INTERNATIONAL JOURNAL OF LATEST TECHNOLOGY IN ENGINEERING, MANAGEMENT & APPLIED SCIENCE (IJLTEMAS)

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VIII, August 2026

Implementation of Enterprise Resource Planning (ERP) System: Case of a Mining-Based Service Provider

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DOI: https://doi.org/10.51583/IJLTEMAS.2026.150800100

Received: 31 August 2026; Accepted: 05 September 2026; Published: 18 September 2026

ABSTRACT

The study investigates the implementation of an Enterprise Resource Planning (ERP) system in a case study organisation to reduce system complexity and achieve improved operational efficiency. It was established that the operational system for the case study firm had become complex to manage using manual systems. The research presents a design criterion with the boundary requirements that needed to be met for the successful implementation of ERP by establishing the critical success factors. The major constraint areas of the operational system were identified to be maintenance and logistics. A detailed analysis was conducted to identify aspects which could be improved. A web-based 3-layered ERP system with the ability to support multiple vendor solutions was found to be the best suited for the firm's requirements. A sample web-based database application was developed to confirm the viability of a web-based solution. This application also demonstrated how an ERP system could automate major processes through breakdown data capturing and reporting processes. It also provided insight into how an ERP system could organize information in the right format for decision-making and achieve improved internal communication, collaboration, and operational efficiency.

Keywords: ERP, operational, efficiency, system, implementation, constraint, web-based, communication, collaboration

INTRODUCTION

In this ever-changing business environment of the modern day, various efforts are being made to increase the effectiveness of these management systems. Most companies aim to attain world class competitiveness, a state in which their businesses can thrive in the future and they can exceptionally satisfy customers in the global markets they serve at the same time minimising the costs at which they are doing business. In this regard, companies have been continuously improving with the view of increasing their management effectiveness to achieve world class competitiveness. However, for managers to be able to plan and make timely and well informed decisions, they strongly depend upon the availability of the invaluable resource-information. The involvement of Information Technology (I.T) systems in management systems is playing a vital role in modern day management as global businesses seek to improve or maintain their competitiveness in the increasingly challenging global market place. Information systems are often used as a tool to improve customer service, shorten cycle times and reduce cost (Bradley, 2008). In this regard, efficient information systems would improve competitiveness through cost reduction and better logistics"(Madanhire and Mbohwa, 2016). Production, manufacturing and other information in the organisation can now be integrated through the use Enterprise Resource Planning (ERP) systems for competitiveness. This can be done through use of tools to standardize and integrate business processes to accelerate access to common resources across the organization

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VIII, August 2026

so that ERP systems help organizations facilitate information sharing and improve operational efficiency" (Shen, Chen and Wang, 2016).

Background

In this information technology (IT) age, companies are now adopting I.T on a large scale. According to (Bae and Ashcroft, 2004), companies are doing this by implementing ERP systems to accomplish data processing and business transaction needs. Through the implementation of ERP systems, organisations are moving away from legacy systems in which the organisations were mainly fragmented into departments which would work independently and sometimes this would result in the departments competing rather than working together to fight external competition (Madanhire and Mbohwa, 2016). ERP systems are therefore now used to integrate various sections of the organisation with an aim of improving operational efficiency. ERP systems are highly organised software packages capable of integrating the management functions of an organisation. They provide several separate yet integrated modules capable of linking the whole organisation's processes such as accounting, human resources, distribution, manufacturing and maintenance. In addition, they are able to connect the organisation to its suppliers and customers at various stages during the lifecycle of the product (Ahmed et al., 2003). The results of all this will be improved data reliability, and processing efficiency (Bae and Ashcroft, 2004). The tangible benefits realised include reduced inventory, improved productivity, quicker closing of financial cycles, improved customer satisfaction and reduced IT and procurement costs. The intangible benefits include new or improved business processes, improved systems integration, computing platforms standardization and increased visibility of corporate data. Implementing an ERP would be way of improving the business to fight this competition. This is why the Case Study firm seeks to improve its competitive advantage in the global market and to rejuvenate its business processes by implementing an ERP project. The company is operating fragmented units and it would benefit from the implementation of an ERP system to integrate its business processes as well as reducing the operational system complexity. Enterprise resource planning systems, if implemented successfully, can bestow impressive strategic, operational and information-related benefits to adopting firms. A failed implementation can often spell financial doom (Bradley, 2008).

ERP LITERATURE REVIEW

Definition

An Enterprise Resource Planning (ERP) system can be considered as a management system which is fully integrated and covers all the functional areas of an organisation. An ERP software attempts to integrate all departments and their functions across the company onto a single computer database system that can serve the different departments' specific requirements. It is then composed of a set of functional modules such as finance, logistics, human resources, production etc which presents a holistic view of the business.

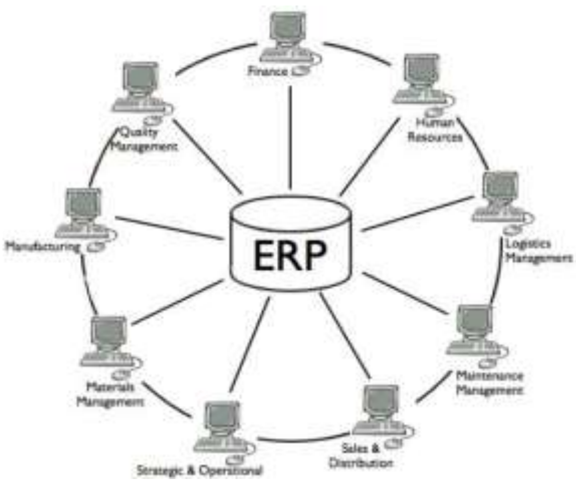

Figure 1. Information integration in ERP systems (Kotiranta, 2012)

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(Nazemi and Tarokh, 2012) put the ERP as the technological infrastructure which is designed to provide the required functional capabilities and a core platform designed to effectively support the capabilities of the tools and business processes to bring about the best business practices. The ERP system directly evolved from the MRP II (Manufacturing Resource Planning) system which has the ability integrate information between manufacturers, vendors and customers. Now ERP can be considered as a business model framework which is used to plan for all the resources of a business from strategic planning down to execution of the plan.

An ERP report by (Panorama Consulting Solutions, 2015), summarises the main reasons why organisations decide to implement ERP systems as given by the Figure 2 below arranged in order of percentages.

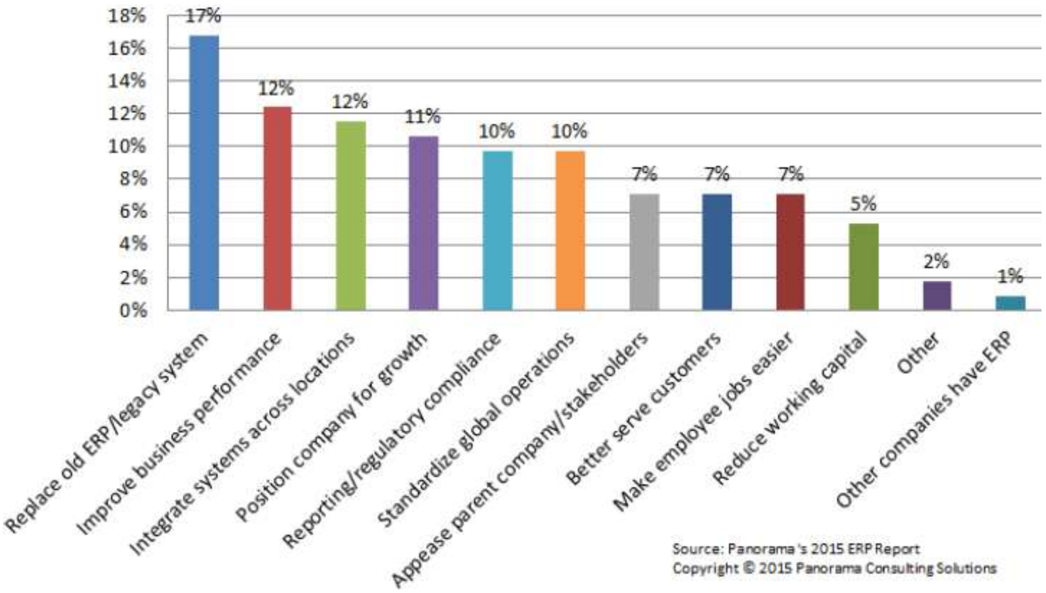

Figure 2. Reasons for implementing ERP systems (Panorama Consulting Solutions, 2015)

Some studies, (Zhelyazkov, 2003; Shen, Chen and Wang, 2016) have indicated that the benefits of implementing ERP systems entail inventory reduction, reduction of personnel, increased productivity, improvements in order management, more rapid closing of financial cycles, reduction in IT and procurement costs, improvement of cash flow management, increase of revenue and profits, reduction in transportation and logistics costs, reduction in the need for system maintenance, and improvement in on-time delivery performance. Other competencies gained will be increased visibility of corporate data, new or improved business processes, improved responsiveness to customers, unanticipated reduction in cost, tighter integration between systems, standardization of computing platforms, increased flexibility, global sharing of information, improved business performance.

ERP implementation will result in information transparency across all departments which may give rise to security concerns. Outsourcing the system may also give rise to concerns over data insecurity.

ERP Implementation

Implementation of an ERP system involves reengineering of the existing business processes so that the best business practices and standards are met. Every organisation that intends to implement an ERP system will reengineer its business processes in one way or another. The main aim will be to efficiently redesign the company's value added chain. According to (Zhang et al., 2002), the dimensions concerning BPR are: the organisation's willingness to reengineer its business processes, the organisation's readiness for change, the organisation's capability to reengineer and communication.

