

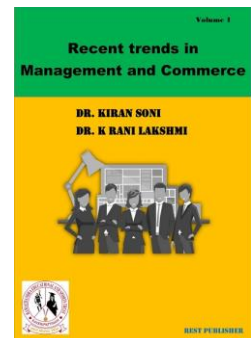


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Facility Management and Maintenance using the SPSS Method

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Abstract. Those who work in facility maintenance are in charge of maintaining places including rooms, hallways, parking lots, grounds, and pathways. They also keep an eye on key company assets like security smoke alarms, HVAC units, pipes, machinery, the lighting and electrical systems. On the other hand, workers who perform facility maintenance keep a facility functional and effective. The field of facility or management systems (FM) focuses on assisting people. It guarantees the efficiency, sustainability, comfort, and functioning of the built environment, which includes the structures where we live and work as well as the surrounding infrastructure. Simply put, facilities management is the administration and upkeep of commercial structures, including all elements required to maintain people's health and safety. These can range from culinary and sales services to building maintenance. There are two categories of facilities management (FM): Hard FM and Soft FM. **Research significance:** Facilities management is crucial because it guarantees that employees work in a secure and comfortable setting. People feel happy, are energized, productive, and enthusiastic about their work in a good environment. This will encourage them to show up for work and do a better job there. The working environment is improved by good facility planning and design, and an appropriately planned and designed workplace can boost the productivity of the people and institutions who occupy it. The productivity of a badly built building's tenants is impacted. Facility management has the capacity to directly increase output, but it can also have an impact on other aspects of employees' life that affect an organization 's output. Improved social connection among coworkers thanks to FM and helps them work effectively, focused and motivated. **Method:** Ratio studies are statistical analyses of data from appraisals and property valuations. Nearly all states utilise them to produce quantitative measure of the proportion of current market price about which individually estimated taxable property is appraised as well as to offer assessment performance indicators. **Evaluation parameters:** Facility lifecycle information integration, Facility management and maintenance, Decision support, Service-oriented architecture and Software agents. **Result:** The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis. **Conclusion:** Characteristics of sisal fiber the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

Keywords: Facility lifecycle information integration, Facility management and maintenance, Decision support, Service-oriented architecture and Software agents.

1. INTRODUCTION

The provision of first-rate infrastructure and logistical assistance to private and public businesses of all sizes and operating in all industries is known as facilities management. Its goal at the local level is to efficiently and effectively manage facility facilities and amenities to provide the structures that house us all and to assist organizations' initiatives as well as those of their initiatives, project teams, and individual members. Resource management at the strategic and tactical levels is hence FM's main duty [1]. Maintenance (FM) sector maintenance personnel experience more accidents and illnesses than the national average due to continual exposure to static electricity, falls, crushes, cuts, and other hazards. According to case study analysis, many documented accidents may have been averted if the victim had adhered to the right risk-reduction strategies when carrying out an FM work. Nowadays, meetings, publications, and training sessions are used to spread safety information. Despite being extensive, this material is frequently dispersed among various sources. According to research, a person is less likely to acquire direct information about fatalities and serious injuries and to pay attention to warnings the more resources and time they must expend in their search for information. By discussing current industry trends, available technology, and restrictions, this research makes an effort to address these problems [2]. managers of buildings with the capacity to enhance future building performance. This is accomplished by making sure that life perform is fully understood while designing and by making sure that designers and builders have access to specialized abilities at an early point of projects to verify that crucial elements are accurate. By outlining both possible standardization and measurement

