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INTEGRATION OF BUILDING MANAGEMENT SYSTEM FOR HOTELS AT KOLHAPUR WITH SPECIAL REFERENCE TO MECHANICAL AND ELECTRICAL SERVICES.

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ABSTRACT:-

The most energy-intensive facilities are hotels, which have significant energy bills as a result. Hotel energy solutions project publication, evaluation of energy usage by hotels via networked survey and desk research. Energy efficiency measures are critically vital to hotels, as they give savings of 20% or more, because energy utilities are the most controllable of all operating expenditures. Hotel, motel, and restaurant energy conservation Architectural engineering utilises a variety of mechanical/electrical systems. Inadequate integration at the equipment interface leads to intrusion and an incorrect task sequence during installation, which can have a negative impact on the overall project. This study come up with useful guidelines and processes to avoid making mistakes in the integration of the interface, which would necessitate redoing work, increase costs, and delay completion. Cutting operating costs boosts profits and promotes tourism market competitiveness.

Index Terms – Evaluation, Conservation, Integration, Expenditures

INTRODUCTION

The hotel managers had to re-arrange quickly their priorities and to implement various measures to meet guest's requests in respect of their increased environmental needs. The hotel categorization system serves as a tool for establishing a hotel hierarchy based on the quality of service supplied. This study compares the star ratings issued to hotels by the official Indian rating system with the guest evaluations given to hotels on TripAdvisor and Expedia to verify the effectiveness of the rating system. The survey's findings reveal that a hotel's average guest rating is proportionate to the categorization system's star rating, refuting the theory that customers rate a 3-star hotel favourably.

Inadequate integration at the equipment interface leads to intrusion and an incorrect task sequence during installation, which can have a negative impact on the overall project. This study come up with useful guidelines and processes to avoid making mistakes in the integration of the interface, which would necessitate redoing work, increase costs, and delay completion. Cutting operating costs boosts profits and

promotes tourism market competitiveness. Hotel structures face a significant problem in coordinating mechanical and electrical systems and detailing their configuration. These systems are designed and built by qualified consultants and contractors. The hotel administrators had to immediately reorganise their priorities and put in place a variety of measures in order to meet the growing environmental demands of its guests. This entails beginning with hotel staff education and training, then implementing a series of actions to improve service quality one by one.

These play the most critical role in the entire architecture/ construction business, by providing a comfortable, safe living environment. Mechanical and electrical systems comprise multiple working categories and activities that sustain numerous complex arrangements of pipes throughout the entire hotel unit. Problems are frequently encountered when interfaces are improperly integrated, resulting in delays in the project and reduced product quality. The major Mechanical and electrical installation interface integration of MEP in hotels require the identification of separate arrangements for HVAC (Heating, Ventilation and Air Conditioning), power supply, fire protection, telecommunications, and other related systems. Hence, the purpose of integrating the interface is to recognize problems, resolve conflicts, and perfect the layout of the system for these mechanisms to serve their functions fully.

BUILDING MANAGEMENT SYSTEM (B M S)

A building management system, also known as a Building Automation System (BAS), is a computer control system that is installed in buildings to operate and monitor mechanical and electrical equipment such as ventilation, lighting, electricity, firefighting, and security systems. In large projects with complex mechanical, HVAC, and electrical systems, building management systems are frequently used. BMS-connected systems typically account for 40% of a building's energy usage, with lights accounting for 25%. Energy demand management requires the use of a BMS system. If lighting is included, this Hotel Rating System functions as a grading tool to develop a hierarchy of hotels in respect to their BMS-connected systems, which typically represent 40% of a building's energy use. This study compares the hotel's rating provided by the official India rating system with the hotel's rating provided by customers on TripAdvisor and Expedia to verify the effectiveness of the rating system. The study results demonstrate that a hotel's average guest rating is directly linked to the number of stars assigned by the rating system, proving that guests do not give a 3-star hotel a favourable rating. The purpose of home automation is to improve occupant comfort and efficient building system operation while lowering energy consumption and running expenses.

