, 2019).

Preventive maintenance provides numerous benefits to organizations across diverse industries:

- *Reduced Downtime*: Regular upkeep and inspections decrease the likelihood of unexpected breakdowns, thus minimizing downtime and associated productivity loss.
- *Prolonged Equipment Lifespan*: Timely maintenance and care extend the operational life of machinery and assets, thereby postponing the need for replacements and reducing long-term costs.
- *Cost Savings*: Preventive maintenance often incurs lower costs compared to reactive repairs, as addressing issues early helps prevent major breakdowns that may be more expensive to fix.
- *Enhanced Safety*: Regular maintenance ensures equipment operates at its best, reducing the risk of accidents or malfunctions that could compromise safety.
- *Improved Efficiency*: Well-maintained equipment operates more efficiently, leading to increased productivity and optimal performance.
- *Enhanced Asset Reliability*: Scheduled maintenance enhances the reliability and predictability of equipment performance, ensuring consistent output.

- Compliance and Regulation: Adhering to maintenance schedules assists in meeting industry standards and regulations, ensuring compliance with safety and quality requirements.
- *Optimized Planning*: Planned maintenance enables better resource allocation, labor scheduling, and spare parts management, resulting in streamlined operations.
- *Increased Resale Value*: Regular maintenance preserves the value of assets, making them more appealing if they are to be sold or leased in the future.
- *Environmental Benefits*: Efficiently running machinery due to preventive maintenance contributes to lower energy consumption, thereby reducing the environmental impact.

In summary, preventive maintenance offers a range of benefits, from cost savings and increased safety to improved efficiency and equipment reliability, making it a crucial strategy for effective asset management.

Corrective maintenance:

Corrective maintenance, also referred to as run-to-failure, Failure-Based Maintenance, or reactive maintenance, is a strategy employed to restore equipment to its required function after it has failed. This approach, sometimes synonymous with Breakdown Maintenance or Operation-To-Failure, involves repairing or replacing equipment following a breakdown or malfunction. *(J. H. Shin, H. B. Jun, 2015; Ali Rastegari, Volvo GTO Mohammadsadegh Mobin, 2016)*. Corrective maintenance, often known as Breakdown maintenance, can be the costliest option. Not only can worn equipment cause damage to other parts and result in multiple failures, but the subsequent repair and replacement expenses and the loss of revenue due to downtime during overhauls can be substantial *(Alok Kumar Sarker, 2019)*.

Maintenance Management:

Management, in a broad sense, involves the planning, coordination, control, supervision, and improvement of activities to attain specific purposes and goals. Maintenance management is characterized as the organization of maintenance within a predefined policy. Additionally, it is described as all managerial activities that establish maintenance objectives, strategies, and responsibilities. These are implemented through means such as maintenance planning, control, and supervision, alongside the improvement of organizational methods, including economic considerations. The operationalization of the maintenance philosophy is facilitated through maintenance management. Notably, the definition of maintenance management differs from the general definition of management and the definition by, as it omits the managerial aspects of control, supervision, and improvement activities. *(Mirka Kans, 2008)*

Maintenance management is delineated as a collection of activities designed to formulate maintenance objectives, strategies, and responsibilities. These are put into action through processes such as maintenance planning, maintenance control and supervision, and the refinement of organizational methods, incorporating considerations related to economics. *(Isabel Lopesa, et al. 2016)*

Enhancing the provision of pertinent information about the condition of components enhances the effectiveness of a maintenance solution, helping prevent failures and optimizing the utilization of the equipment or component's effective lifespan by conducting replacements right

before potential failures. Consequently, this information contributes to refining the accuracy of the maintenance policy. *(B. Al-Najjar, I. Alsyouf, 2003, Ali Rastegari, Volvo GTO Mohammadsadegh Mobin, 2016)*.

Computerized Maintenance Management System

A facet of maintenance management involves interpreting available data and transforming it into valuable information to optimize equipment management. This necessitates the structured gathering and analysis of data for effective utilization. Successfully managing this process without computer-based support is nearly impractical, underscoring the importance of a well-implemented computerized maintenance management system (CMMS) as a key tool in supporting proactive maintenance management. *(Michael Wienker, Ken Henderson, Jacques Volkerts, 2016)*.

The escalating volume of accessible information and a rising demand for immediate access to it for decision-making underscore the essential role of a computerized maintenance management system (CMMS) in facilitating and subsidizing maintenance management. Conventional maintenance systems, known for their reliance on lengthy batch reports prioritizing data processing, are being replaced by dynamic, real-time queries that provide responses within seconds instead of days. (*Volvo GTO Mohammadsadegh Mobin, 2016, Ashraf W. Labib, 2004, Ali Rastegari*).

Managing maintenance in large industrial operations is intricate and significantly influences business profitability. Consequently, maintenance management appears nearly unattainable without the backing of a computerized system. Hence, it is anticipated that a computerized maintenance management system (CMMS) will play a crucial role in efficiently and effectively managing relevant maintenance activities in the foreseeable future. To achieve streamlined maintenance management, it is imperative to have technical, economic, and historical information about the devices and the company's facilities. The utilization of a computerized maintenance management system (CMMS) is instrumental in achieving this goal. *(MarÃa Carmen Carnero, 2015, H Mohd Noor, S A Mazlan, A Amrin. 2020)*.

The revolution of Computerized Maintenance Management System commenced in the late 1980s and early 1990s when organizations transitioned from manual methods using pencil and paper to incorporating computer systems *(Martin Campbell-Kelly, 2018)*. In the 1990s, the utilization and programming of tools like "Access" began to advance. This evolution in technology facilitated the maintenance of information based on contemporary technology, enabling users to easily record, search, analyze, and report data stored in databases. (Theodore Cohen, Matthew F. Baretich, William M. Gentles, 2020).

The CMMS offers the following functionalities: Supporting Condition-Based Maintenance, monitoring spare parts movement, expediting fault reporting by operators, enhancing communication between operations and maintenance personnel, supplying historical information crucial for creating preventive maintenance schedules, furnishing maintenance managers with data for improved departmental control, and providing accountants with machine information for informed capital expenditure decisions. While commercially available CMMS packages generally include data collection and analysis capabilities, they have traditionally lacked comprehensive decision analysis features *(Ali Rastegari, Volvo GTO Mohammadsadegh Mobin, 2016)*.To establish which information the system should record and furnish to bolster maintenance strategy, the organization needs to comprehend the role of a CMMS. Implementing a CMMS enables swift and efficient communication, yielding various advantages such as

enhanced planning and scheduling, convenient access to historical data, and cost reduction linked to spare parts and maintenance activities. Additionally, integrating a CMMS within the organization facilitates the successful implementation of the Total Productive Maintenance philosophy. (*Vincent Yee, 2007 Isabel Lopesa, et al. 2016*).