techniques, this article examines the foundation for gauging facility management effectiveness. These aspects are taken into account in regard to performance and value in addition to helping with cost control and efficiency [3]. Map, assess, and manage operation and maintenance structures and processes with the help of effective information technology (IT) solutions from facility management (CAFM). Since that time, a large number of software programmers have been developed, each with a unique set of features, functions, and levels of success. Even if there are many suppliers and users across several industries, there's still uncertainty regarding the processes and outcomes that can be obtained. The absence of wanted to continue (models) and thoroughly documented case studies is intimately related to this. The implementation of CAFM and the elements that influence success are also little understood [4]. Association for Facility Management (IPFMA). Expert interviews revealed the main issues FM practitioners have with achievement measurement and improvement while also supplying actual data on the adoption of super sport bikes within FM companies. A nearly fully questionnaire was created for this study based on a review of the literature and interviews with experts. Two sections made up the questionnaire. The responses were categorized by the researchers in the first part, and the examination into the application of performance measurement in FM practice was the subject of the second [5]. FM as a unit of support that offers services to other organizational units or services related to facilities. Yet, when FM is present, such as when serving staff members and guests in an interpersonal and inter settings, the discipline also has typical traits of a B2C environment. Thus, we would like to make it clear that these two fields are reflected in our view of FM; As a result, we refer to the management discipline of FM as B2B2C. Financial constraints continue to rule the FM agenda for facility specialists and researchers. We suggest a request perspective that offers fresh perceptions of value. This does not imply that financial factors are not significant. To broaden the minds of decision-makers, we attack problems through this research from various angles [6]. Facilities managers at publicly traded organizations face more severe financial restrictions than those at the majority of private businesses. As a result, decision-supporting tools should be created and made available. FM education encompasses a wide range of fields, including engineering, architecture, management, business, and construction. Since none of these systems has historically been fully matured to cover the vast array of topics and facets of FM, this has happened. Although many faculties offer FM courses, only a few colleges in the United States currently offer FM degrees [7]. A set of more or less specialized technical and service-related duties that aren't part of the primary process but are required for the execution of this basic process can be said to serve as the foundation for facility care for facility services firms. General services, external services, housework, and technical services are common names for this group of responsibilities. The disparity between so-called "soft" and "hard" services is another name for it. The profession became known as FM in the late 1970s when it started to gain acceptance and formally establish itself inside American and Canadian organizations (Rondeau et al., 2006). Many definitions have been put forth since then [8]. The associated concepts and definitions are growing as facility management gains importance and more people and organizations get involved. The International Building Maintenance Union (IFMA), which define quality control as "the work of an organization and the inclusion of people in the physical workplace," provides one of the most straightforward definitions. Engineering News-Record provides the following definition in further detail: space planning, design, construction, and management in various types of buildings, from factories to office buildings. Plans are developed for corporate facilities strategy, long-term forecasts, estate development, space inventories, programmers (through design, implementation, and restoration), including equipment including equipment inventories [9]. It also develops strategies for constructing operations and maintenance. FM standards have been met via the deployment of facility management systems. A BIM model that is provided when a building is being commission is a goldmine of data that might be useful as during FM process, but not all data is useful on a regular basis inside this broad scope of an FM. Data recovery, management changes, and cost and productivity monitoring are crucial in practise. According to Lucas (2012), facility management and information exchange in the AEC sector are still fragmented throughout the facility life cycle [10]. Maintenance and operation of the facility (Shen et al. 2010). The issue is that different levels of data must be repeatedly gathered. Information can be gathered once and used over the course of a project with the help of BIM technology. The knowledge and technological gaps between design and facilities management specialists are so significant. Identifying the data requirements for facility maintenance activities is the first stage in Design for Management (D4M). Identification of the data requirements of various parties throughout life cycle of a construction project is the first step in maximising the benefits of a BIM information database. The relevant information may be delivered to the right party there at right time thanks to new technology, according to the demands of facility management [11]. Operational and facility maintenance goals This finding can be explained in part by the challenges owners have when determining the calibre of the samples offered. Because of this, owners often neglect to include FM requirements in contracts as well as project specifications. In other words, it is impossible to request a thing that can not be evaluated. There aren't many studies that particularly aim to estimate samples' IQs in the AECOO area. A framework for rating the quality of design information from the perspective of the builder is provided by Berard in [12]. Performance in facilities management reflects the sector's diversity. Examples include ranking or thread assessment (Kincaid, 1994). Companies have historically exclusively used financial indicators to gauge the operation of their facilities, and many FM sectors have a propensity to record unit costs (Tranfield and Aklagi, 1995). They may have been important in the past, but in the digital age, there is a widespread belief that financial indicators—while they may appear to be quantitatively precise and acceptable measures of competitiveness—neither gauge competitiveness adequately nor serve as a forecasting tool. Performance of facilities [13]. Take, for instance, facility management (FM). The academic community faces a challenge in producing research and education in response to new fields and changes through out higher education system. A