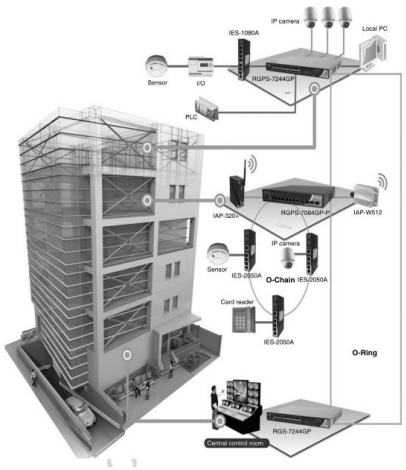


Figure **Error! No text of specified style in document.**:1 B M S INTERGRATION

Aim- Feasibility study and benefits of building management system (BMS) as a management tool for three star hotels with special reference mechanical and electrical services which will minimize operational costs and optimize energy management strategies.

OBJECTIVES WHICH HAVE COVERED IN THIS PROJECT STUDY ARE AS FOLLOWS:

To focus its activities in the line of reducing operating costs by introducing new sources of energy that preserves the environment by creating an eco-friendly establishment. Cutting the operating costs increases the profit and allows improved competitiveness in the tourism market.

To pose valuable findings and recommendations of BMS for mechanical and electrical services to the hotel management system for cutting the operational costs, based on saving energy, and to boost development of hotels.

To attain Flexibility to grow and expand – The powerful combination of open systems protocols and a scalable platform means the BMS can help support growth and expansion of the ME(mechanical and electrical) system in the future.

Intelligent reporting, Comprehensive reporting with functionality for customizable reports delivers greater transparency into system history and promotes compliance.

RESEARCH METHODOLOGY AND DATA COLLECTION

The study followed qualitative and quantitative methods. The qualitative approach included a review of the literature and an analysis of relevant publications. New insights were also gained from websites on the energy efficiency concept and its operational cost.

The quantitative approach covered data obtained from an online survey. A self-administered questionnaire was developed for managers and department supervisors of three star hotels in Kolhapur.

Preparation of questionnaire to get feedback from tourists and visitors

Study of Onsite developed BMS system for five star and four star hotels.

Personal interview with agencies, and suppliers and also companies providing BMS to hospitality buildings with varied usage.

Physical and visual survey of services and BMS for the purpose of finding the relevant services related issues mechanical and electrical services.

Book and net case study.

THE INTELLIGENT BUILDING APPROACH

Integrated building solutions that are intelligent are becoming the norm. Authorization, intrusion prevention, security, cooling, lighting, digital video, power monitoring, variable speed drives, and other building integration features are included. Through a consistent and customizable user interface, the integrated approach provides you with access to all building systems. Building integration also lowers training expenses and integrates alerts and log data. Because it shares a data network, has fewer computers and servers, and employs equipment for numerous purposes, an integrated construction method minimizes capital expenditures. When no one is present, a passive infrared detector, which is often employed solely in intrusion systems, can trigger CCTV recordings, relax HVAC control settings, and switch off lights.

MAIN FUNCTIONS OF THE BUILDING MANAGEMENT SYSTEM

Operator control and monitoring Fast and selective monitoring and operation of the system with practical plant and room diagrams.

Alarm handling detailed overview of the alarms for a fast localization and elimination of faults. Central elements of the alarm handling are therefore the danger identification, danger

Alarm, and an adequate intervention. This is supported by the flexible transmission of alarms to mobile devices, for example, printers or pagers.

Event control System-wide monitoring of systems and processes for the occurrence of specific criteria to trigger specific predefined actions.

Reports Today are modern management stations work with integrated database applications. This allows you to save an almost unlimited number of past events and their recorded actions.

IMPLEMENTING AN BUILDING MANAGEMENT SYSTEM

The closed-loop control system continuously monitors the operation of each device and modifies all parameters to achieve the best set of process values. The BMS connects all AHUs, pumps, and other equipment, and all A/C parameters in each area are continuously monitored to ensure optimum levels and maintain air quality. Worker management systems, technician management, and other individuals who supervise control are all included in service management systems. You can save 10% to 40% on your electricity bill if you use a building management system, or "BMS"Hotel EMS enhances current operations by allowing centralised power of many areas of energy usage, such as lighting and HVAC, as well as the level of error produced by manually running these services. Reduced is a possibility. BMS has been shown to be self-sustaining after two to five years.

BMS' are categorized primarily into 3 levels:-

Level-I BMC systems: These systems are essentially single-function electronic timers that are often installed on or near controlled equipment. The following are the control functions:

- Switch on and switch off time,
- Automatic temperature drop / adjustment,
- Dry-bulb economizer,
- Enthalpy controller,
- Single and multi-zone systems,
- Colder power management controller.