A CMMS serves as a tool for bolstering maintenance strategy through an information system and a suite of functions designed to process data and generate indicators in support of maintenance activities. Typically, CMMS encompasses a predefined set of functions and applications, including:

- *Assets Management*: Involves recording all assets (or equipment) and maintaining a historical record of repairs and equipment parts lists.
- *Work Orders Management*: Enables the setting and issuance of work orders to maintenance technicians.
- *Preventive Maintenance Management*: Supports the planning, scheduling, and control of preventive maintenance activities.
- *Inventory Control*: Provides access to spare parts availability.
- *Report Management*: Processes extensive data and generates performance indicators.

These functions contribute to enhanced efficiency and effectiveness in maintenance operations, leveraging Information and Communication Technologies. *(Isabel Lopesa, et al. 2016)*.

Odoo:

Odoo stands as a robust open-source platform designed for business applications. Built atop this foundation is a suite of tightly integrated applications that span various business areas, encompassing Customer Relationship Management, Sales, Accounting, and Stocks. Odoo benefits from a dynamic and expanding community that consistently contributes features, connectors, and additional business apps *(Daniel Reis, 2015)*.

Odoo stands as an open-core enterprise resource planning platform. The source code for its Open Object framework and core ERP modules is overseen by Odoo S.A., with its headquarters situated in Belgium. Customized applications, support, and supplementary services are extended through a global community and authorized partners across the globe. The initial version of Odoo, previously known as Tiny ERP and Open ERP, was launched in February 2005. Odoo SA releases both major community and enterprise versions annually, with the latest, Odoo 10.0, released on October 5, 2016. It has evolved into a comprehensive suite of integrated business applications suitable for small, medium, and large enterprises. Odoo modules encompass a broad spectrum of functionalities, including billing, accounting, manufacturing, purchasing, warehouse management, project management, finance, CRM, and point of sale (POS), e-commerce CMS, and more, supporting various business processes across the enterprise *(Arun Devkota 2016)*.

Benefits of Utilizing Odoo:

1.*Rapidly Growing User Base*: The Odoo user community experiences substantial growth annually, particularly gaining popularity among SMEs due to its open-source nature, facilitating easier modification and customization. It boasts a user base of over two million worldwide.

2.*Ease of Use*: Odoo ERP offers a user-friendly interface that is easy to understand and navigate. The toolbar conveniently displays all installed applications, making it straightforward

for users to access a wide range of functions. This simplicity makes it suitable for implementation in smaller companies.

3.*Quick Implementation*: Odoo ERP can be implemented across various companies within a few months. The existence of robust communities and specialized Odoo partners contributes to swift implementation. Different Odoo modules can be effortlessly installed with just a few clicks.

4.*Open Ecosystem*: Odoo offers two software versions - a light Community version, lacking certain functions but free to download and use, and an enterprise version fully supported by the software vendor, incurring costs per user. The active community and contributions significantly contribute to Odoo's continuous development. Additionally, Odoo provides fully supported cloud ERP (SaaS) with subscription plans.

5.*Easy Customization*: Odoo's flexibility and easy customization stem from its easily accessible source code available for download on Git. Users can tailor the system to meet their specific requirements, leveraging the popular Python programming language.

6.*Wide Coverage of Business Applications*: Odoo spans a comprehensive array of business applications. The community edition encompasses thirty-four core business applications applicable to various businesses. With over 54,000 developers globally contributing to the open-source project, 312 new apps are developed monthly in 23 different languages. The software vendor plays a crucial role in guiding the development, quality inspection, and approvals of these modules.

7.*Fully Integrated Geographical Information System (GIS) for Enterprises*: The Odoo GeoEngine is a module that adds spatial/GIS capabilities to Odoo, allowing users to visualize and query business information on a map. GeoEngine utilizes OpenLayers and PostGIS technologies, supporting applications such as geographical queries and filters, geo-marketing, stock location, fleet management, dashboards, asset localization, and personalized map creation.

8.*High Integration Capabilities*: Being open-source software, Odoo offers robust integration capabilities with third-party apps. The Odoo connector, a powerful framework, facilitates the development of bi-directional connections between Odoo and other software or services.

9.*Cost-Effective*: Odoo presents a cost-effective solution, especially beneficial for SMEs that may find heavy licensing fees associated with proprietary software like SAP Business One to be prohibitive. Implementation of Odoo involves a lower financial investment and is considered a less risky option.

Odoo Maintenance

Odoo Maintenance refers to the maintenance management functionalities provided by the Odoo ERP (Enterprise Resource Planning) system. Odoo is an open-source business management software that integrates various applications to streamline and automate different aspects of a business, including maintenance management.

Within the Odoo ecosystem, the Maintenance module is designed to help organizations effectively manage their maintenance activities. Some key features and functionalities of Odoo Maintenance may include: (Asset Management, Preventive Maintenance, Work Order Management, Cost Tracking, Mobile Accessibility).

Asset Management: Track and manage assets, equipment, and machinery used in the business. This involves maintaining a detailed record of each asset's history, including maintenance activities, repairs, and relevant information.

Preventive Maintenance: Implement preventive maintenance schedules to ensure regular inspections and upkeep of equipment. This proactive approach helps prevent breakdowns and extends the life of assets.

Work Order Management: Create and manage work orders for maintenance tasks. This includes assigning tasks to maintenance technicians, tracking progress, and ensuring timely completion.

Inventory Management: Monitor and control spare parts and inventory related to maintenance activities. This helps in ensuring that the necessary parts are available when needed for repairs or maintenance.

Cost Tracking: Track the costs associated with maintenance activities, including labor, materials, and other expenses. This helps in analyzing the overall cost of maintenance operations.

Integration with Other Modules: Seamless integration with other Odoo modules such as Accounting, Inventory, and Purchasing, providing a holistic view of the entire business process.