structured model featuring six criteria for defining an academic degree was constructed following an extensive journal articles to describe the most current developments in FM. This essay investigates a methodical method for analyzing and describing new areas [14]. The HVAC Maintenance Coach, Design and construction Consultant, Energy Management Trustee, Aided Architecture for something like the FM system, which required a fully autonomous data integration tool and was suited for BIM deployment, the (CAD) Product Specialist, Heating and cooling Shop Administrator, HVAC Energy Boss, Heating Systems Technician, and Updating Manager were selected. The aims, abilities, attitudes, and context of each FM person were compiled from data gathered through interviews and summarized in a one-page description [15]. This paper presents an action, service-oriented strategy that brings together data, information, and knowledge captured and collected as during entire facility life cycle from planning process, design, construction, material / component / manufacturing equipment, operation, and maintenance in an effort to improve decision support for facility management as well as upkeep. Through agent-based web services, all data, information, and knowledge sources, as well as hardware and software applications, are loosely integrated. These services provide proactive or reactive decision support at all levels of the facility life cycle, trying to improve facility maintenance and operations in particular. To validate the suggested strategy, case studies using prototype applications of the concept have been carried out [16]. Use cases for facility management. We retrieve the data from the BIM facility management repository of the International Center of Construction Technology and validate the data using GIS via the BIM model. The surface-based model that was uploaded to the GIS has a significant storage capacity, supports BIM modelling, and contains data at an amount of precision between LOD1 and LOD2. To verify details beyond LOD3, you can download the Model to an extra viewer. FM data can be seen by choosing a facility object from the BIM model [17]. firms that handle facilities. Facility management has recently been recognized by UK investment banks as an important industry segment in the supports services industry. The major players and their results in the £3 trillion support services business segment are described in their reports. Investors find the support services industry generally appealing because it has outpaced the FTSE All-Share Index over the past three years by 29%. Many viewpoints are used to define this economic progress [18].

2. MATERIAL AND METHOD

Facility lifecycle information integration: Data product lifecycle management stages. Understanding the stages of the data life cycle is essential to understanding DLM. The majority of experts concur that the data lifecycle encompasses these five components: creation, storage, usage, sharing, archiving, and destruction, despite the lack of an industry standard for business DLM. The stages that information must go through and how they are managed throughout the course of its lifespan are referred to as the information life cycle. The five major stages of the information life cycle are creation, storage, processing, distribution, and transfer. Organizations place a high value on information lifecycle management because it enables efficient management of information from generation through disposal. ILM can assist businesses in increasing productivity, cutting expenses, and enhancing security.

Facility management and maintenance: Those who work in facility maintenance are in charge of maintaining places including rooms, hallways, parking lots, grounds, and pathways. They also keep an eye on key company assets like security smoke alarms, HVAC units, pipes, machinery, the lighting and electrical systems. On the other hand, workers who perform facility maintenance keep a facility functional and effective. The field of facility or management systems (FM) focuses on assisting people. It guarantees the efficiency, sustainability, comfort, and functioning of the built environment, which includes the structures where we live and work as well as the surrounding infrastructure. Simply put, facilities management is the administration and upkeep of commercial structures, including all elements required to maintain people's health and safety. These can range from culinary and sales services to building maintenance. There are two categories of facilities management (FM): Hard FM and Soft FM.

Decision support: Inventory management and other process and eventually can gather details and information and then synthesis it into useful intelligence using DSS. In actuality, middle to high management tends to use these systems most frequently. A decision-making system (DSS) is a type of computer programmer application that helps an organization make better decisions. It analyses a lot of data and gives a business the finest solutions available. Planning an illustration would be a GPS route. A DSS is able to plan routing quickest and optimal routes between two places by weighing the many options. These innovations are commonly allowing for real-time traffic monitoring in congested areas.