Phased implementation could be considered where one or a group module implementation at a time, and usually a single location at a time. The benefits of this approach include: the resources required are spread out,

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focus on a particular module is established, the existing legacy systems will still be available as a backup, reduced risk, gain of useful knowledge at each phase and that a demonstrable working system will be useful.

Various studies have provided different approaches which can be used to implement an ERP system throughout the implementation lifecycle based on various case concepts and case studies. (Azhdari, Mousavimadani and Zarebahramabadi, 2013) illustrates a generic 5 stage ERP development process which incorporates design, implementation, stabilizing, continuous improvement and transformation steps.

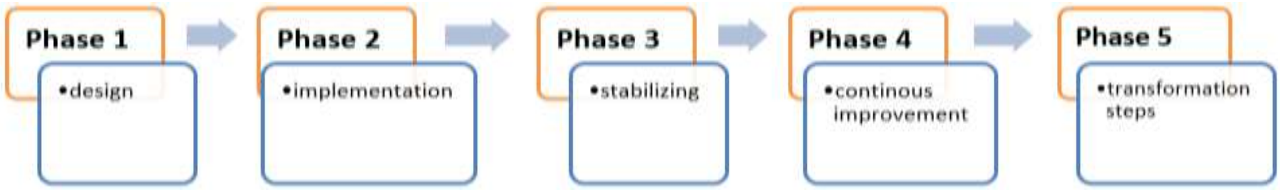

Figure 3. Phase implementation framework (Azhdari et al, 2013)

The implementing of ERP systems is now a common phenomenon in the world, however the ratio of unsuccessful implementation is still high (Ahmed, 2017). Critical success factors (CSFs) in Information systems are the few key areas of activity in the organisation in which favourable results are absolutely necessary for the manager to reach intended goals. ERP implementation is becoming an increasingly common phenomenon world over as companies seek to increase their global competitiveness. However, the rate of failure in ERP projects still remains high which has prompted increasing interest in research in areas concerning ERP implementation. Various studies have established that ERP implementation can be established if proper planning is done and CSFs of the project are established and followed. More recent literature has extended this discussion to cloud ERP adoption in mining and other developing country contexts (Masenya and Aroba, 2025), Industry 4.0 and IoT enabled predictive maintenance integrated with ERP (Hector and Panjanathan, 2024), an updated critical success factor review covering 2012 to 2023 (Leyh and Lorenz, 2024), and ERP cybersecurity and data security risk.

MATERIALS AND METHODOLOGY

The researchers used qualitative research methods to carry out the study. From literature (Otieno, 2010), indicates that case study is the most suitable and common qualitative research method used in Information Systems, hence the researchers used the case study method as the main research method. The research instruments used to collect data from the case study company are interviews, questionnaires and observations. The data obtained was analysed to establish the benefits of the ERP system to the company, the system requirements of the ERP system, risks associated with the ERP implementation and how to address them, the key Critical Success Factors (CSFs) for the implementation process, and the detailed ERP requirements for the critical areas in the system. Interview and open ended questionnaire responses were analysed using thematic analysis: responses were transcribed, coded into recurring categories such as manual process bottlenecks, reporting delays, and inventory errors, and grouped into themes that informed the identified system requirements. Quantitative questionnaire responses and operational records were tabulated and summarized using Excel spreadsheets to support the qualitative findings. Findings were triangulated across the interview, questionnaire, and observation data to strengthen the reliability of the conclusions drawn regarding system requirements and critical success factors.

The study used a qualitative approach, as well as a case study research design, where 15 respondents were sampled in 10 functional departments, using a purposive sampling technique, quantitative data was collected. Data collection lasted for 90 days with structured observations in the field, with daily shift notes on manual data capture errors recorded and availability KPI's against an operational target of 85%. The project manager was interviewed using a semi-structured format and 12 key metrics measuring ERP integration and critical success factors were assessed. The team analyzed the themes from the qualitative interviews and the quantitative downtime logs and created MTTR and MTBF results in excel spreadsheets. All three data sources

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were used to triangulate findings, which were then used to develop a prototype of a web-based 3-tier ERP application to assist with real-time breakdown reporting throughout the mine site.

CASE STUDY

The Case Study firm is a leading productivity partner for the mining, infrastructure and natural resources industries. With cutting-edge technology, it develops and produces innovative drill rigs, rock excavation and construction equipment, and provides world-class service and consumables. The company was founded in Stockholm, Sweden, and has passionate people supporting and collaborating with customers in more than 150 countries including in Southern Africa. This allows for better and faster response to different markets that have different demands. The entity allows for close collaboration with mining, infrastructure and natural resources customers. The firm was contracted by a major platinum company to perform maintenance services on their mining machinery on mineral rich Great Dyke mine in March 2010. The equipment includes 4 types of Trackless Mobile Machinery (TMM) consisting of Drill Rigs, Bolters, Scoop Trams and Dump trucks which they use for mining. The case study firm has the duty to carry out maintenance services to ensure smooth operation during the mining process, hence it has set up a station on site at the mine. ERP system was considered necessary to meet the conditions of the contract and at the same time make profit, proper, effective and world-class maintenance management is required. In this regard, and with a view to continuously improve, the company made a decision to implement an ERP to optimise its business operations from the current manual operations for most of its business processes. To satisfy customer requirements and at the same time satisfy the parent company requirements, the case study company would want to facilitate desired mining production, at the same time minimising the costs. The firm has three pillars from which the objectives of the ERP project are derived which entail cost, availability and safety. The key objective for the firm is to monitor and analyse maintenance operations to effectively improve the maintenance function so as to avail reliable machines with stable availabilities above 85% for the mining operations, according to procedures and promoting zero harm.

Currently, the case study entity has ten functional areas with the core function being maintenance (both reactive and proactive). These functional areas entail Maintenance Planning; Human Resources; Workshop Maintenance; Supply Chain; Underground Maintenance; Projects; Safety, Health, Environment and Quality (SHEQ); Rock and Drilling Tools (RDT); Service Exchange; and Administration. The Maintenance Planning unit is serving as the central information control area (Figure 4), with one of its main function being reporting and communication information from and among the other departments. This department is directly linked with several functional areas in the system. This department receives information directly from the customer (side), underground and surface workshop personnel. Currently, this area is the backbone of most communication operations in the system.

Figure 4. Relationship between maintenance planning and other departments

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The team is mainly responsible for receiving information and distributing this information, especially information on breakdowns from the underground and surface crews and communication this information to the managers. The Planned Maintenance Officer is responsible for the overall operations of the department including scheduling preventive maintenance (PM) while the clerks are involved in the execution of these. The main function of this area is to monitor availabilities and generate availabilities. Breakdown times are obtained from production checklists received from the equipment operators which are then used to generate the availability report. The availability report also contains information on equipment utilisation and breakdown causes and failure modes. Currently excel is being used to generate these reports.

Currently, the Human Resources department is using HR Link which was tailor made by SAP for them to satisfy the specific HR needs. This system keeps employee records with easy retrieval when required, sets specific objectives for specific employees, reviews employee objectives for appraisal, assesses of employee performance and progress, and administers payrolls. However, there are still various HR duties which are still being performed manually such as administration of overtime, leave administration and administration of shifts.

The Stores and Supply Chain department is responsible for of stock supplies and warehouse management. In its operations it responsible for inbound logistics, operations logistics, and outbound logistics. Currently, the department is using a system called Business Planning and Control System (BPCS). This system is capable of keeping a database of the inventory in the warehouse but is however unable to: indicate red flags for spares which need to be ordered taking into account the lead time, order expedite, link with the clearing agent, and communicate the withdrawal of critical spares from the warehouse with the managers. Work orders are being generated manually which is presenting this department with problems such as human errors, double entries, and editing problems.

The Project and Product Support unit deals with sub-assembly repairs, repair of prolonged breakdowns and midlife interventions. The duty of this department is to plan for the cost, spares and other resources, projects durations, manpower (including outsourcing), and scheduling. The planning and execution of these projects are done manually. It is directly linked to other departments such as the maintenance planning and supply, thereby being inherently affected by the problems that they are facing. The major challenges are stock outs, erratic supply of spares, labour and understaffing. Currently this department doesn't have any computerised system to assist in the scheduling, stores procurement of spares and materials, and outsourcing manpower.

There is also the Workshop Maintenance department that works hand in hand with the maintenance planning department with its duty being execution of the maintenance activities. The maintenance team in this department is there to carry out daily inspections and checks on machines and scheduled preventive maintenance, as well as attending to complicated breakdowns on machines that are referred to the surface from underground. This unit has two specialist areas: drilling (maintenance on boomers and bolters) and trucking (maintenance on scoop tramps and dump trucks). There is also a Service Exchange function within the workshop which is responsible for repair and refurbishment of components such as hydraulic cylinders by external service vendors. This is done to minimise costs on spares consumption. This functional area is therefore responsible for making these components available by sourcing the service providers, administering the work, tracking the components and making the payments. While the Rock and Drilling Tools (RDT) function exists as a support area to supply the mining operation customer with consumable rock and drilling tools (drilling rods and drill bits) which are used by the machines involved in drilling.