Mobile Accessibility: Access maintenance-related information and tasks on-the-go using Odoo's mobile application, allowing maintenance teams to stay connected and informed.

Odoo Maintenance is designed to optimize maintenance processes, enhance equipment reliability, and reduce downtime. It is suitable for businesses in various industries that rely on efficient maintenance practices to ensure the smooth operation of their assets and equipment.

The traditional worksheets and maintenance reports relied upon by the maintenance department in one of the ready-made garment factories were studied, through which it is difficult to report errors by operators, the inability to communicate between operations and maintenance employees, the difficulty of providing important historical information to create preventive maintenance schedules, and the inability to provide maintenance managers with data to improve oversight of departments.

Therefore, a Computerized Maintenance Management System was implemented using Odoo Maintenance Module.

How to start using Odoo

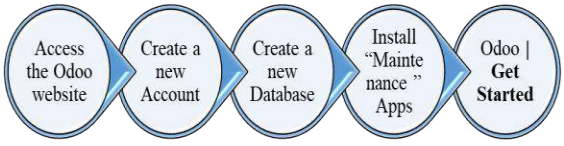

Figure 01. Odoo Get Started **Access the Odoo website (https://www.odoo.com/) (Fig. 2).**

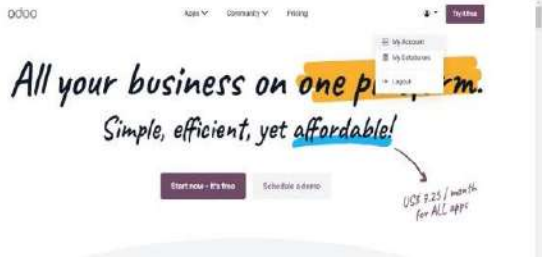

Figure 02. Odoo website window

If you are using the Odoo platform for the first time, you must create a new account (Fig.3).

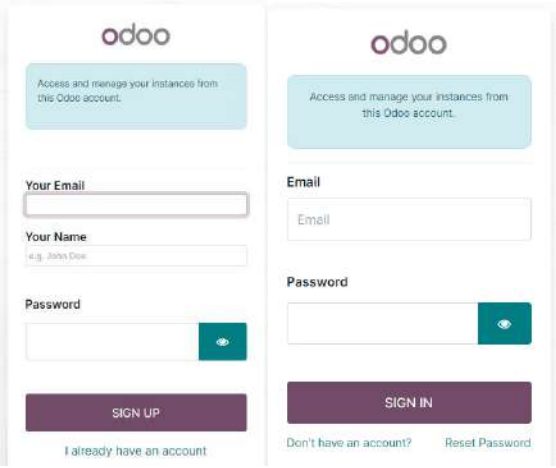

Figure 03. Odoo Sign in or Sign up page **If you have an account on the Odoo platform, you can Sign in, it asks for your email and password.**

Create a New Odoo Database

After logging in, we will enter the Odoo database page. A new database is now being created (Fig.4).

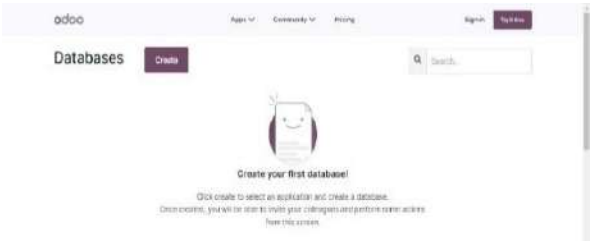

Figure 04. Odoo Database Page **Choose your Odoo Apps A new page appears to choose the applications you want to use**

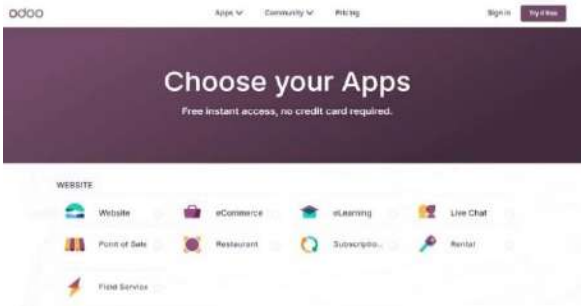

Figure 05. Odoo Applications Page **Select the applications we want to use and press Continue**

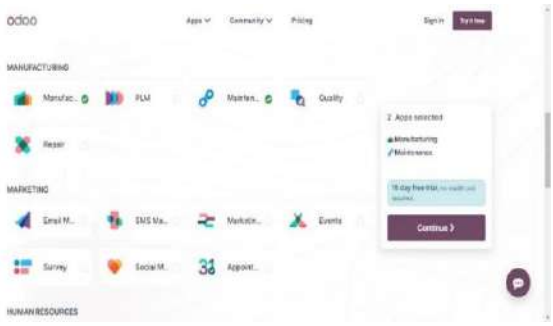

Figure 06. Select Odoo Applications

Odoo Get Started

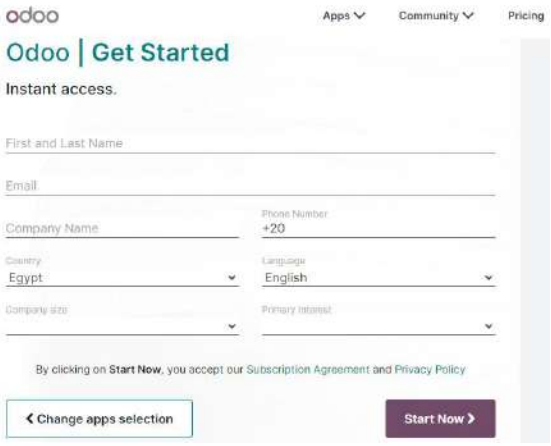

Figure 06. Information of Odoo Database page

A new page appears asking for the following:

1. Name of the database
2. Your personal account (email).
3. Password to enter the program.
4. Choose the language in which you want to use the program.
5. Choose the city in which we use Odoo to set the timing and other services related to the program.
6. Choose that service to create virtual data to try the program with the Databases page appears (Fig. 7).