Service-oriented architecture: Business applications can be created using the software components known as services thanks to the software development process known as service-oriented architecture (SOA). Each service offers a certain business capacity, and or the services can communicate with one another in a variety of languages and platforms. Web services are typically used to develop a service-oriented architecture because they "make functional foundations accessible through conventional web protocols". Simple Object Access Protocol, or SOAP, is an illustration of a web services standard. Building software applications using services accessible through a network, such as the Internet, uses the SOA architectural style. It encourages software components to be loosely coupled so they can be reused.

Software agents: A software engineer is a computer programme that works continually and independently on behalf of a person or a business. For instance, a software agent might regularly retrieve electronic messages or archive different computer data. Agents are referred to as bots, short for robots. When the execution is tied to a robot body, they may take the form of software, such as a chatbot that runs on a phone (like Siri) or another computing device. Software agents can

communicate with those other agents or people or can operate autonomously. Software agents are described here to be distinct from hardware agents (robots) or human agents. A software agent lives on a computer, is capable of navigating networks, can see its surroundings, and can take different actions to accomplish its objectives.

Method: SPSS Statistics is a statistical control Advanced Analytics, Multivariate Analytics, Business enterprise Intelligence and IBM a statistic created by a software program is a package crook research. A set of generated statistics is Crook Research is for a long time SPSS Inc. Produced by, it was acquired by IBM in 2009. Current versions (after 2015) icon Named: IBM SPSS Statistics. The name of the software program is to start with social Became the Statistical Package for Science (SPSS) [3] Reflects the real marketplace, then information SPSS is converted into product and service solutions Widely used for statistical evaluation within the social sciences is an application used. pasted into a syntax statement. Programs are interactive Directed or unsupervised production Through the workflow facility. SPSS Statistics is an internal log Organization, types of information, information processing and on applicable documents imposes regulations, these jointly programming make it easier. SPSS datasets are two-dimensional Have a tabular structure, in which Queues usually form Events (with individuals or families) and Columns (age, gender or family income with) to form measurements. of records Only categories are described: Miscellaneous and Text content (or "string"). All statistics Processing is also sequential through the statement (dataset) going on Files are one-to-one and one-to-one Many can be matched, although many are not in addition to those case-variables form and By processing, there may be a separate matrix session, There you have matrix and linear algebra on matrices using functions Information may be processed.

3. RESULT AND DISCUSSION

TABLE 1. Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
Facility lifecycle information integration:	90	4	1	5	282	3.13	.115	1.093	1.196
Facility management and maintenance:	90	4	1	5	270	3.00	.131	1.245	1.551
Decision support:	90	4	1	5	291	3.23	.133	1.264	1.597
Service-oriented architecture:	90	4	1	5	294	3.27	.119	1.130	1.276
Software agents	90	4	1	5	297	3.30	.158	1.495	2.235
Valid N (listwise)	90								

Table 1 shows the descriptive statistics values for analysis N, range, minimum, maximum, mean, standard deviation Facility lifecycle information integration, Facility management and maintenance, Decision support, Service-oriented architecture and Software agents. this also using.

TABLE 2. Frequencies Statistics

		Facility lifecycle information integration	Facility management and maintenance	Decision support	Service-oriented architecture	Software agents
N	Valid	90	90	90	90	90
	Missing	0	0	0	0	0
Mean		3.13	3.00	3.23	3.27	3.30
Std. Error of Mean		.115	.131	.133	.119	.158
Median		3.00	3.00	3.00	3.00	3.00
Mode		3	3	3	3	5
Std. Deviation		1.093	1.245	1.264	1.130	1.495
Variance		1.196	1.551	1.597	1.276	2.235
Skewness		-.429	.321	-.043	-.260	-.098
Std. Error of Skewness		.254	.254	.254	.254	.254
Kurtosis		.047	-.794	-.900	-.198	-1.484
Std. Error of Kurtosis		.503	.503	.503	.503	.503
Range		4	4	4	4	4
Minimum		1	1	1	1	1
Maximum		5	5	5	5	5
Sum		282	270	291	294	297
Percentiles	25	3.00	2.00	2.00	3.00	2.00
	50	3.00	3.00	3.00	3.00	3.00
	75	4.00	4.00	4.00	4.00	5.00

Table 2 Show the Frequency Statistics in Facility Management and Maintenance. Facility lifecycle information integration, Facility management and maintenance, Decision support, Service-oriented architecture and Software agents. curve values are given.