Underground Maintenance is also available as a way of reducing downtime, as the underground maintenance team is there to immediately attend to machine breakdowns as soon as the breakdown is communicated by the machine operators. However, there are other breakdowns which may be complicated such that they cannot be attended while the machine is underground due to factors such as accessibility, safety, the need for spares etc. In such cases, they refer the machine to the surface so that it can be attended by the surface maintenance team. The underground maintenance crew is also responsible for acknowledging breakdowns and downtime as well as conveying information to the surface maintenance personnel.

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All these functions are controlled by the Administration unit which performs the overall management functions from operations management to strategic management. It consists of the contracts manager and maintenance manager. Cost and profitability management are done through this area.

The Case Study firm's operational system has become complex and difficult to operate efficiently using a manual based system. Most of the problems being faced in the functional areas of the organisation can be addressed by an appropriate ERP system to serve specific needs. However, implementation of Enterprise Resource Planning (ERP) systems is technologically complex, costly and associated with high failure rates hence the need for proper planning before implementation. The Case Study firm processes are used to convert inputs such as time, financial resources, human resources, spares etc. into outputs such as equipment availabilities, profits, safety, customer satisfaction etc. The key functional areas make up the subsystems which help in converting the inputs into the desired outputs. However, these subsystems should collectively work together to achieve these outputs. The ERP model should therefore increase ties between these subsystems to increase the overall efficiency of the system i.e. the effectiveness of the conversion of the inputs to the outputs. Feedback loops should also be place to ensure corrective action is taken.

DETAILED ANALYSIS AND EVALUATION

Maintenance management

Maintenance management is the core business at the Case Study firm, hence optimisation of the maintenance function contribute to the overall effectiveness. The effectiveness of the maintenance function however directly depends on the effectiveness of the maintenance planning function with key issues as given by Table 1.

Table 1. Current maintenance analysis issues

INPUTS	ANALYSIS PROCESS	OUTPUTS
Checklists (Downtime and breakdown information)	Availability monitoring and analysis	• Daily availability reports; weekly and monthly availability summary reports. • (KPI -85% availability)
Downtime	Maintainability analysis	• Weekly maintainability report with MTTR. • (KPI-MTTR<1.5 Hours)
Uptime	Reliability analysis	• Weekly reliability report with MTBF. • (KPI-MTBF > 14 Hours)
Oil consumption log sheets	Hydraulic Oil consumption analysis	• Daily report on oil consumption by the machines. • (KPI-oil consumption < 15 litres)
Hose failures on checklists	Hose performance analysis	• Daily hose performance report
Failure frequency	Failure analysis	• Failure analysis reports

Machine availability is one of the main pillars of the contract with the mining customer, hence the need for effective monitoring of the machine availability. In addition to preparation of summary availability reports, it is also key to monitor, communicate and report the availability on real time basis and monitor the availability of each machine as it drops with the increase in downtime. Maintainability analysis is a key decision support tool which shows the Mean Time to Repair (MTTR) which is an indicator of the effectiveness of the reactive maintenance function. However, the effectiveness of the reactive maintenance function depends on a lot of factors and to investigate these factors requires a zoom in on the mean times to repair.

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Currently, the MTTR is being calculated using all the downtime, and an improvement can be made to separate the times to repair and the waiting times so that focus can be established on the problematic areas in the reactive maintenance function. Furthermore, the maintainability analysis can also be carried out at machine type level, machine level, breakdown type level and failure mode level. In addition, the maintainability analysis was being done on weekly cycle an improvement can be made to do the analysis based on the planned maintenance (PM) cycles. This will also allow for analysis for a PM cycle and for a number of cycles. Reliability analysis is another key decision support tool which shows the Mean Time Before Failure (MTBF) which is a measure of the effectiveness of the proactive maintenance function. This analysis can also be done at machine type level, machine level, breakdown type and failure mode level so as to increase the effectiveness of the analysis. Again it can also be done according to the PM cycles. Breakdown segregation is also key at case study firm. The breakdowns need to be classified as either mechanical, electrical or hydraulic for this information to be used in the analysis of reliability and maintainability. This allows for identification and establishment of focus on the critical areas. This effective analysis and measurement of the key performance indicators of the maintenance function will allow for planning on how to improve the system as feedback or corrective action.

Table 2. Summary on maintenance analysis

	MAINTENANCE PLANNING ANALYSIS	
CATEGORY	**STRENGTHS**	**WEAKNESSES**
Data capturing and analysis	▪ There are data clerks to capture the data on production log sheets on day and night shifts. ▪ The data clerks can receive any other data relevant to the function such as oil consumption data. ▪ Daily availability analysis is done to determine the effectiveness of the maintenance function ▪ Maintainability analysis is done to determine the effectiveness of the reactive maintenance function ▪ Reliability analysis is done to determine the effectiveness of the proactive maintenance analysis ▪ Hose performance is analysed with hose performance being regarded as a critical area considering the hydraulic nature of the machines ▪ Hydraulic oil consumption is analysed to determine the efficiency of equipment to produce each tonne of ore	▪ Data is captured manually ▪ Downtime not split into the relevant categories such as reporting time, waiting time and time to repair when the downtime data is captured. ▪ The current system cannot generate breakdown history from the captured breakdown data. ▪ Breakdowns/failure modes are not segregated to ease the data capturing process ▪ Failure modes are not clearly documented to ease the data capturing process ▪ The assets are decomposed into hierarchical trees down to the last component being maintained to ease the data capturing and analysis process. ▪ Breakdown failures captured into MS Excel spreadsheet which take time to refine and quicker analysis for required periods ▪

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	▪ Analysis is done to determine the most frequent failure modes and guide on the machine(s) or machine type with the deviating performance requiring intervention to stabilize	
Work planning	▪ Planned schedule of machines for planned maintenance ▪ PM guides are issued out for issues that should be addressed on the machines on PM ▪ Guides issued out for daily machine checks, ▪ PM is done based on intervals based on different meters depending on the component being maintained	▪ Less effective assigning of duties and follow up on those duties ▪ PM activities do not have estimated durations and follow up on exceeding planned will be poor ▪ Using the current manual system, it is difficult to keep track or to quickly access information on when the last service was done or when the next service will be due ▪ Management of work orders if poor, using a manual system it is difficult to get information on work orders such as its status, location of the work, and the type of work. ▪ Daily machine inspection documents issued out on shift commencement, the issuance is manually done. ▪ System generated documentation will help in closing the loop of feedback into the system through logging of outstanding areas
Backlog management	▪ Outstanding corrective work areas are document on planned maintenance service over-inspections done through the line supervision i.e. Charge hand and Maintenance Foreman ▪ Backlogs are highlighted on review meetings minutes and are not removed until they are closed.	▪ Keeping track of the backlogs is difficult using a manual system ▪ There is no way of tracking cancelled work orders ▪ The action areas and notifications on these are not based on work order importance ▪ Report for outstanding corrective works is managed through the MS Excel spreadsheet which is subject to human errors
Parts planning	▪ Planned Preventive maintenance service forecast generates the basis for forecasting spare part requirements for upcoming service intervals i.e. 125Hrs; 250Hrs; 500Hrs; 1000Hrs; 2000Hrs; 4000Hrs ▪ Weekly meeting with the logistics personnel to plan on the	▪ Part number are not digitalized to ease parts planning ▪ Lack of detailed reports from logistics to make parts planning more effective ▪ Maintenance program schedule is computed manually using measured work rates for the machinery which is not always a constant factor, the fluctuation may result in overstocking of planned preventive

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	parts required ▪ Review on received stock to proffer informed planning	maintenance spare parts ▪ Delays in the supply chain to deliver the identified spares may result in more requirements for the machines as secondary damage take place during the waiting period for delivery
Reporting	▪ The key report of any maintenance function, which is the availability report is compiled on daily basis ▪ Overall reliability and maintainability reports ▪ Notification of reported breakdowns done on hourly basis via text messages	▪ Inadequate reports ▪ Failure analysis is not detailed due to lack of segregation of failures, lack of hierarchical decomposition of the machines, sub-assemblies and components. ▪ The failure modes are not digitalized to ease the analysis and reporting of some parameters ▪ Asset expenditure reports are missing ▪ Work distribution (reactive against proactive) reports are missing ▪ Work closure rate reports are missing ▪ Using the manual system, it is impossible to report availabilities on real time basis ▪ It is difficult to establish breakdown trends using the manual system ▪ MTTR and MTBF are reported on weekly basis rather than on PM ▪ Input data for the various reports are maintained in MS Excel database and plotters. Errors in capturing and computation affect the report integrity and quality for analysis cycles.

Logistics

For the logistics function to function effectively, there is need for effective inventory management with indication on the optimal times to replenish taking into account the lead time. This will then require automatic data capture and analysis to report mean stock consumptions, demand focus, stock health and status of critical spares. Such automatic data capture and analysis will then require the system to move away from manual work order management towards an automated work order management system in which authorisation and approval is also automated. This will significantly reduce time losses and also allow for improvement in the communication system especially on the withdrawal of critical spares.