Figure 07. Odoo Database page

We select the database that was created, and click (Connect). The Applications page appears

"Maintenance" Application

Figure 08. Odoo Database Applications page

Maintenance Menus

Maintenance menus contain: (Dashboard, Maintenance, Equipment, Reports, Configuration)

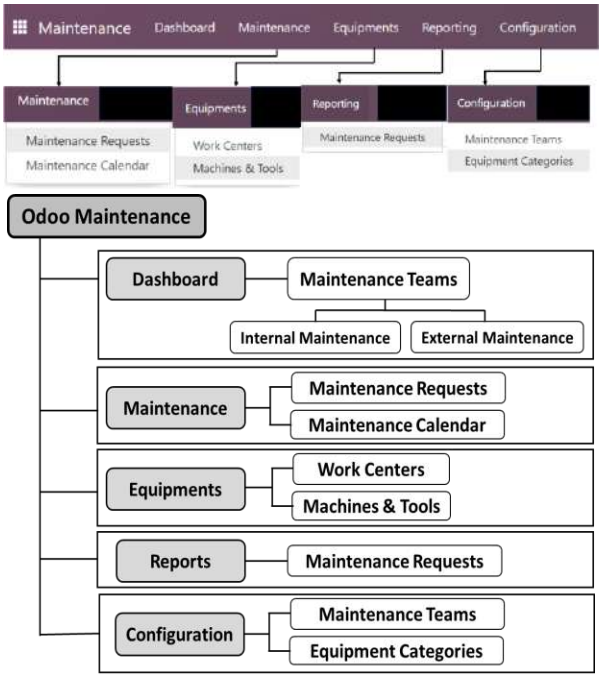

Figure 09. Odoo Maintenance menus

Maintenance Team

To oversee and supervise maintenance requests, you have the option to designate a maintenance team within the module of Odoo Maintenance. When generating a maintenance request, you'll be prompted to specify the relevant maintenance team. By assigning a team to handle maintenance tasks, that particular team assumes responsibility for all maintenance operations. Upon accessing the Maintenance module, a dashboard, illustrated below, displays various maintenance teams associated with the company.

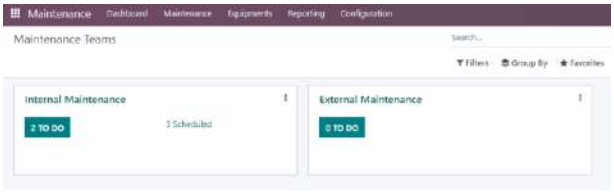

Figure 10. Maintenance Team page

The quantity of pending maintenance requests is visible for each maintenance team. To access supplementary operational tools, you can select the three small vertical dots located at the top right corner of each tab.

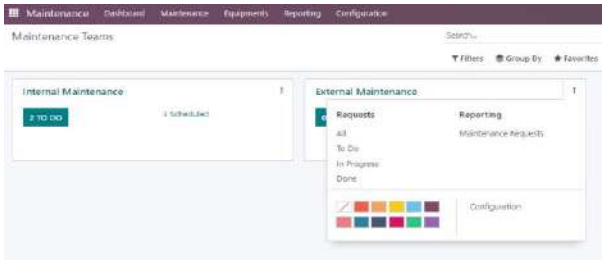

Figure 11. supplementary operational tools in Maintenance Team

The menu bar provides access to view maintenance requests based on their status, including All, To Do, In Progress, and Done. Utilize the Reporting feature to generate the Maintenance

Requests report. If adjustments are needed in a maintenance team, you can use the Configuration option.

Create a new maintenance Team

To establish a new maintenance team, navigate to the (**Configuration**) menu within the module and select the (**Maintenance Teams**) option. This action will open a new window displaying the list of previously configured (Maintenance Teams).

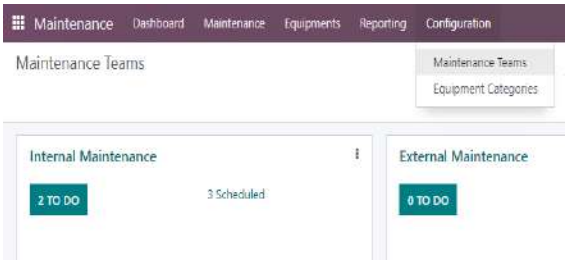

Figure 12. Maintenance Configuration menu

Establishing a new team is a straightforward process. Upon clicking the (**New**) button, a new entry will be generated beneath the current list, as illustrated below.

On this page, you will find a compilation of all the Maintenance keywords you have outlined. Select the Form button, as indicated in the above image, to initiate the creation of a maintenance team. This will unveil a blank field for establishing new Maintenance Teams, as depicted below.

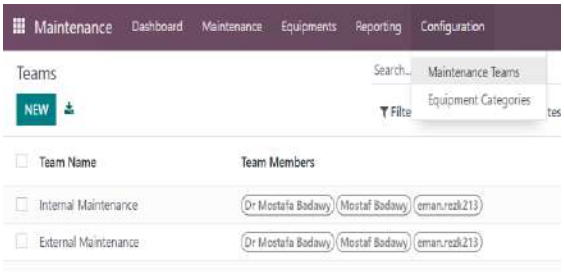

Figure 13. Maintenance Configuration menu

Creating a new team is an easy task. When you click on the **New** button, a new line will appear under the existing list as shown below.

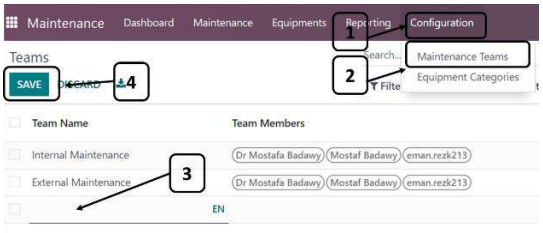

Figure 14. Create a new maintenance Team

Here, you can mention the **Team Name**, **Team Members**, and **Company**. Once you complete these fields, your new maintenance team is ready for operation.

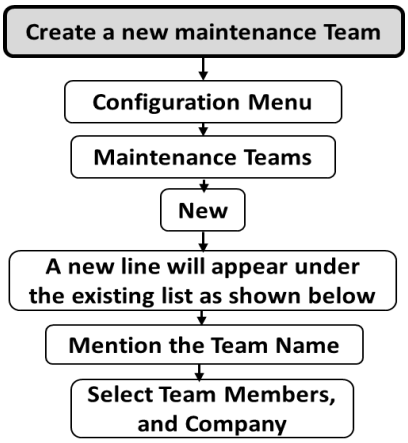

Figure 15. steps of Creating a new maintenance Team

Create New Users to the database

Access to Settings module, to establish new users, navigate to the (Users & Companies) menu within the Settings module and select the (Users) option. This action will open a new window displaying the list of previously configured (Users).