TABLE 3. Reliability Statistics

Cronbach's Alpha Based on Standardized Items	N of Items
.658	5

Table 3 shows the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

TABLE 4. Reliability Statistic individual

	Cronbach's Alpha if Item Deleted
Facility lifecycle information integration:	.587
Facility management and maintenance:	.656
Decision support:	.536
Service-oriented architecture:	.591
Software agents	.614

Table 4 Shows the Reliability Statistic individual parameter Cronbach's Alpha Reliability results. The Cronbach's Alpha value for Facility lifecycle information integration .587, Facility management and maintenance .656, Decision support .536, Service-oriented architecture. 591 and Software agents 614 this indicates all the parameter can be considered for analysis.

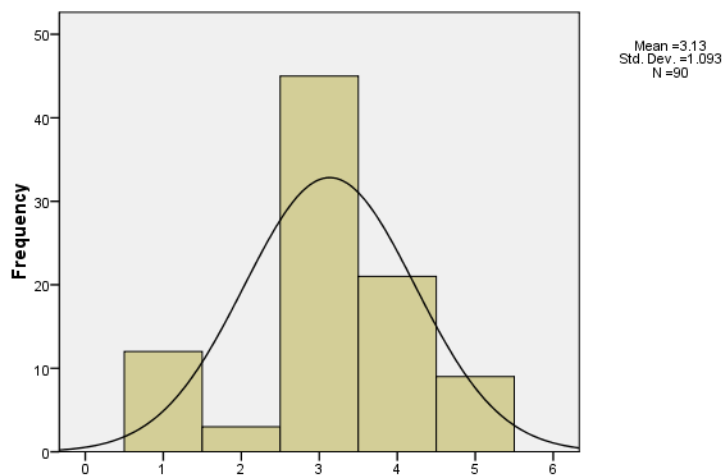


FIGURE 1. Facility lifecycle information integration

Figure 1 shows the histogram plot for Facility lifecycle information integration from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Facility lifecycle information integration except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

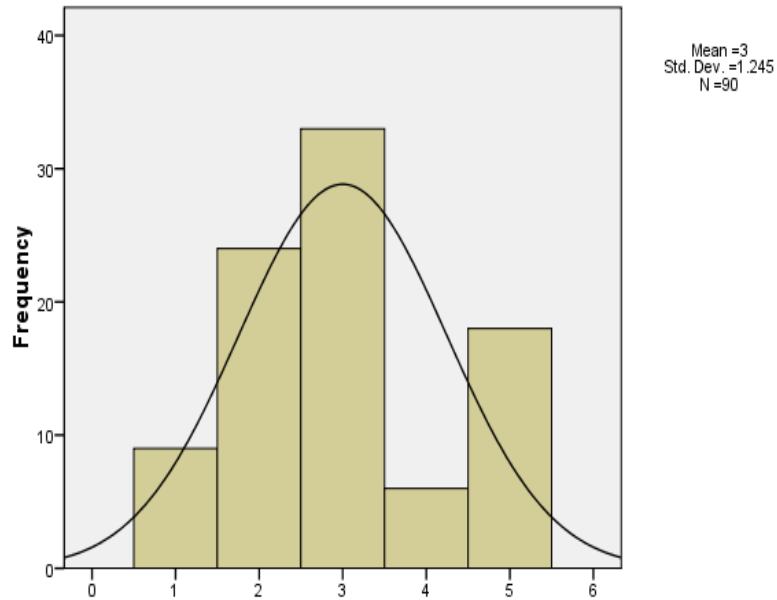


FIGURE 2. Facility management and maintenance

Figure 2 shows the histogram plot for Facility management and maintenance from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Facility management and maintenance except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