Table 3. Summary on Logistics analysis

	LOGISTICS ANALYSIS	
CATEGORY	**STRENGTHS**	**WEAKNESSES**
Ordering	▪ Orders are approved first by the managers before procurement	▪ Currently systems are only able to order items internally ▪ The managers and logistics personnel are

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		unable to track orders when items are in transit ▪ Most orders are placed manually ▪ Ordering approval requires manual signatures
Inventory management	▪ Computerised list of all the items in the inventory with details such as the part number, value, unit cost, quantity at hand, location in warehouse, lead time etc. ▪ Periodic stock reconciliation exercises are carried out ▪ The GIM system would be able to generate a list of all the items in the inventory which can exported to excel upon request with the relevant details ▪ Warehouse locations are cleared labelled for easy identification	▪ Difficulties in tracking the mean consumption rates ▪ No effective means of knowing when critical levels of stock are reached ▪ Reconciliation exercises are done on monthly basis for all the stock in the inventory which is complex and prone to human errors ▪ Managers are unable to easily and quickly check stock health ▪ It is difficult to see excess and obsolete stock ▪ It is difficult to identify a material using the part number only, additional information such as description and pictorial view may be required.
Demand and forecasting	▪ Ordering of some items is done based on mean consumptions but manually and after manual analysis as well ▪ The GIM system which is currently being implemented would be able to generate pending orders with items recommended to order	▪ The system still being used is BPCS which cannot recommend items to order ▪ No alerts on critical stock which need to be ordered ▪ Orders of most items are being placed when the items are requested for use and found unavailable in the inventory
Issuing	▪ No item in the inventory is issued out unless it is authorised by the relevant authority ▪ The availability of the requested items is checked in the system and physically in the warehouse before it goes to the appropriate manager for authorisation. ▪ The quantities on hand are updated when items are issued out ▪ Costs are allocated to the respective cost accounts after	▪ Stores request require manual signatures on the paper documents ▪ The availability of the requested items in checked by manually entering the part numbers into the BPCS system which may be time consuming ▪ The availability of the items in the inventory has to be checked manually before the stores requisition document is generated for approval ▪ The quantities at hand have to be updated manually ▪ Risk of double entries ▪ Difficulties in editing the documents ▪ System currently involves several manual

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	items are issued out	processes which are prone to human errors. ▪ Cost allocation is done manually
Reporting	▪ Weekly materials meetings are done to assess the status of the logistics function and stock health ▪ Items received are reported in the daily meetings ▪ Critical stock request reports are prepared on weekly basis which are used to determine the critical stock which needs to be ordered ▪ Reports on the summary of job numbers of the month are generated which are useful in the analysis of the monthly costs	▪ Reports are generated manually which makes it difficult for detailed analysis ▪ Reporting on critical issues which require immediate action may be delayed ▪ It is difficult to assess and effectively report the risk of running out especially on critical stock ▪ It is difficult to assess and report excess and obsolete stock ▪ The system involves many manual operations which are time consuming such that the waiting times are lengthened and operations such as inventory updating and cost allocations are delayed.
Dispatching		Most of the dispatching activities are currently not being done through this area

Projects

This area is also in turn highly dependent upon the maintenance planning, logistics and workshop maintenance function areas. Information on scheduling and prolonged breakdowns is obtained from maintenance planning while spares, service kits and other resources required to execute the projects are obtained through logistics. The workshop maintenance will be responsible for the actual execution of the projects by providing the labour required although labour will have to be outsourced in some instances. The operation can be improved if effective project management is done through effective planning and scheduling for duration and resources. The availability of all the resources (service kits, human resources, time etc.) required to carry out a particular project should be checked well before the project is commenced to allow for corrective action to be taken in time. Proper backlog management and follow up on action areas will also be required.

Workshop maintenance

The workshop maintenance function is highly dependent upon the effectiveness of the communication system since it is on the execution end and it is directly interfaced with the machines and useful information is bound to be generated. Proper communication channels are required to integrate this area with the other areas such that information is effectively transmitted. Some of the maintenance issues faced are recurring, therefore the system can be optimised by keeping breakdown history and reviewing and analysing these problems, with such information to be used in training programs as well.

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Inter-departmental and external communication

There is room for improvement in the communication system both internally and externally, which can be achieved by the ERP system. Full integration of the functional areas required quick flow of information from one area to the other. In a survey of [insert number] employees conducted by the researchers using a structured questionnaire, findings showed that there is room to improve communication at Case Study firm. It was found that 40% and 60% of respondents agreed that internal and external communication was good respectively, as shown in the pie charts in Figure 5. The areas of improvement would be reporting, review, top down and bottom up flow of information, effective update channels and quick communication of changes. Areas of improvement in external communication would be feedbacks, analysis and evaluations, and order expediting. However, the communications infrastructure would need to be improved if the overall communication is to be improved.

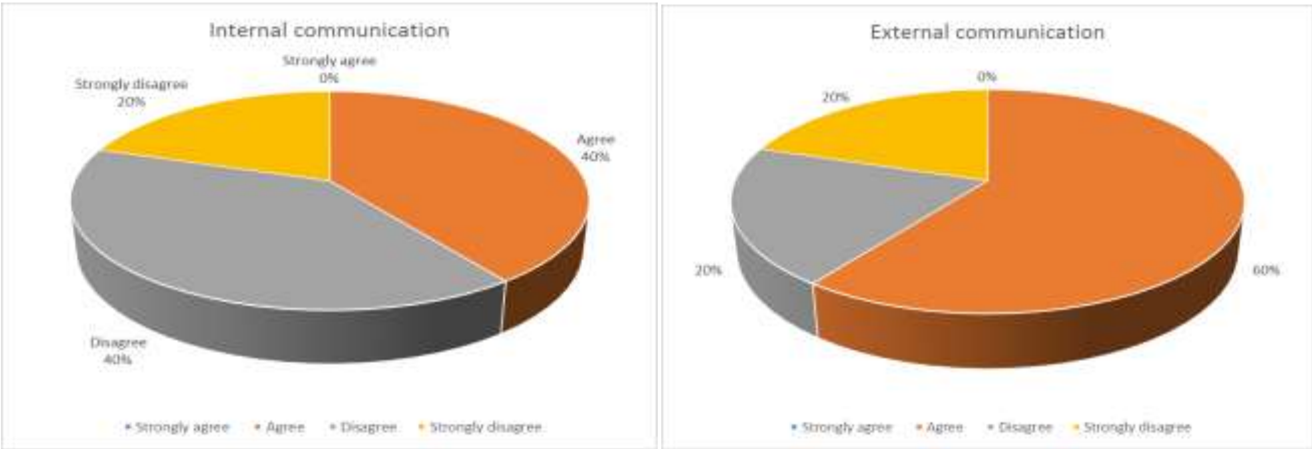

Figure 5. Results from questionnaires on internal and external communication

Existing system

It was established that some processes were put under wrong sub-system areas which would hinder the system from operating efficiently. All procurement processes have to be done through the logistics function, which is not the case for some operations in the firm, as Rock Tools management areas conduct their own procurement for rock tools, this being attributed to the current unstable operation of the logistics area. Also currently some of these dispatching operations are being done through the service exchange area, and this could be rectified by having the service exchange area belonging to the logistic function. It is also key to have a well-defined finance function which not the case in the currently. The finance processes are spread out in various functional areas of the system with the main ones being under senior management.

Proposed ERP framework model

ERP architecture

The case study firm is a dynamic company, technologically changing and quick to utilize new technologies as they become available. The architecture of the ERP system is therefore key to ensure adaptability of the system to the changes which may occur in the business and the ease of incorporating these into the ERP system. A three tier architecture ERP system would give an opportunity to redesign the product and not only look into today's needs but into the future. This would entail the following layers: data tier, business/application tier, and presentation tier.

Data tier: which is the database management system that provides access to the application's data. Business/Application tier: uses an application server and processes the business logic for the application. This layer contains the functionality modules of the system to represent the business process of the organisation. Presentation tier: this layer will give the users access to the application. It presents data to the users and option-

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ally permits data entry and manipulation. Data clerks can input data this layer and other users such as managers can access required information such as reports through this tier. A Web based application will be suitable for the Case Study firm to allow users in multiple locations to interact with the ERP system.

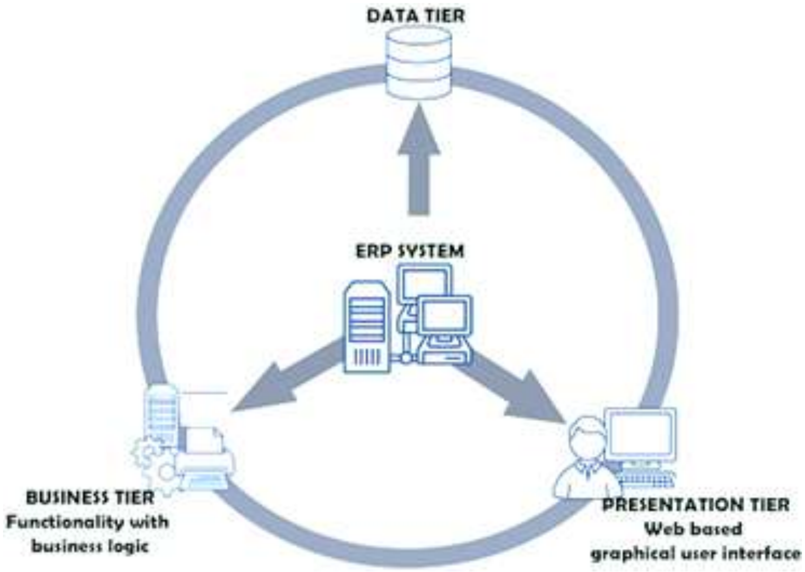

Figure 6. Suitable ERP architecture

For example, in the 3 tier architecture ERP system, if a user wants to find the machines which have been affected by a particular breakdown on particular day. First, the presentation layer displays a web page with some fields for the user to enter and filter the desired information. The information is then passed to the application layer which formats a query and passes it to the database layer. The database layer runs the query and returns results (list of machines of machines affected) to the application layer which formats it into a web page. As a result of this, a 3 tier architecture would have the following benefits: can be scaled well, more reliable, flexible to changes, lower support and maintenance costs, and more security. However, it will be subject to more infrastructure costs.