Level II EMC system: These systems often offer remote control and can handle a variety of tasks, including duty cycle and optimal start and stop.

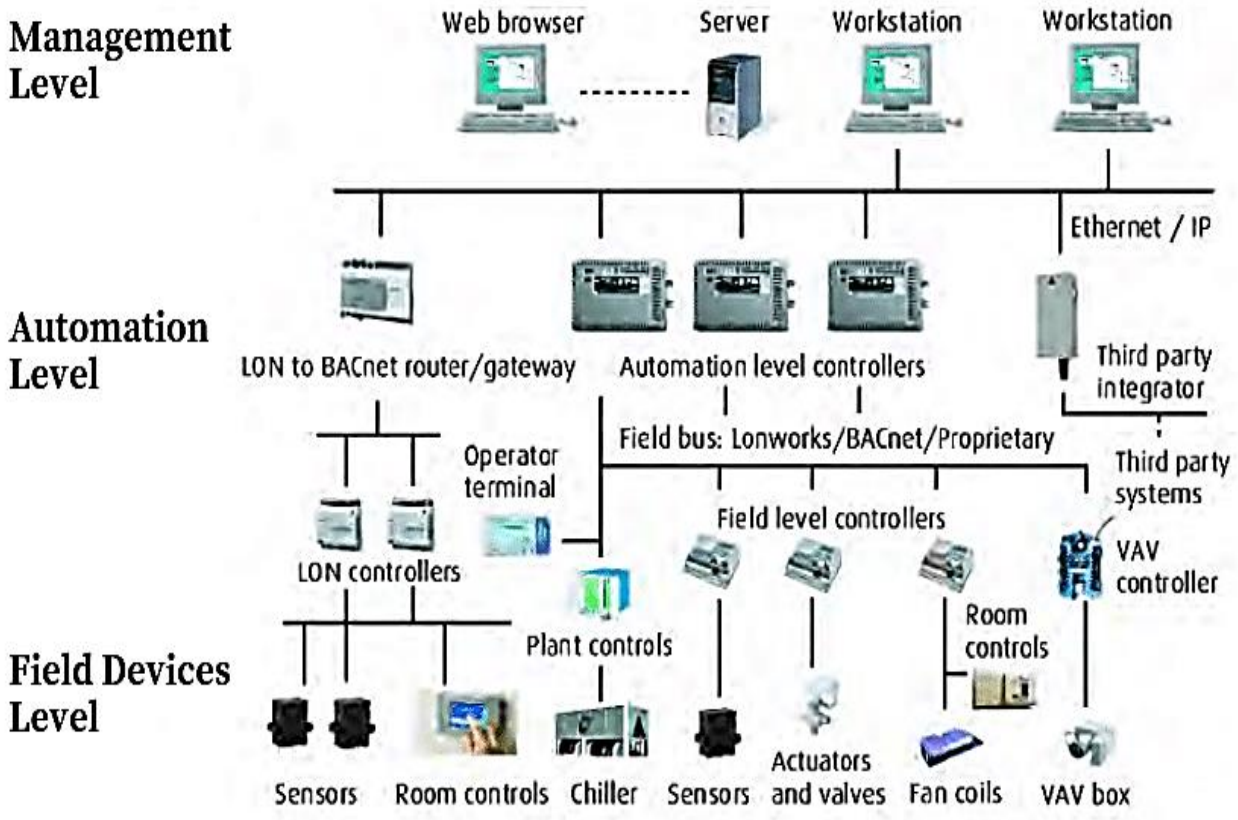
- Demand controller (to reduce peak current demand): The MD controller allows the user to programme the maximum demand threshold and take action.

B. When current demand exceeds threshold, set maximum demand / predicted demand / alarm or load limit.

- Programmable multifunctional controls;
- Multi-load system programmer (to turn numerous coolers on or off).

Level III EMC System: These are central building control systems with control screen graphics. The central console monitors and analyzes remote data acquisition devices. These systems are usually only suitable if the hotel consists of many buildings or floors of a high-rise building with a central plant and some remote machinery rooms.