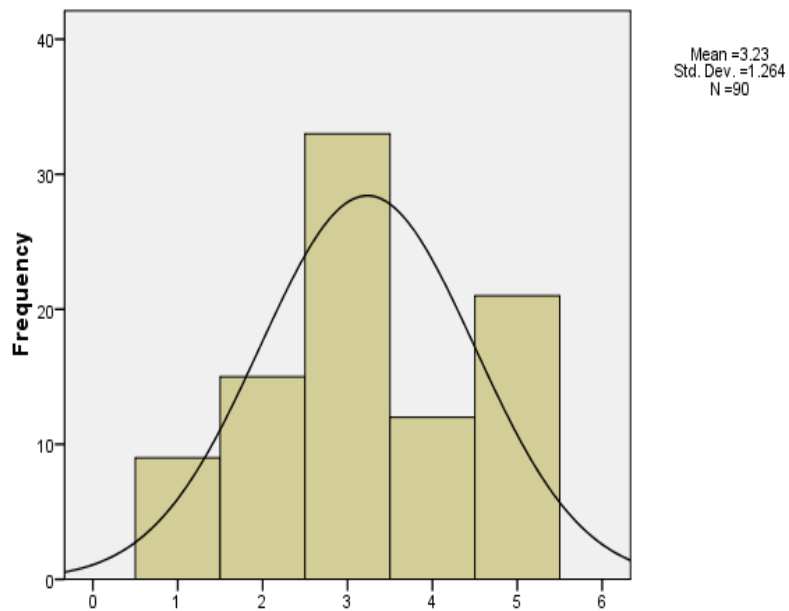


FIGURE 3. Decision support

Figure 3 shows the histogram plot for Decision support from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Decision support except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

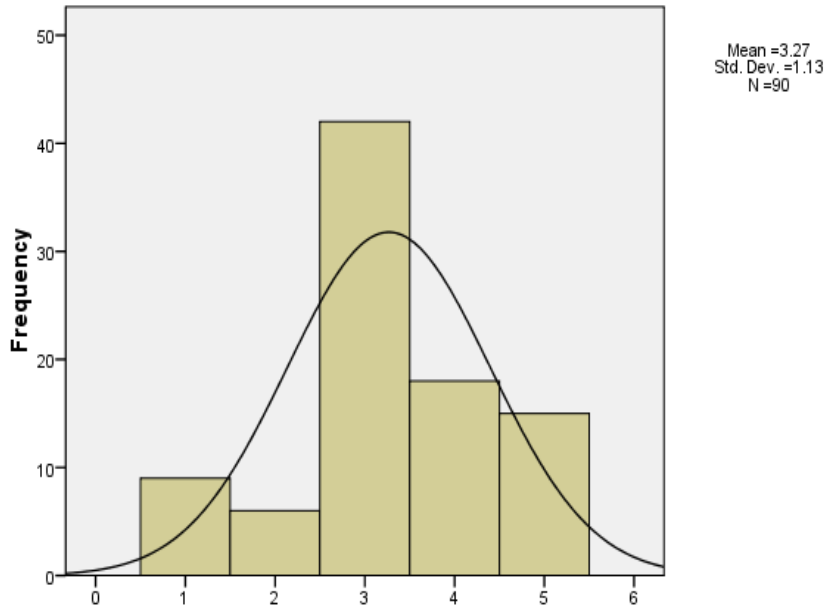


FIGURE 4. Service-oriented architecture

Figure 4 shows the histogram plot for Service-oriented architecture from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Service-oriented architecture except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