Figure 16. Users & Companies page

When you click on the New button, a new page will be appeared, containing: (Name, Email, Access Rights, Preferences), Upon clicking the (**New**) button, a new user will be generated.

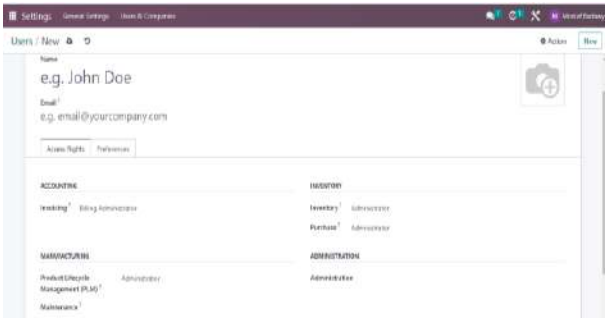

Figure 17. Create a New Users to the database

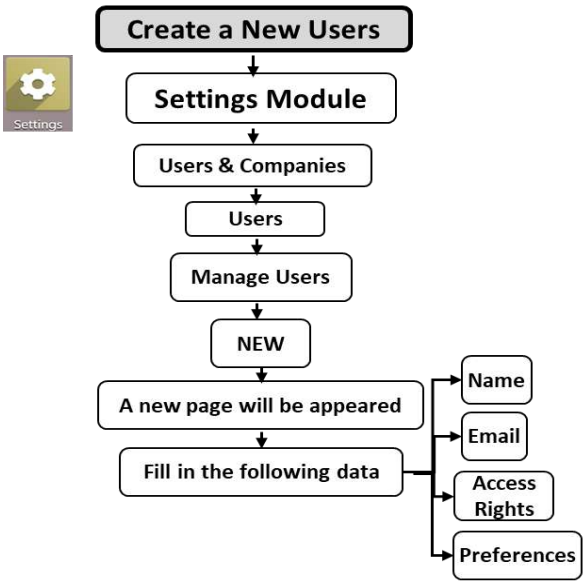

Figure 18. Steps of Creating New Users to the database

Equipment

To facilitate maintenance operations, it is essential to have equipment, and it is equally important to keep a record of this equipment. Utilizing the **Machines & Tools** feature within the Maintenance module allows you to compile a comprehensive list of all equipment utilized in your company for maintenance purposes. This feature is accessible under the **Equipment** menu of the module.

Equipment Categories

Efficient management of diverse equipment types can be achieved by creating and maintaining Equipment categories.

To configure and oversee equipment categories, access the "**Configuration**" tab menu in the Maintenance Dashboard, then select "**Equipment Categories**" from the drop down menu.

Create an Equipment Categories

To generate equipment categories, access the "**Equipment Categories**" option from the Configuration menu. A list of previously configured equipment categories appears. This page displays all the equipment categories that have been established.

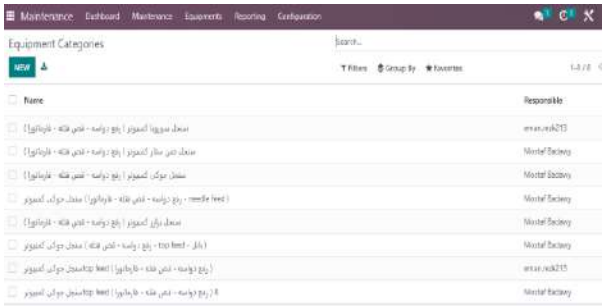

Figure 19. Equipment Categories page

On this page, you'll find a comprehensive list of all created **Equipment Categories**. Each category is accompanied by its name, and you can designate the individual **responsible** for it by selecting from the user menu.

Create a New Equipment Category

To create a new Equipment category, simply click on the "**New**" button.

Figure 20. Create a New Equipment Category

This will open a new configuration window as shown below. Here, you can specify the Category Name in the given space.

Figure 21. New Equipment Categories page

1. Start configuring the category by giving it a name in the "**Category Name"** field.
2. Assign an employee who is in charge of this equipment category in the "**Responsible"** field.
3. Additional notes pertaining to this equipment category can be entered into the "**Comments"** field.
4. Once you've configured the equipment category, you can utilize the "**Equipment"** window to access details of the equipment assigned to this category.
5. The **Maintenance** window will show the list of maintenance requests created for the equipment under this category.

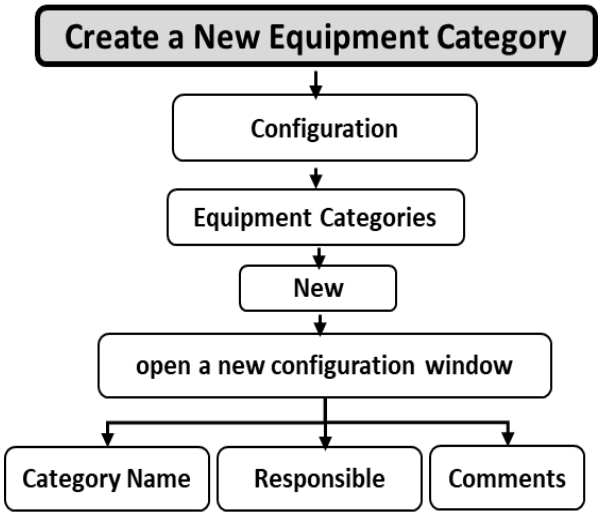

Figure 22. Steps of Create a New Equipment Categories page

Create a New Equipment

Once the "**Equipment Categories"** have been named, clicking on the "**Equipment"** button will open a new configuration window, as depicted below. If there is no equipment listed, this page will be displayed.