- Economizer Cycle,
- Reset the hot / cold deck temperature
- Reset outside air temperature
- Cold water reset
- Reset the outside air schedule



PROS AND CONS OF BUILDING MANAGEMENT SYSTEM

PROS	CONS
Well-designed smart system will save money and reduce inefficiencies	The least expensive systems may not offer the capabilities needed to address your building's specific issues,
Advanced fault detection and diagnosis to identify or predict problems as soon as possible, minimizing downtime, occupant complaints, and maintenance costs.	Requires technicians with specialized training to service smart systems, especially as they grow in complexity.
Improved transparency with contractors and ability to validate fixes.	May lock users into long-term, expensive service contracts.
Monitoring of energy consumption. Operating conditions of all systems are visible in real time.	Oversensitive or un prioritized alarms can create alarm fatigue.
Higher levels of security and safety	Increased complexity of the system
Simplified operation for users and administrators	Initial cost + the cost of installing a cooling system for the computers
Simpler staff tracking	Normal buildings last longer than intelligent buildings
Reduced system costs by sharing infrastructure	Need a trained staff for it operations

ENERGY SAVING BY CONSTRUCTING ENERGY MANAGEMENT SYSTEM

By providing a comfortable working environment and implementing an energy management system, you may save energy and increase productivity.

SCHEDULE OF OCCUPANCY: Verifying that the building is operating in accordance with the occupancy level is an important energy-saving technique that necessitates ongoing inspection to confirm

that the settings are accurate. The possibility to use a one-time or 0–30-minute timer to extend the timed operation ensures a one-time change of residence.

ZONING: Further zoning the space with diverse occupancy patterns is a cost-effective strategy to save additional energy. Only when necessary, these zone sections are heated or chilled. To optimise your savings potential, apply occupancy time, corrections, and optimizations to each zone.

OPTIMIZER: The term "optimizer" connotes energy conservation. Was the optimizer a stand-alone controller with an external temperature sensor on the north wall and an interior temperature sensor before the introduction of BEMS? The time coefficient was changed based on the heat loss of the building and the difference between the room temperature and the intended living temperature, and the temperature increase rate was computed based on the outside air temperature. The BEMS should generate detailed information on the optimizer's operation and be examined on a frequent basis to ensure maximum savings.

CONTROL STABILITY: Inconsistent control increases energy consumption by 3-5 percent and reduces the life of valves and actuators. For service areas such as: B. Distributed ventilation unit, VAV box, or fan convection heatsink, primary heating, cooling, and central heating units should offer consistent flow temperatures. Hunting is caused by local plant control with unstable primary plants and/or inappropriate PID settings. The BEMS trend analysis tool allows you to keep track of valve position and fine-tune control loops to save money.

SAVING ELECTRICITY: LOAD CHANGES A load change is when an electrical load is turned off on a regular valid for a period of time. Ambient systems such as ventilation systems can be subjected to duty cycles without creating any trouble.

Based on the scale of your facility, road cycling can save you anywhere from 5 to 25% on your electricity costs.

MAXIMUM DEMAND: Setting a restriction on the maximum permissible consumption (typically 30 minutes) and not crossing that limit is a cost-cutting measure. The controller seamlessly integrates with the peak load counter and continuously checks the pace of power consumption, the amount of energy consumed, and the remaining time to determine whether the limit will be crossed. BEMS needs to minimise its power consumption even more. It can be tough to figure out which generated voltage can flow.

VARIABLE FREQUENCY DRIVE: BEMS can reference environmental factors and occupancy levels from data access by using these demand-related data methods. When the VFD is used to drive the pump,

the pressed transducer and PID constitute a control technique. Maintaining the system press to the best of its ability based on the current load As a result, when demand is low, the pump runs at a slower pace and draws less current. Energy savings: Increasing the amplitude by 10 Hz saves at least 25%.

SENSORS AND ACTUATORS

ACTUATORS: Actuators govern industrial processes by influencing the flow of mass or energy. They can be electrically, pneumatically, or hydraulically operated (International Organization for Standardization, 2004, p. 3). Typically, they are electromechanical valve or shutter control devices that are mechanized.

SENSORS: Touch-sensitive elevator handles (tactile sensors), as well as light that dim or brighten when the base is touched, are just a few of the many capabilities that most individuals think of.