Functionality modules

The researchers established the ERP modules that would be required for the Case Study system to be fully operational. The ERP system should however be flexible in allowing addition of other modules in the event changes occur in the business which cannot be covered by these modules in Figure 7.

Figure 7. Required functionality modules

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Maintenance module: Should support all maintenance operations (proactive and reactive) in the system, and it should include the maintenance planning, workshop maintenance and underground maintenance. However, it should treat these as integrated functional areas without dissolving the responsibilities of the personnel in those respective areas. This module must be highly integrated with the logistics, project management, finance, and administration modules.

Logistics modules: This module should handle all receiving, inventory management and dispatching operations. This means that it will be covering the stores and service exchange functional areas in the current system. All procurement processes of all materials, both internally and externally will be done through this module. This means other functional areas such as RDT which have been doing their own procurement will no longer be handling such operations. For efficient operation of the system, this module should be highly linked to the finance, logistics, maintenance, rock tools management, project management and administration modules.

Finance module: It will compile functional data from the other functional modules and generate reports on the financial position of the organisation. To achieve this, it requires this module to be highly linked to all the other modules. Administration module: This module must allow the managers to perform their managerial and administrative operations. The web-based architecture will allow remote users to perform these. Again this module must be well linked with all the other modules. HR and SHEQ module: To reduce complexity of the system, this module must support the HR and SHEQ processes but must treat these as different functional areas of the organisation.

Project management module: This module must handle all projects to be carried out in the system from planning and scheduling up to execution. The module should handle both maintenance related project and system projects.

Rock Tools Management module: this module will focus on the rock tools as consumables and all the operations involved within the lifespan of these materials.

Maintenance requirements

ERP maintenance module would seek to effectively have mining machinery at the Case Study firm maintained. These machines are of 4 types but can be first categorised into 2 categories, trucking machines and drilling machines before further classifying them into the 4 types. These assets can also be further decomposed again. It is important to decompose these assets to make the management and analysis of the maintenance of these assets more effective. The ERP system should therefore identify not only the items being maintained as the machines but should also identify the subassemblies and key individual components of these machines as items to being maintained as well (Figure 8).

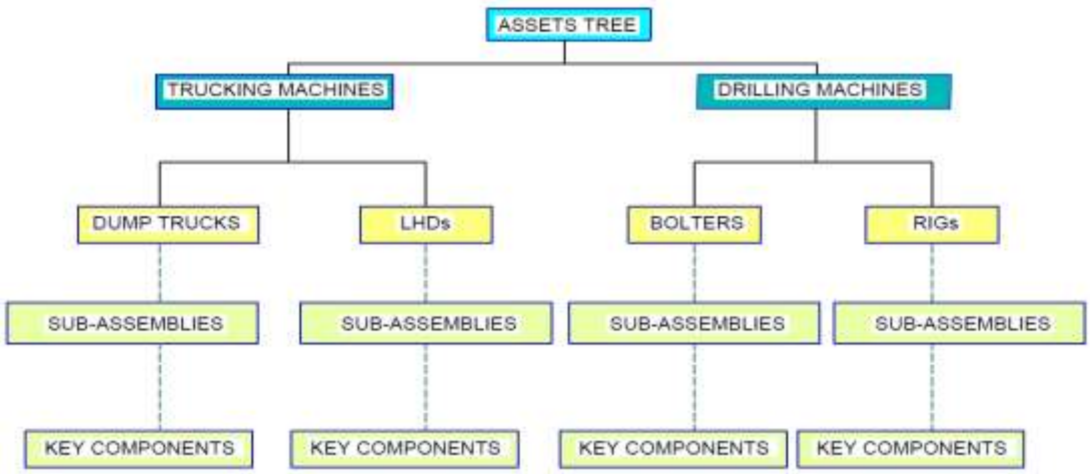

Figure 8. Maintenance assets tree

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The nature of the environment to which the machines are subjected, is difficult to completely remove the reactive maintenance component. However, it is important to make the reactive maintenance effective to minimise downtimes and minimise inherent costs. The ERP should therefore be capable of supporting the current Preventive maintenance strategy but effectively improving its reactive and proactive components. However, with technological changes, the maintenance strategy can change hence the ERP maintenance module should also have a provision to allow for any future changes. Notifications, updates and reports also play a vital role in keeping managers updated on the status of the maintenance function and also for them to make informed decisions. Therefore, the ERP maintenance module should effective address issues to do with data capturing, notifications and updates and reporting.

The module should recognise all the operations involved in a maintenance flow (whether planned or unplanned) from work identification up to reporting with the various interactions and data capturing operations in-between. The flow chart below shows how the maintenance work is carried out.

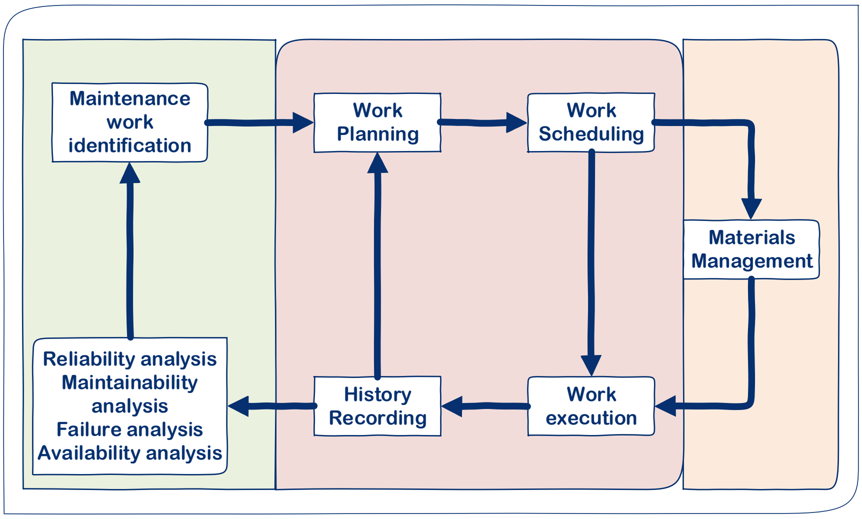

Figure 9. Maintenance operations flow chart:

Process mapping is also key to illustrating how the module will be integrated with other modules. The process flow and decision chart below shows how the maintenance function can be integrated with the HR and Logistics functions.

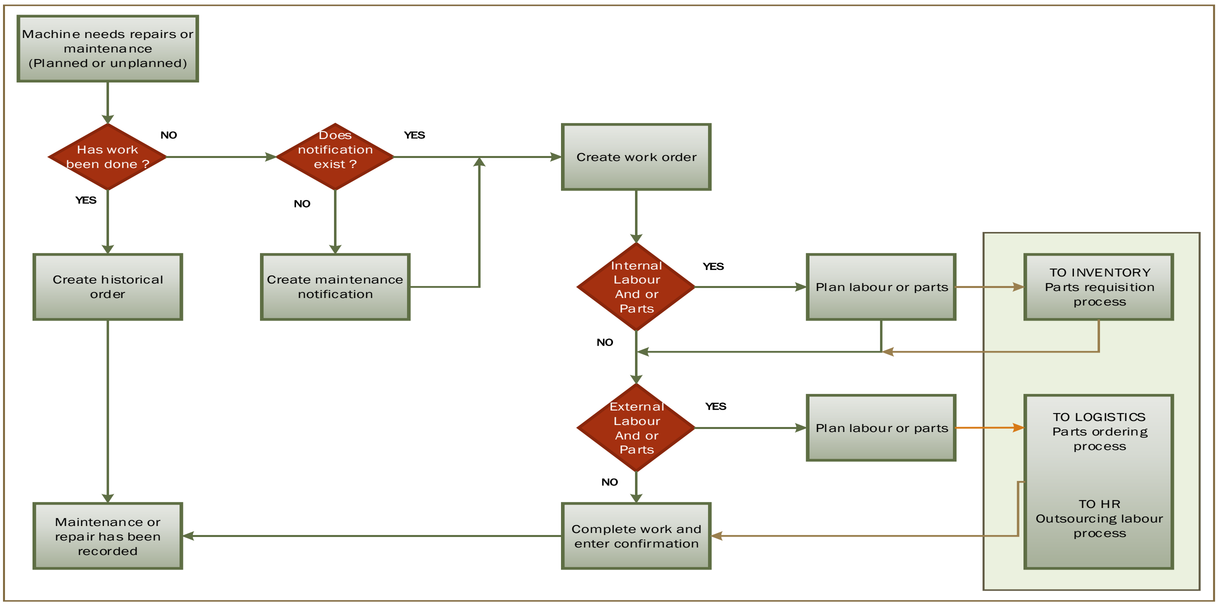

Figure 10. Maintenance work flow chart

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These ERP requirements specifications are sorted according to category but they are not sorted in any order of priority. Columns for priority and criticality of the requirements have been included to prepare for the selection and evaluation process.

Logistics requirements

These ERP requirements specifications for the logistics module are summarised in the Table 4 below. These ERP requirements specifications are sorted according to category but they are not sorted in any order of priority. Columns for priority and criticality of the requirements have been included to prepare for the selection and evaluation process.