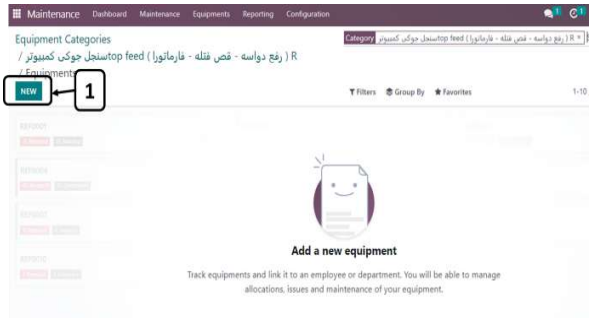

Figure 23. To Add New Equipment page

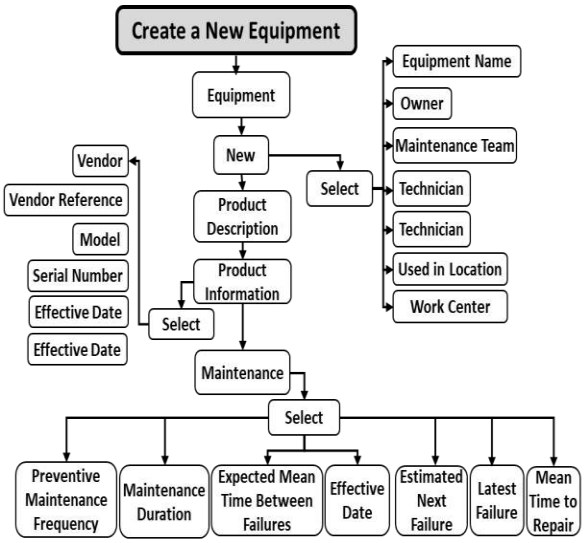

Figure 24. Steps of Adding New Equipment

Clicking on the **New** button will lead you to a new configuration window as shown below. You can provide a **Name** of the equipment in the given space.

1- You can provide a **Name** of the equipment in the given space.

2- Select the suitable **Equipment Category** from the drop down.

3- In the **Owner** field, identify the owner of this equipment.

4- Now, you can assign this equipment to a particular **Maintenance Team** by mentioning them in the given field.

5- In the **Technician** field, mention the technician who is in charge of this equipment.

6- In the **Used in Location** field, mention the location where this equipment is used.

7- In the **Work Center** field, mention the work Center where this equipment is used.

8- Under the **Description tab**, you can add a description of the equipment.

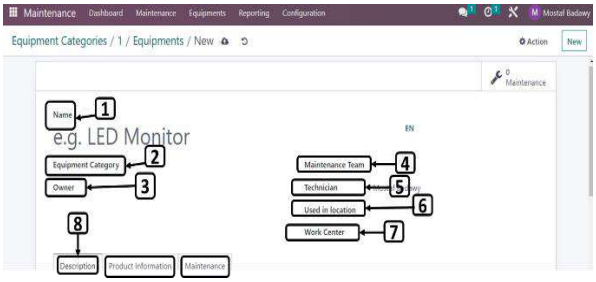

Figure 25. Create a New Equipment page

Product Information

Now, go to the "**Product Information**" tab, where you can specify the details of the equipment. you can mention the **Vendor** and **Vendor** Reference, if the equipment is purchased from another company.

The **Model** and **Serial Number** of the equipment can be added in the respective fields. **Effective Date** indicates the date on which this equipment will become effective. You can use this date to compute the mean time between failures. Specify the **Cost** and **Warranty Expiration Date** in the corresponding fields.

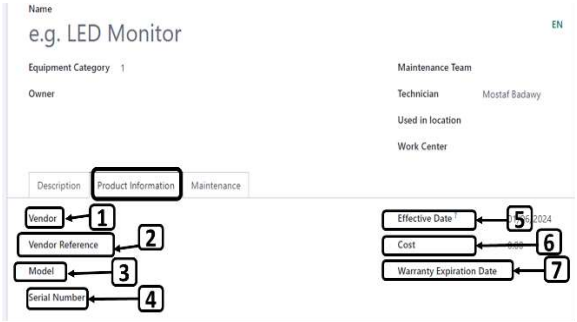

Figure 26. Equipment Information page

Maintenance Information

The next action date of the equipment will be available in the Next Preventive Maintenance field.

1. This will be available based on the "**Preventive Maintenance Frequency"** you set in the respective field.
2. You can designate the "**Maintenance Duration**" for utilizing this equipment in hours.
3. The "**Expected Mean Time Between Failures**" can be added in days.
4. The Mean Time Between Failures will be automatically computed based on the "**Effective Date"** you provide.
5. The "**Estimated Next Failure**" will be displayed by taking into account the latest failure date and mean time between failures.
6. The date of **Latest Failure** will be displayed in the designated field.
7. The average time taken to repair the equipment can be seen in the **Mean Time to Repair** field.

Once you specify all the necessary details, the equipment configuration will be completed.

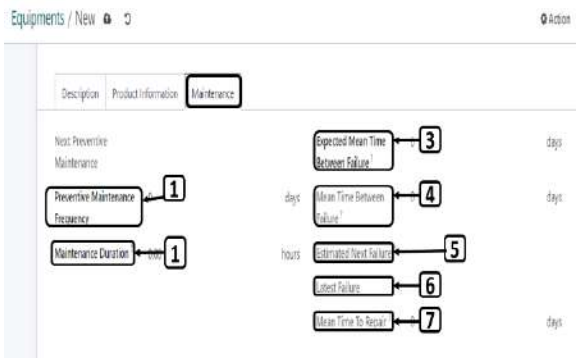

Figure 27. Equipment Maintenance Information page

From the Kanban view of the Module, you will see all configured equipment in your company.
1. On each equipment tab there are "**Three Small Dots**" that provide editing and deletion of the respective operations.
2. There is the option to utilize default "**Filters**" like (My Equipment, Assigned, Unassigned, Under Unread Messages, Maintenance, and Archived).
3. The "**Group By**" feature offers the Technicians, Category, Owner, Vendor, Employee, and Department to group the equipment.
4. Using the **small clock** icon, you can schedule various activities for the equipment.

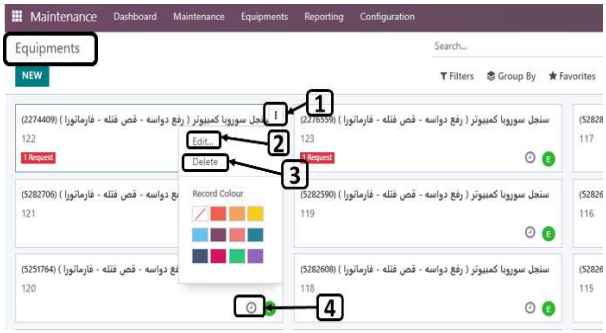

Figure 28. Configured Equipment's page

Create a New Maintenance Request

From the maintenance menu, we select Maintenance Request, then click New.