ENERGY ASSESSMENTS

Energy assessment is an important part of a successful energy management program. This will help you to know the current status of your hotel's energy consumption and to show your energy costs. Based on the evaluation report, you can identify energy saving opportunities. This assessment also helps to create a baseline for future comparisons of program success by comparing energy consumption prior to program implementation.

Carry out a walkthrough evaluation

Twenty-five percent of the energy consumption of commercial buildings is wasted due to certain management practices. You can save on your hotel by easily adjusting the management and operation methods. Investigate the energy consumption and associated costs of all systems in the hotel. Leverage operational and maintenance staff to support this process. On the next page-

1) Energy Plan-Helps highlight the information needed to start the assessment 2) Illustrative Evaluation Checklist-Helps identify easy-to-implement energy saving improvements.

IDENTIFYING ENERGY SAVING OPPORTUNITIES

1. New employee training on energy management
2. Track energy consumption and report to all employees
3. Create a culture of continuous improvement

a. persecution

b. Visibility

c. Incentive

That is recognition Energy savings can be made in lighting, HVAC, kitchen and food departments, hotel laundry and maintenance departments, mechanical and other electrical services, reception and management, etc.

IDENTIFYING SAVINGS OPPORTUNITIES WITHIN YOUR LIGHTING SYSTEMS

A. Exit signs that have been retrofitted The use of LED exit signs is becoming more common. In most applications, the light emitting diode, or LED, passes electrical code requirements, uses very little electricity, and lasts up to 50 years. LEDs are the clear winners when it comes to saving money and eliminating the hassle of having to replace lamps.

B. LED lights should be used to replace incandescent and fluorescent lights.

This allows an incandescent bulb (15 lumens per watt, 800 hours life) to be replaced with a more efficient and long-lasting LED lamp (70 lumens per watt, 6000 hours life).

Replace a 60-watt incandescent bulb with a 15-watt compact LED bulb that will last 10 times as long and produce roughly the same amount of light for a fifth of the energy. When they are installed in fixtures that are already in use, they pay off quickly.are used for many hours each day.

C. Take Charge of Outdoor Lighting Summer and winter months should have different scheduling. After 11.30 p.m., the alternate lights can be turned off. It's also a good idea to make a zone for every third lamp.

D. Occupancy Sensors (D). Motion-detecting devices are simple to install and turn lights on and off automatically. When motion, heat, or both are detected, occupancy sensors are activated. Savings of 20% to 40% are attainable, and even more savings are possible when places are not used regularly.

E. Make good use of task lighting.

IDENTIFYINGENERGY SAVING IN HVAC

A hotel's HVAC systems consume a lot of energy. As a result, HVAC is an area where energy efficiency improvements are likely to pay off handsomely.

More efficient operation and maintenance of the HVAC system can sometimes result in savings of 20% or more. You can save a lot of money by doing simple things like turning off the system when it's not in use or altering the temperature settings to use it less. The remaining savings could be realized by improving the system's efficiency.

A. Turn off the system while you're not using it.

Making matters more confusing, separate areas of the hotel structure have varied occupancy hours, such as when there is a banquet in the ballroom or a convention in only one wing. B. Use Ceiling Fans

Ceiling fans pull air over the skin, creating an evaporative cooling effect. For people's comfort in the winter, ceiling fans redistribute warm air that settles near the ceiling to the lower section of the space.

C. Check for duct leaks and fix them

HVAC Energy checks the duct system as part of your energy check-up in air distribution systems. Contractors and technicians working in the region can step on these systems, causing them to deteriorate. Repair any broken joints or leaks, and ensure that any pipes that go through unconditioned space are insulated.

IDENTIFYINGENERGY SAVING IN HOTEL KITCHEN, REFRIGERATION

In cold stores, use strip curtains or plastic swing doors. While the door is open, these "infiltration barriers" prevent warm damp air from entering the boxes. Strip curtains in busy kitchens can drastically reduce compressor runtime, saving a significant amount of energy.

Make sure the doors to the cold stores are always locked. Replace or repair any broken door auto-closers, oil door hinges, and correct any drooping doors.

6+Refrigeration relies heavily on airflow. The compressor works harder and fails sooner when the coils are clogged and filthy. Cleaning the evaporator coil (the cold one within the refrigerator) and condenser coil (the hot one outside the refrigerator or on the roof) at least once a year is advised.