Table 4. Summary of ERP requirements for logistics

Index	Category	ERP requirements	Priority	Criticality score
1.	**LOGISTICS**			
1.1.	Orders	Recommend on items to order based on mean consumptions and generate pending orders		
		Generate pending orders for critical stock but accompanied by alerting reports taking the lead time into account.		
		Generate reports on confirmed orders(after the pending orders are approved)		
		Provision to place manual orders but keep history of all manual orders for analysis.		
		Linked to both internal and external suppliers. For internal suppliers it should be linked to the firm Customer center which is in turn linked to the firm Sweden distribution center. For external suppliers it should have access to all the approved suppliers.		
		Handle order redistribution procedures		
		Generate order history reports on order refill history, item refill history including critical stock, item acceptance history etc.		
		Track orders when items are in transit from the time the order is placed, to the time the items are received, generating notifications at various checkpoints.		
1.2.	Inventory management	Keep a stock of all the items in the inventory with details such as the part number(or reference number), value, unit cost, quantity on hand, location in warehouse, lead time etc.		
		Generate a list of all the items in the inventory which		

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		can be exported to excel upon request.		
		Keep a list of all the items in the catalogue (not necessarily in the inventory but can be ordered) with details such as pictorial view of the item, part number, lead time, unit cost etc.		
		Keep track of the mean consumptions on daily, weekly and monthly basis etc.		
		Generate alerts or notifications when critical stock levels are reached		
		Organize and administer periodic order reconciliation exercises		
1.3.	Demand and forecasting	Establish stock consumption patterns		
		Establish economic order quantities and optimal times to replenish especially for critical stock		
		Establish new critical stock based on consumption, ordering patterns and costs		
		Forecast ordering times based on mean consumption rates		
1.4.	Dispatching	Handle automated work orders		
		Check availability of requested items in inventory		
		Generate reports on requested items which were not available in the inventory		
		Update quantities on hand when items are when items are issued out.		
		Allocate costs to the respective cost accounts when items are issued out		
1.5.	Reporting	Generate reports which can be converted to excel format upon request		
		Report alerts as notifications on the user interfaces		
		Report alerts as notifications via email		
		Generate some periodic reports on the user interfaces		
		Generate summary reports on items on hand, cost analysis, mean consumptions etc.		
		Stock analysis		

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		Stock health-keep stock within certain limits and report on critical stock, excess stock and obsolete stock Risk of run out-report on stock that is at risk of running out Excess stock- report on excess stock		
		KPIs-report on the effectiveness of the logistics function based on the set KPIs		
		Dynamic KPIs-handle dynamic KPIs and recommend on which KPIs need to be changed		
		Generate ordering reports (refer to section 1.1.1)		
1.6.	Inventory policing	Allow users to input information on inventory policies which will be used to determine: Item criticality Critical stock Replenishment policy etc.		

Database requirements

The database plays a very important role of the ERP system and it forms the basis of integration of the Case Study firm system. The system would require a centralised database capable of keeping details of the assets, human resources and the inventory. The database should contain all the assets and the components of the assets tree. The centralised database should also contain all the items in the inventory and records of all the human resources in the organisation.

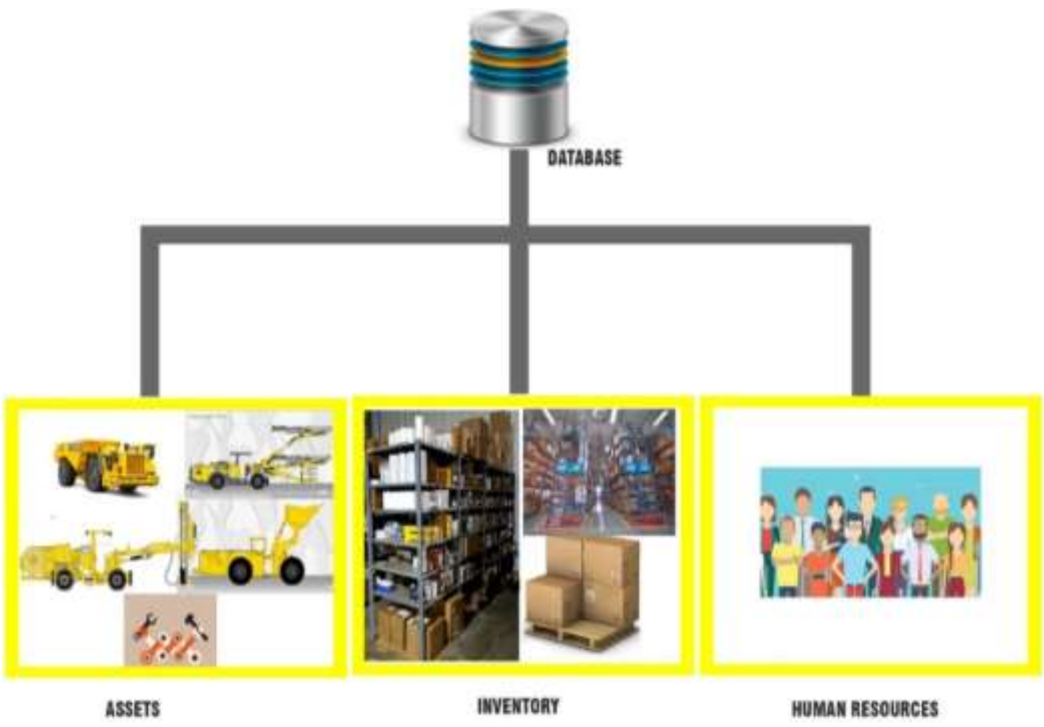

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Figure 11. Centralized database elements of the Case Study firm system

The Table 5 below summarises the items to be contained in the centralised database and their attributes.

Table 5: Key information for the Database

Category	Attributes
1. Assets Machines	▪ Machine type name ▪ Machine model name ▪ Pictorial view of machine ▪ Machine reference diagrams ▪ Machine fleet number ▪ Date commissioned ▪ Estimated lifecycle
Sub-assemblies	▪ Machine type ID ▪ Machine ID ▪ Assembly name ▪ Assembly unique number ▪ Pictorial view of assembly
components	▪ Machine type ID ▪ Machine ID ▪ Part number ▪ Component unique ID ▪ Component pictorial view ▪ Brief description of component
Infrastructure Tools	▪ Asset name ▪ Asset unique ID ▪ Location of asset
2. Inventory	▪ Warehouse name ▪ Warehouse location ▪ Location in warehouse ▪ Part/ stock number ▪ Quantity on hand ▪ Pictorial view of part ▪ Unit cost ▪ Estimated lead time
3. Human resources **3.1 system users**	▪ User name ▪ User ID ▪ User role ▪ User email address ▪ User phone number ▪ User login/authorisation details

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3.2 employees	▪ Employee name ▪ Job details e.g. job title, job description, objectives etc. ▪ Employee qualification details ▪ Employee medical records

User interface

The user interface plays a vital role in the success of the ERP system hence it should allow the users to interact with the system and promote efficient communication in the most effective way. Since the company system involves various employees operating in different location, to address this and allow users to interact with the system at any given time, a web based Graphical user interface would be suitable. To allow efficient utilisation of the system, the user-interfaces should be customised to suit each specific group of workers in the organisation. The user-interface can have dashboards which suit the specific needs of the 10 key functional areas of the organisation eg:

Data clerks: would require interfaces which allow them to capture data with relative ease. These interfaces should allow them to select items from fields already loaded in the system as opposed to manually typing the details.

Data analysis roles: user interfaces for users with roles which require data analysis should readily provide them with analysed data which is categorised to allow them to filter through to get the required information. The system should also display critical information on the interface for the user to quickly see the information being communicated.

Managerial roles: the system should have a dashboard on which critical reports are displayed at any given time so managers to quickly view the reports. The reports should also be easy to interpret for example bar graphs and pie charts. Their dashboard should also display notifications on issues of high priority for example new breakdown recorded, pending breakdowns, availability reaching critical levels, daily cost reaching critical levels etc. The interface should also allow managers to view detailed reports from all the other functional areas.

Technician roles: the interface for the technicians should allow them to receive notifications on new work orders, request new work orders, follow up on work orders, request materials, fill in job cards, and request overtime. When interacting with the system, the interface should allow them to select from fields which are already available to minimise the time to be spent entering the data.

Sample input / output

The researchers demonstrated how one of the key areas of the system should function for demonstration purposes of this study. They selected the data capturing and reporting functions of the maintenance function to be the key areas to be demonstrated in this study. Availability is one of the key pillars of the contract hence the need for effective availability monitoring on real time basis. To demonstrate this, the researchers developed a web based database application which is capable of allowing data clerks to capture breakdown information, analyse the information and display real time availability reports to the managers. The application consists of 3 main elements; the database, application logic and a web based Graphical User Interface. The main purpose of this application is to illustrate a sample input (how breakdown data can be entered) and a sample output (how availability data can be reported on real time basis). The web based GUI consists of 3 dashboards; for system administrator, for data clerks and for managers.

A centralised database was created to contain information on the machines, breakdowns, system users and maintenance personnel. The system administrator can create new tables, create new entities and populate the tables on the admin dashboard. The table below summarises the tables of the database and their attributes.