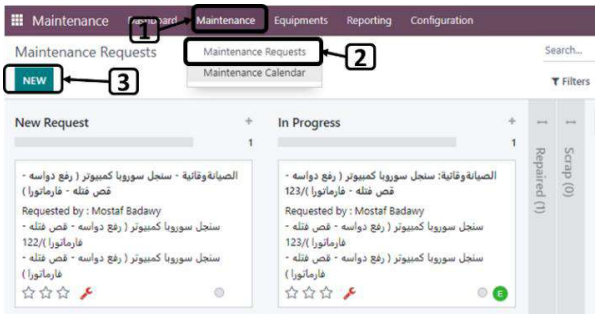

Figure 29. Maintenance Requests page

A new configuration window appears
1. You can add the **title of the maintenance request** in the given space.
2. Mention the **Equipment** id that needs to be maintained in the respective field.
3. The date on which you create the request will be considered as the **Request Date.**

4. Mainly, in Odoo, there exist two of maintenance requests: **Corrective** and **Preventive.** Preventive maintenance will be done in a regular interval to prevent the equipment from any unexpected failures. The Corrective maintenance will be done to repair the equipment when it fails to operate.
5. If you have the **Manufacturing Order** of the equipment, you can specify that in the request.
6. Add a **Description** to get additional details of the request.
7. In the **Team** field, you can assign a team for the maintenance of the equipment.
8. Mention the **Responsible** who is in charge of this maintenance request.
9. The date on which the team planned the maintenance can be specified in the **Scheduled Date.**
10. **The duration** of the maintenance work can be defined as hours.
11. Use the **stars** to indicate the Request Priority.
12. According to the progress of the operation, you can change the stages of the request. The default stages are **New Request, In Progress, Repaired, and Scrap**.

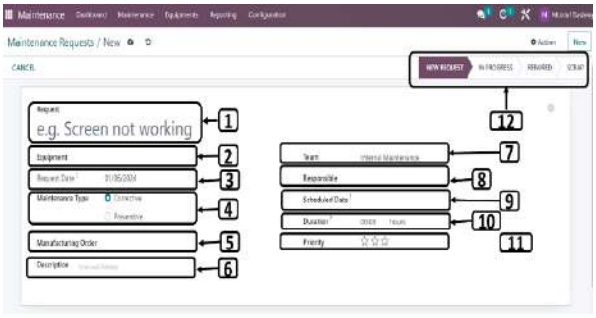

Figure 30. A New Maintenance Requests page

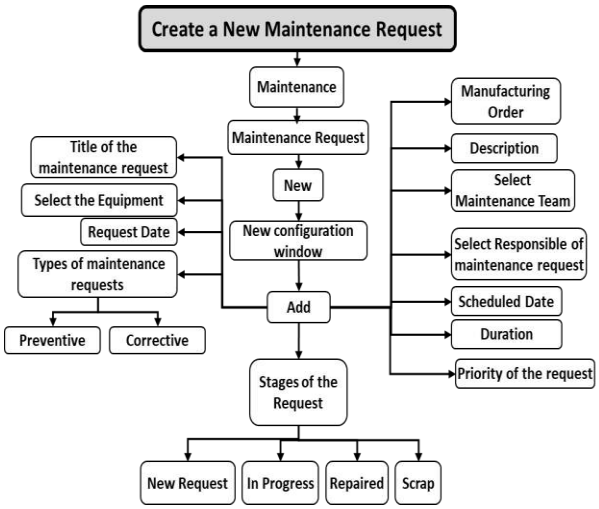

Figure 30. Steps to Create New Maintenance Requests

Maintenance Requests

1. If there's an equipment failure, you can create a maintenance request for that equipment from the "**Maintenance Request"** menu. The Kanban view of this platform is shown below. Here, you can observe the maintenance requests assigned under different stages.
2. You can utilize the options found within "**The Three Dots"** adjacent to each maintenance request to either edit or delete the corresponding request.

3. To add a new request under a specific stage, simply click on the "+" icon located to the right of the stage title. You will get a space to mention the title of the request. You click the **Add** button to add the new request to the particular stage and the **Edit** button to edit the details of the request.
4. In order to add a new stage to the Kanban view, you can click on the **+Stage** option which will help you to create a new stage.
5. Next to the title of each stage is a **Settings Icon**, which provides the ability to Fold, Edit, and Delete the respective stage.
6. **Stars icon** can be used to determine the priorities maintenance requests based on the emergency.
7. To schedule maintenance request activities, the **small clock icon** allows you to do this. If maintenance is overdue, it transforms into a repair indicator.
8. Through the maintenance request, you can also identify the assigned employee as shown by the **circular icon**.
9. You can also have a conversation with the assigned employee through the **Chat Box**.

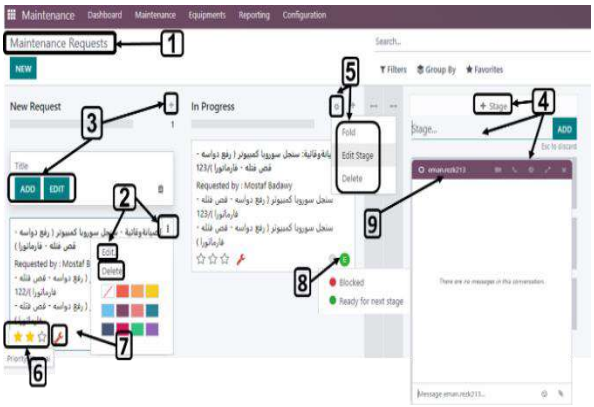

Figure 31. stages of the Maintenance Requests

You can follow a record of all procedures that occurred on the equipment from the beginning of creating the maintenance request to its completion as shown below.

Figure 32. following the records of all procedures that occurred on the equipment

Maintenance Calendar

1. In your Odoo Maintenance module, through the Maintenance menu we select Maintenance Calendar, as it provides a calendar view of all orders created.

2. You can specify the method of displaying maintenance requests by Day, Week, Month, or Year.
3. Select the suitable calendar view according to your convenience.
4. The scheduled maintenance requests can be seen on the calendar.
5. The preview will show the scheduled date and time, Priority, Technician, and Maintenance Type as shown in Figure 33.

