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Impact on Productivity by Worker for Maintenance Sites of University Housing Projects in Saudi Arabia
housing projects in Saudi Arabia

Our study relies on the efficiency of workers in order to reduce the time required to complete maintenance requests and work in order to be more productive to fulfill the demands - in housing projects at King Faisal University in the Kingdom of Saudi Arabia for 288 villas, using analysis by Building Information Modeling (BIM) and studying areas of weakness through the Extend program. In order to achieve the expected goal by making use of the resources.
GENERAL INFORMATION

➢ THE UNIVERSITY IS LOCATED IN THE EASTERN REGION, AL-AHSA CITY, IN KSA
➢ THE TOTAL AREA OF THE UNIVERSITY (4,000,000 M2)
➢ THE UNIVERSITY WAS DIVIDED INTO 5 ZONE - SCOPE OF WORK IN (ZONE D)
➢ MAINTENANCE CONTRACT AT THE UNIVERSITY, AMOUNTING TO 111 MILLION SAUDI RIYALS
➢ THE NUMBER OF EMPLOYMENT IS 887 WORKERS
OUR GOAL

Improving processes from problem receiving to problem closure and customer satisfaction

To minimize the maintenance time through improving workers’ efficiency in the housing projects of zone D
To facilitate the operation and maintenance of university housing facilities, all information will therefore be included in the BIM model of the Extend program, and an analysis of the current state of operations and resources to begin to evaluate the process and to assist improvement in achieving the goal.
“Knowing yourself is the beginning of all wisdom.”
— Aristotle
Collect requirements

The primary data used in the study had its collection done by the use of a semi-structured form of the interview guide. The process of all preliminary requirements is based on (interviews), A formal\informal approach to elicit information from stakeholders by talking to them directly.

(PMBOK PAGE 143)
MAXIMO program
For the maintenance operations during two years at the university.

Additional data
Use secondary data that shall be obtained from published articles like websites, newspapers, journals, and books.

Case study on Staff Housing-288 Villas
It is located at King Faisal University-Hofuf, at the moment is under construction and maintenance.
- Use of BIM simulations (extend program) to sort the data
- Data analysis to establish any weaknesses, identify improvement opportunity and analyze all available assumptions attached with employee inefficiency.
- Use of simulations for optimization of resources.
- Maximum performance for the entire maintenance period due to efficient work orders process and increased productivity among workers. Optimizing use of resources and maximizing asset management.
- Obtaining the efficiency of workers, improving maintenance time, and achieving customer satisfaction.
Analysis of the succession of operations with the current and proposed situation

A typical logical work order process flow

A typical logical work order process flow, As Propose to add 2 Expert
In the current situation / the process of receiving transactions is done through administrative communications (incoming and outgoing section) and this section is working on studying transferring the transaction to the Technical Affairs Department, which in turn is studying the transaction and transferring it to the maintenance department.

In the proposed situation / the process of receiving transactions is done through an expert in maintenance, a contact is received and a work order begins and all the details needed by the maintenance department are identified, which determines the location of the problem, describes the problem, determines its importance, prepares all drawings electronically and then refers it to the maintenance department to start work directly.
In the current situation / the problem is examined by sending a team of workers through which the problem is studied and then a description of the problem is written and then the problem is transferred to the supervisor to provide spare parts and then the maintenance process is completed and work is finished.

In the proposed situation / the transaction examination process is carried out through an expert 2, where the work order is read according to the description of the problem and then go to the site to determine the spare parts and determine the method of repair and also the competent department to finish it according to the technical principles.
<table>
<thead>
<tr>
<th>NO</th>
<th>current situation</th>
<th>UTILIZATION</th>
<th>proposed situation</th>
<th>UTILIZATION</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receiving tasks (Administrative Communications)</td>
<td>45</td>
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<td>45</td>
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<td>2</td>
<td>Task Transfer (Technical Affairs)</td>
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<td>0.86</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td>Decision 1</td>
<td>80% ok and 20% back</td>
<td>Decision 1</td>
<td>95% ok and 5% back</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Site Monitor</td>
<td>45</td>
<td>0.21</td>
<td>45</td>
<td>0.21</td>
</tr>
<tr>
<td>6</td>
<td>electricity worker</td>
<td>45</td>
<td>0.96</td>
<td>45</td>
<td>0.96</td>
</tr>
<tr>
<td>7</td>
<td>Mechanical worker</td>
<td>45</td>
<td>0.96</td>
<td>45</td>
<td>0.96</td>
</tr>
<tr>
<td>8</td>
<td>Civilian worker</td>
<td>45</td>
<td>0.96</td>
<td>45</td>
<td>0.96</td>
</tr>
<tr>
<td>9</td>
<td>Decision 2</td>
<td>70% ok and 30% back</td>
<td>Decision 2</td>
<td>90% ok and 10% back</td>
<td></td>
</tr>
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<td>10</td>
<td>Store</td>
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<td>50</td>
<td>0.35</td>
</tr>
<tr>
<td>11</td>
<td>Order</td>
<td>30</td>
<td>0.04</td>
<td>30</td>
<td>0.04</td>
</tr>
</tbody>
</table>