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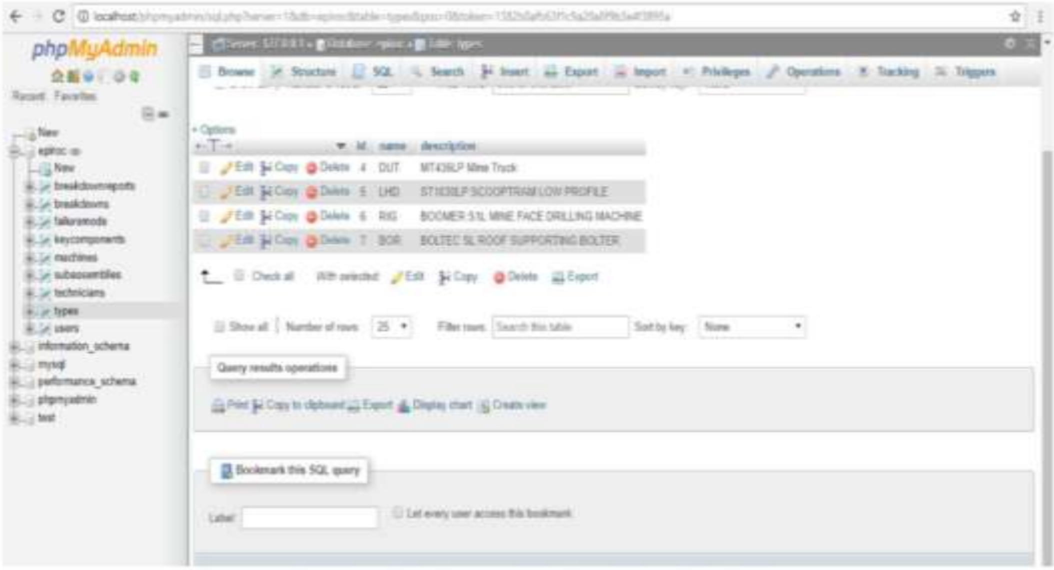

Figure 12. Extract from the database showing tables in the database

A program code was created which can send information to the database or request information to the database after receiving commands from the web GUI. The code can also request breakdown information from the database and compute availabilities for all the machines.

The web based GUI allows the administrator to create new machines, new users and new personnel; data clerks to capture data on breakdowns and the managers to view information on breakdowns even when they are all at different locations. The GUI therefore consists of 3 interactive dashboards for each of these.

The user interface on this dashboard allows the administrator to create new elements. The user interface allows the administrator to input the appropriate information required in the database for each of the relevant fields.

Dashboard for management

The attributes and capabilities of the dashboard for managers will give availability graphs. These bar graphs which show the current status in availabilities enabling them to quickly monitor the availability of each machine such that the overall availability of each machine in that particular day won't fall below the threshold of 85%. It will be easy to see machines with availabilities reaching critical levels as given in Figure 13.

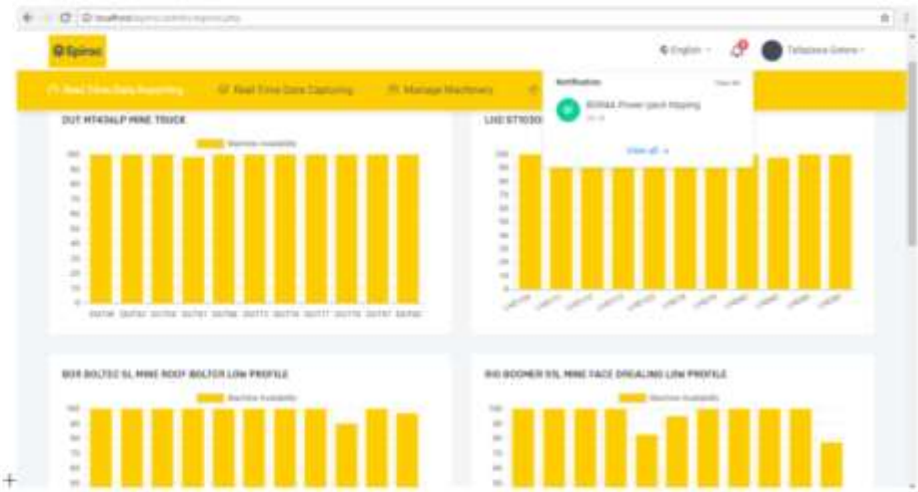

Figure 13. Extract from the web based database application showing the managers dashboard with graphs showing availabilities for all the machines as the day progresses

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Notifications will be displayed for each breakdown that has just been recorded to the system and all breakdowns with a pending status. The managers will also have access to the summary Table 14 but will not be able to change the status of a breakdown.

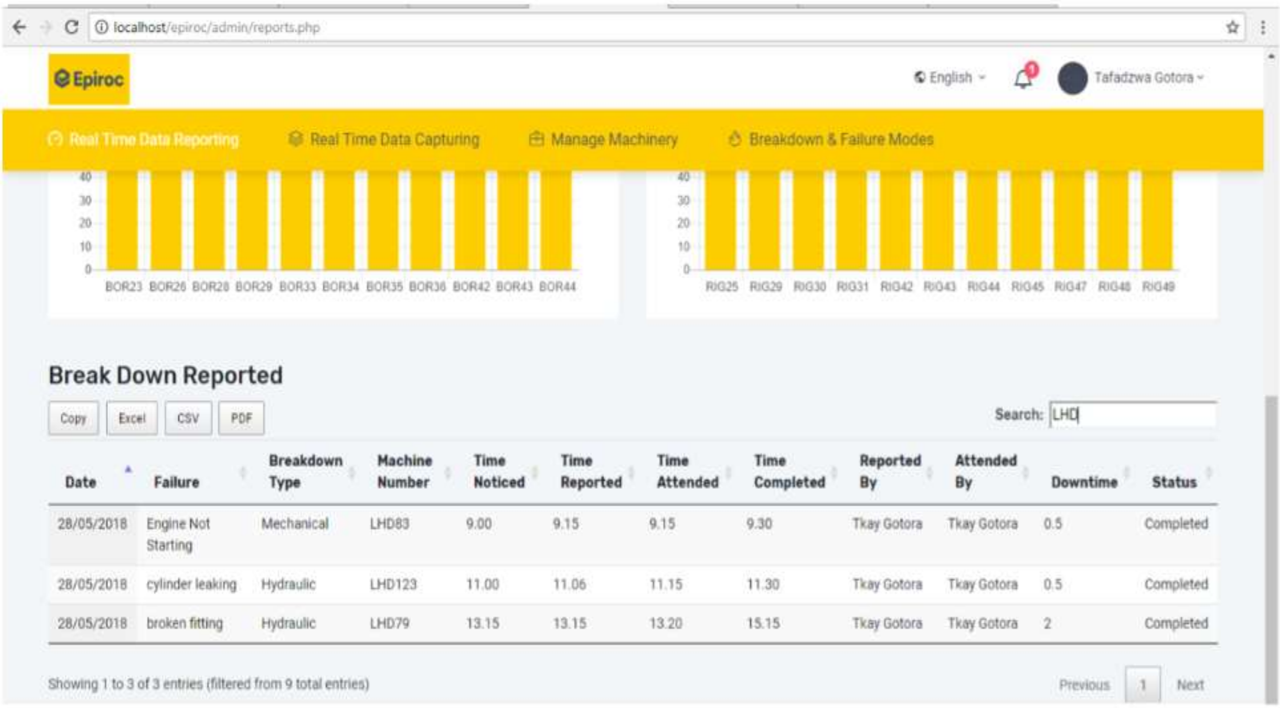

Figure 14. Extract from the web based database application showing the managers dashboard with table for viewing reported breakdowns with all relevant details

A web based ERP solution would best satisfy the boundary conditions. With a web based solution, various users at different locations would be able to interact with the system. For example, the mobility that a web based solution would bring would allow managers to make authorisations even when they are not on site. With a web based solution, the ERP system can be distributed through interoperable, cross platform, and highly pluggable web-service components. The implementation process will play vital role to the overall success of the ERP system. There is therefore need to closely follow the key critical success factors established for the project.

Already it can be seen that the phased implementation route would be more suitable for the Case Study. This is from an economic point of view since it will spread out the costs over a period of time and reduce the risks of failure by establishing focus. Phased implementation would also tally with the idea of getting different modules from different vendors as it allows for implementation of one module at a time.

DISCUSSION

The recommended appropriate ERP system would reduce the complexity in the system by effectively integrating all the functional areas, as the main attribute of ERP systems is to reduce system complexity through process automation. The nature of the operations conducted on site are demanding and time sensitive which calls for effective ways of conducting the operations. Most of the processes are repetitive with high frequency rates which makes process automation very beneficial. Process automation would allow the management of the daily important tasks freeing up workers to focus on key tasks which need more attention. Process automation can also help achieve cross departmental collaboration and prudent workflow execution.

Implementing an ERP system at Case Study firm would also change the way people work. It would create new and standard working ethics which will also contribute to improve operational efficiency. It would also be expected to improve external communication with customers and suppliers, subject to confirmation once the system is implemented. With the nature of the operations at Case Study firm, a lot of information is generated but it is extremely difficult to effectively analyse this information and report it in the required format which proffer effective decision making. An ERP system would therefore be expected to become a decision-making tool by effectively analysing and reporting information in the right format exactly when it is required, once implemented and adopted.

To effectively measure the performance of the system it would require advanced data capturing and analysis which would be extremely difficult to achieve using a manual system. Although evidence of the need of an ERP system at Case Study firm is overwhelming, it also important to recognise that the costly nature of the implementation process would then affect the decisions that have to be made. It should be noted that this study proposed an ERP framework and demonstrated a working prototype for one functional process, breakdown data capturing and availability reporting, which confirms technical feasibility rather than measured organizational impact. A full ERP system was not implemented across the firm, and no before and after measurement of cost, downtime, error rates, or processing time was undertaken. The efficiency, communication, and decision making benefits discussed in this section should therefore be read as expected or projected outcomes, to be verified through post-implementation evaluation once the system is deployed.