IDENTIFYINGENERGY SAVING IN HOTEL LAUNDRY

- Shift the lights – different switches operating for different corners of the laundry. This will help in switching off the lights when not required.
- Check and record the water consumption. Compare water consumption daily to find wastages, if any.
- Periodically clean exhaust duct and blower of lint and dust. Keep steam pressure at lowest possible level.

IDENTIFYINGENERGY SAVING IN HOTEL FRONT OFFICE AND LOBBY

- Lower all lighting levels during late night and day light hours. Turn off all lights in offices when these are closed. During day light hours reduce electric lighting load in Lobby etc. to minimum to make full use of natural light.
- Lobby, managers should ensure that Lobby Main Entrance doors are not unduly kept open. A door opening will result in ingress of heat from outside and adversely affect air conditioning.

ENERGY CONSERVATION SOURCES FOR HOTELS AT KOLHAPUR

SOLAR PHOTOVOLTAIC SYSTEM

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Refrigeration relies heavily on airflow. The compressor works harder and fails sooner when the coils are clogged and filthy. Cleaning the evaporator coil (the cold one within the refrigerator) and condenser coil (the hot one outside the refrigerator or on the roof) at least once a year is advised quarterly.

Power Plants as following: - Capacity Benchmark Costs (Rs. /WP) Category Wise Subsidy's.

Above 1 Kw and up to 10 kW 47,000/- 14,100/-

Above 10 Kw and up to 100 kW 44,500/- 13,350/-

Above 100 Kw and up to 500 kW 44,000/- 13,200/-

"Net Meter" refers to an energy metre that can record both the import and export of electricity, as described in the Electricity Supply Code, or a pair of energy metres, one for recording the import and the other for recording the export of electricity.

TUBULAR DAYLIGHT SYSTEM

Daylight is a natural source of illumination for space. It is highly desirable to provide more available daylight in buildings, not just for energy efficiency but also to improve the performance and well-being of the occupants.

Daylight coming in via the windows is a frequent way to light an indoor space, but it only provides a limited amount of room depth.

One particularly interesting method for transmitting daylight into deeper interior spaces is the tubular day lighting system (TDD).

A device that allows daylight to enter spaces where windows are not available, such as deep-plan offices. The vertical light pipe is basically installed on the top of the room i.e. on the roof surface. Vertical light pipe can transfer the light into the interior area of the room where a traditional long windows and skylights are not possible to transfer the natural daylight in the deep and core area of the room. A small clear acrylic

dome is installed on the top of the roof, which allow the sunlight inside the tube and then it is transmitted to the diffuser.

SUMMARY AND CONCLUSION

1. This study will help to understand limitations of conventional methods of management over mechanical and electrical services adopted by three star hotels and detailed study of Building Management System that should be implemented by three star hotels in terms of services for energy efficient and cost effective benefits.

2. Energy Management and Reduce Operational Costs

- Optimal start and stop of plant
- Building warm up and cool down cycles
- Night purge
- Automatic Seasonal plant sequence selection
- Seasonal temperature setting adjustments
- Load based control strategies
- Economy cycle control including CO2
- Equipment runtime monitoring and duty cycling
- Occupancy control and control setback.

It was discovered after studying the energy MANAGEMENT scenario in Kolhapur that energy losses are on the higher side, starting to affect revenue generation.

The installation of an interconnected control system to monitor solutions and maintenance practises is required. Sensos and actuators are currently lacking, resulting in more human input in monitoring power management. • In Kolhapur, where the premium economy is dominantly going to upgrade, there is a need to plan out structured upgrades in terms of comfort.

The BACS automation level enables connectivity and communication between the various field Devices. Companies like Honeywell and Schneider offer this service all over the world. At a low price.

Although installation is an expensive process, the payback period and overall benefits are significant. As a result, the only option in the current situation is to retrofit existing hotel infrastructure. Given the advanced improved system for three-star hotels, centralised HVAC as a replacement for split AC should be considered. Energy losses at the transmission level can also be controlled using BMS. Based on the rating category of existing hotels, partial energy integration is possible.

RECOMMENDATION

In order to meet the full customer requirements and to compete with the international marketplace the proposed IHM should incorporate the following facilities: intelligent room condition indicator, intelligent id recognizer, room condition indicator, system self-checking, the announcement of information, air-conditioner controller.

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