The paper system is used through the outgoing and incoming department, which in the course of an administrative employee is not technical, and administrative matters are used only to transfer transactions, while a communication base, an expert person, and a model have been set up to receive maintenance requests via a unified number, which in turn clearly conveys the problem, identifying all requests, preparing orders and describing problems, and 100 have been exploited. % According to the results in the paper, the work is transferred to the Director of the Technical Affairs Department, which increases the workload on him and takes 66% of his time to study the issue and then sends it to the concerned department, while this procedure was canceled in the proposed situation and only a report was sent to him for follow-up and knowledge, which increases his production efficiency in the proposed system, the transaction is transferred to the head of the maintenance department to carry out the process of starting the study, determining the problem and its location, and studying the transaction, while in the proposed situation, the transactions are sent by the expert on them with all the data to study the possibility of their implementation and refer them to the competent area, and this gave greater access to transactions. More, as the occupancy rate is now only 49%, and there is time to end administrative work or receive additional requests that increase productivity.

Here, the task of the site supervisor, who was only working to send the team of technicians from all disciplines and study the site to reach its specialty and determine the problem, was transferred to an expert person with experience to be examined when needed, then determine the materials and the person responsible for the repair process, along with providing him with the method of repair. And it was through simulation that the percentage of expert employment was 98%, unlike the previous one, which was only 21%, which contributed to the speed of completion and accuracy of work and complementary follow-up.

In the previous case, the employee's utilization rate in the task was 96%, while after the process of re-engineering operations for maintenance orders, greater accuracy occurred and the worker's occupancy rate was 41%; which gives the worker a greater ability to complete a greater number of transactions.

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In the current situation, the need for materials is known by the workers, but after studying the situation, the spare parts are determined by the expert 2, who is familiar with the method of solution and also the materials needed to finish the work.

In the current situation, a paper form is made and it is done by the method of administrative procedures for approvals to exchange spare parts, but through the proposal submitted, all operations are done electronically, which works to determine the existing spare parts that require making a purchase order with a final inventory.

In the current situation, the purchase requisition processes are carried out via an advance and require paper procedures and approvals of the authorized holders. In the proposed situation, approvals are made electronically and also does not require effort to find out the problem as there is a technical report by experts to describe the problem with the availability of materials in the warehouse or request additional materials according to the technical opinion of it.

We note that the time to complete the process in the past is about 621 minutes, either through the process of re-engineering operations and adding experts 2 and improving the distribution of tasks with the same previous technical and administrative staff contributed greatly to reducing the time to finish work to 272, which means about 60% so that now a greater number is accomplished due to the presence of technical reports to contribute to future reforms while preserving a copy of the preventive maintenance operations and also for the technical body responsible for maintenance work.
Faster support, more prominent quality, and lower cost, by utilizing crafted by an electronic framework to get issues and furthermore to characterize the issue all the more decisively and to dispense more work materials.
Results and Recommendations

The study of maintenance operations and the follow-up of transactions made available by simple solutions come very impressive results as it reduced the service delivery by only two changes by 60% in relation to addressing the development of labor efficiency on the site, and it also directly contributes to large solutions through simple changes and practical solutions that contribute to providing Faster service, greater quality and lower cost, by using the work of an electronic system to receive problems and also to define the problem more precisely and to allocate more work materials and the duration of work and the number of workers, which has become the work under the supervision and those with industry assets and the instructions of an experienced supervisor, despite the same staff and the same Mechanisms and methods of solution only an organization has been made to transfer the transaction accurately and quickly to the concerned department and the competent worker in order to make the service easier.

We suggest that an integrated link be made between departments, supervisors, warehouses and also purchases about the work of a system that contributes more to provide the service with full satisfaction to the beneficiaries and also great savings Through electronic identification of preventive maintenance processes that preserve buildings for greater sustainability and less breakdowns in all parts of the buildings.
Do you have any questions?
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THANK YOU!