RECOMMENDATIONS

Based on the results of this research study, it is recommended that further study may be required to determine the requirement for the other functional areas of the Case Study firm system. The critical areas of the system which would be key for the efficient operation were identified to be maintenance and logistics. Detailed requirements of these areas were therefore provided in this study. The assumption was that any standard modules would adequately cover the other functional areas. However, determination of the ERP requirements in these areas will also be key.

The researchers also recommend the company to adopt phased implementation so as to spread out the implementation costs and to establish focus so as to minimise failure risks. The maintenance and logistics modules should however be implemented first as these are the most problematic areas at the moment and are key to the overall efficiency of the system. It was also established that there is need to tailor make modules which would pay particular attention to the specific needs of the company. The company can however adopt off the shelf systems which are flexible to configure and customize to meet the specific requirements of the company. This recommendation is based on the unique nature of the contract they have for the mining customer. The researchers also recommend that the company establish measurable baseline Key Performance Indicators (KPIs) for the key Critical Success Factors, recorded before implementation and tracked throughout, so as to establish vision and focus for the implementation process and enable a before and after comparison of system performance. Building on the availability, MTTR, and MTBF targets already defined in Table 1, these KPIs should be extended to cover inventory accuracy (percentage of stock records matching physical counts), stock out frequency (incidents per month), procurement cycle time (days from requisition to receipt), work order closure rate (percentage of work orders closed within the target period), and reporting turnaround time (hours from event occurrence to report issuance).

Information which needs to be uploaded into the database should readily be available. The researchers therefore recommend an exercise to compile this information to be conducted. Such information includes critical machine components and categorised failure modes which have been encountered up to date. For the users to be capable of using the system when it becomes fully functional, there is need for user training and education. However, the users should receive training and education from the early stages of implementation part of which is received through involvement and participation. Training and education will have a positive effect on the success of the ERP implementation.

Risks of interruption of the daily operations during the implementation process, and ensuring the company’s data security and ERP implementation can result in their data leaking to their competitors have to be mitigated against. Proper planning is required to avoid adverse interruption of operations, and use of third to firewall the system during implementation to avoid security risks.

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CONCLUSION

The study was undertaken at the Case Study firm on how best an appropriate ERP system could be implemented for a mining based client service provider to improve operational efficiency, communication, performance measurement and reducing operational costs. A web based ERP solution was developed to offer flexibility, mobility and portability, allowing various users to interact at different locations as well as to easily incorporate any necessary changes into the system. The sample web based application developed in this study confirmed the technical viability of a web based solution for one functional process. It shows how processes such as breakdown data capturing and reporting can be automated, which is expected to save time and improve operational efficiency once the system is fully implemented and adopted; this study did not carry out a before and after measurement to quantify these gains. It also demonstrated how communication can be improved by a web based solution by allowing accurate sharing of information through the system even when the users are at different locations. It also demonstrated how information can be organised and presented in the right format to the right people for decision making. The proposed system for the Case Study firm has to be central to the maintenance function, generating reports, which can be used by the maintenance personnel as decision making tools to enhance the effectiveness of the maintenance role, and inventory management as well as supply chain activities. The ERP system would address and satisfy the findings of this study in achieving improved operational efficiency, reduced system complexity and all the other benefits intended from the implementation of the system.

REFERENCES

1. Addo-tenkorang, R. and Helo, P. (2011) ‘Enterprise Resource Planning (ERP): A Review Literature Report Enterprise Resource Planning (ERP): A Review Literature Report’, (January). doi: 10.13140/2.1.3254.7844.
2. Ahmed, N. (2017) ‘Critical Success Factors Plays a Vital Role in ERP Implementation in Developing Countries : An Exploratory Study in Pakistan’, 8(10), pp. 21–29.
3. Ahmed, S. M., Ahmad, I., Azhar, S. and Mallikarjuna, S. (2003) ‘Implementation of Enterprise Resource Planning (ERP) Systems in the Construction Industry’, Construction Research Congress, 40671(March), pp. 1–8. doi: 10.1061/40671(2003)125.
4. Al-sabaawi, M. Y. M. (2015) ‘C Ritical S Uccess F Actors F Or E Nterprise R Esource P Lanning I Mplementation S Uccess’, 8(4), Pp. 496–506.
5. Ansen, J. B. (2014) ‘Sustainably Developing E-Skills In Africa- A Case With Enterprise Resource Planning (ERP) System’, Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS), 5(8), pp. 148–152.
6. Azhdari, G., Mousavimadani, F. and Zarebahramabadi, M. (2013) ‘A conceptual framework for concurrent implementation of ERP (Enterprise Resource Planning) and KM (Knowledge Management): A fuzzy TOPSIS method’, 7(41), pp. 4271–4279. doi: 10.5897/AJBM11.3049.
7. Bae, B. and Ashcroft, P. (2004) ‘Implementation of ERP Systems : Accounting and Auditing Implications’, Information Systems Control Journal, 5(June), pp. 43–48.
8. Barsukova, D. (2013) ‘Implementation of Enterprise Resource Planning Systems : Point of View of Consultants’.
9. Bradley, J. (2008) ‘International Journal of Accounting Information Systems Management based critical success factors in the implementation of Enterprise Resource Planning systems’, 9, pp. 175–200. doi: 10.1016/j.accinf.2008.04.001.
10. Forcht, K. A., A, N. C., Kieschnick, E., Texas, A. and Aldridge, A. (2007) ‘Implementing Enterprise Resource Planning (ERP) For Strategic Competitive Advantage’, Viii(2), Pp. 425–429.
11. Hector, I. and Panjanathan, R. (2024) ‘Predictive maintenance in Industry 4.0: a survey of planning models and machine learning techniques’. PeerJ Computer Science. DOI: 10.7717/peerj-cs.2016
12. Ismail, A.-R. (2014) ‘Success Factors in Enterprise Resource Planning (ERP) Systems Implementation’.
13. Kotiranta, J. (2012) ‘Preparing for ERP Implementation. Case: Enersize Oy’, (April).
14. Leyh, C. and Lorenz, A. (2024) ‘ERP System Implementation Projects: An Update on Critical Success Factors’. Springer Nature, FedCSIS-ITBS 2024 / ISM 2024 special session

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VIII, August 2026

15. Madanhire, I. and Mbohwa, C. (2016) ‘Enterprise Resource Planning (ERP) in Improving Operational Efficiency: Case Study’, Procedia CIRP. Elsevier B.V., 40(2001), pp. 225–229. doi: 10.1016/j.procir.2016.01.108.
16. Maguire, S. and Maguire, S. (2015) ‘ERP implementation in Omantel : a case study ERP implementation in Omantel : a case study’, (February 2010). doi: 10.1108/02635571011008416.
17. Masenya, T. M. and Aroba, O. J. (2025) ‘Factors Affecting the Implementation of Cloud-Based ERP Systems in the South African Gold Mining Industries (book chapter, pp. 149 to 176)’. In Innovation Management for a Resilient Digital Economy, IGI Global Scientific Publishing. DOI: 10.4018/979-8-3693-8357-5.ch006
18. Moon, Y. (2007) ‘Enterprise Resource Planning (ERP): a review of the literature a review of the literature’.
19. Muscatello, J. R., Small, M. H. and Chen, I. J. (2003) ‘Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms’, International Journal of Operations & Production Management, 23(8), pp. 850–871. doi: 10.1108/01443570310486329.
20. Nazemi, E. and Tarokh, M. J. (2012) ‘ERP : a literature survey’, pp. 999–1018. doi: 10.1007/s00170-011-3756-x.
21. Otieno, J. O. (2010) ‘Enterprise Resource Planning Systems Implementation and Upgrade (A Kenyan S tudy)’.
22. Ovidiu, S. and Dascalu, C. (2010) ‘The Advantages And Risks Of Using An Erp System In The Context Globalization’, Ii(2).
23. Panorama Consulting Solutions (2015) 2015 ERP REPORT.
24. Rabaa, A. A. (2009) ‘Identifying Critical Success Factors of ERP Systems at the Higher Education Sector’, pp. 15–17.
25. Shang, S. and Seddon, P. B. (2000) ‘A Comprehensive Framework for Classifying the Benefits of ERP Systems’.
26. Shatat, A. S. (2015) ‘Critical Success Factors in Enterprise Resource Planning (ERP) System Implementation : An Exploratory Study in Oman’, 18(1), pp. 36–45.
27. Shen, Y., Chen, P. and Wang, C. (2016) ‘Computers in Industry A study of enterprise resource planning (ERP) system performance measurement using the quantitative balanced scorecard approach’, Computers in Industry. Elsevier B.V., 75, pp. 127–139. doi: 10.1016/j.compind.2015.05.006.
28. The Institute of Chartered Accountants of India (no date) Information Systems Control and Audit:An Overview of Enterprise Resource Planning (ERP).
29. Yusuf, Y., Gunasekaran, A. and Abthorpe, M. S. (2004) ‘Enterprise information systems project implementation : A case study of ERP in Rolls-Royce’, 87, pp. 251–266. doi: 10.1016/j.ijpe.2003.10.004.
30. Zhang, L., Lee, M. K. O., Zhang, Z. and Banerjee, P. (2002) ‘Critical Success Factors of Enterprise Resource Planning Systems Implementation Success in China’.
31. Zhelyazkov, G. (2003) ‘Enterprise Resource Planning ’:, (201084439)