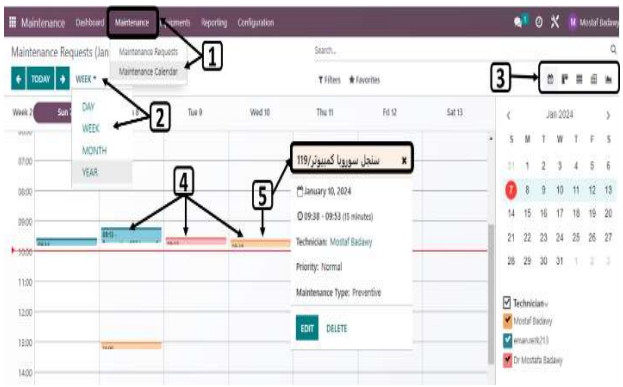

Figure 33. Maintenance Calendar page

From the Calendar view, you can also create a maintenance request. This is done by clicking on the date and time you want in order to schedule maintenance. A pop-up window will appear as shown below. You will get a pop-up window as shown in Figure 34.

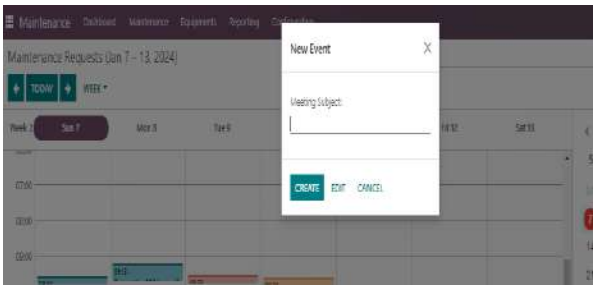

Figure 34. create a maintenance request from the calendar view

Here, you can add the subject and click on the **Create** button. To add additional information to the request, you can use the **Edit** button, which will lead you to the form view of the maintenance request creation window.

Reporting

1. You can access reports of all maintenance activities carried out through the **Reporting** menu available in the Odoo Maintenance module. This module will provide an effective analysis of the **Maintenance Requests** created in the module.
2. You will obtain **Pivot, Graphical, Kanban, List** and **Calendar** reports of the Maintenance Requests.
3. The **graphical view** can be altered between **Line, Bar**, **Pie, Stocked** and **Charts.**
4. Reports can be arranged **ascending** or **descending**.
5. By using the **filters** option, you can obtain reports based on My Maintenance, To Do, High-Priority, Blocked, Ready, Unscheduled, Request Date, Scheduled Date, Close Date, Unread Messages, and Archived.

6. You will get reports based on Assigned To, Category, Stage, and Created By using the **Group By** option.
7. As **Measures**, you can use the **Duration** and **Count** of the maintenance request.

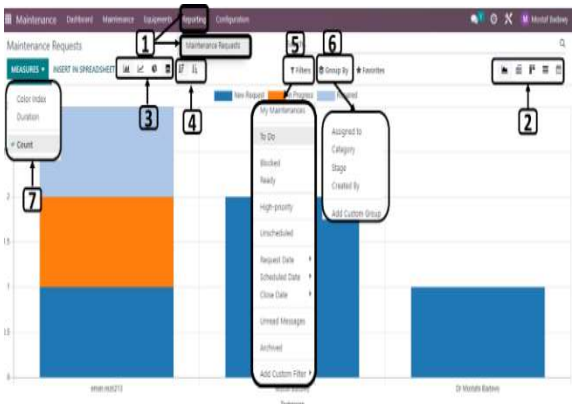

Figure 35. Maintenance Report page

Analyzing maintenance request reports from Odoo is straightforward. By Maintenance Requests option under the Reporting tab, you can examine these reports. In the graph, the X-axis represents Technician information, while the Y-axis shows the Count.

Figure 36. Technician information Report

The product's stages can be seen in various hues, and we can add measures using the Measures icon, including Duration/Color Index. The window depicts how the Pie chart displays the percentage count of each request separately in a circle. From the pie chart's top, we may retrieve each technician's name for a certain request.

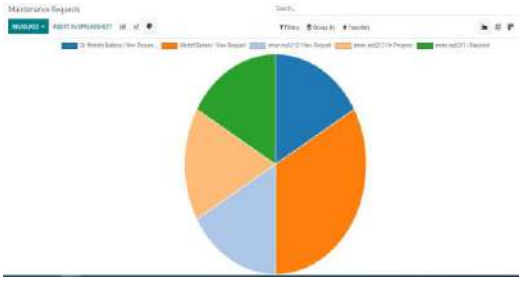

Figure 37. Pie char - Maintenance Report

Users can obtain the count of each request individually regarding the assigned person, stage, or category by selecting Pivot view, as shown in the Figure 38.

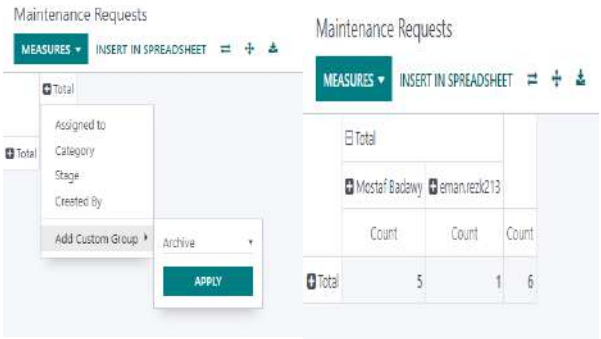

Figure 38. Pivot view Report

Conclusion:

Computerized Maintenance Management System (CMMS) was implemented using Odoo Maintenance in one of the ready-made garment factories instead of using traditional worksheets and reports for maintenance, as it had a clear impact in creating databases for the factory's maintenance management, communicating easily between the maintenance team, and dividing the equipment according to different categories. Create preventive and corrective maintenance requests and track the procedures performed on the equipments, display the maintenance calendar for the equipment, and create various maintenance reports and graphs that are easy to analyze.

Recommendation:

Therefore, we recommend implementing a computerized maintenance management system (CMMS) using Odoo maintenance in ready-made garment factories instead of using traditional worksheets and reports for maintenance, as only one application can be used for an unlimited number of users (Odoo Online) for free, and all applications of the Odoo platform can be purchased, ERP through its website for $7.25/month.

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