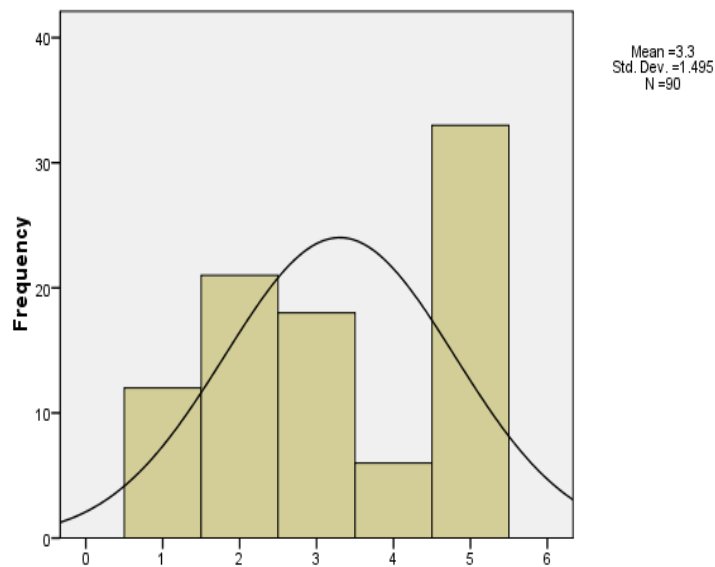


FIGURE 5. Software agents

Figure 5 shows the histogram plot for Software agents from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 5 for Software agents except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

TABLE 5. Correlations

	Facility lifecycle information integration	Facility management and maintenance	Decision support	Service-oriented architecture	Software agents
Facility lifecycle information integration	1	.149	.368**	.407**	.264*
Facility management and maintenance	.149	1	.214*	.096	.290**
Decision support	.368**	.214*	1	.499**	.319**
Service-oriented architecture	.407**	.096	.499**	1	.172
Software agents	.264*	.290**	.319**	.172	1
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Table 5 shows the correlation between motivation parameters for Facility lifecycle information integration. For Service-oriented architecture is having highest correlation with Facility management and maintenance and having lowest correlation. Next the correlation between motivation parameters for Facility management and maintenance. For Software agents is having highest correlation with Service-oriented architecture and having lowest correlation. Next the correlation between motivation parameters for Decision support. For Service-oriented architecture is having highest correlation with Facility management and maintenance and having lowest correlation. Next the correlation between motivation parameters for Service-oriented architecture. For Decision support is having highest correlation with Facility management and maintenance and having lowest correlation. Next the correlation between motivation parameters for Software agents. For Decision support is having highest correlation with Service-oriented architecture and having lowest correlation.

4. CONCLUSION

Those who work in facility maintenance are in charge of maintaining places including rooms, hallways, parking lots, grounds, and pathways. They also keep an eye on key company assets like security smoke alarms, HVAC units, pipes, machinery, the lighting and electrical systems. On the other hand, workers who perform facility maintenance keep a facility functional and effective. The field of facility or management systems (FM) focuses on assisting people. It guarantees the efficiency, sustainability, comfort, and functioning of the built environment, Facilities management is crucial because it guarantees that employees work in a secure and comfortable setting. People feel happy, are energized, productive, and enthusiastic about their work in a good environment. This will encourage them to show up for work and do a better job there. The working environment is improved by good facility planning and design, and an appropriately planned and designed workplace can boost the productivity of the people and institutions who occupy it. The provision of first-rate infrastructure and logistical assistance to private and public businesses of all sizes and operating in all industries is known as facilities management. Its goal at the local level is to efficiently and effectively manage facility facilities and amenities to provide the structures that house us all and to assist organizations' initiatives as well as those of their initiatives, project teams, and individual members. Data product lifecycle management stages. Understanding the stages of the data life cycle is essential to understanding DLM. The majority of experts concur that the data lifecycle encompasses these five components: creation, storage, usage, sharing, archiving, and destruction, despite the lack of an industry standard for business DLM. The stages that information must go through and how they are managed throughout the course of its lifespan are referred to as the information life cycle. Those who work in facility maintenance are in charge of maintaining places including rooms, hallways, parking lots, grounds, and pathways. They also keep an eye on key company assets like security smoke alarms, HVAC units, pipes, machinery, the lighting and electrical systems. On the other hand, workers who perform facility maintenance keep a facility functional and effective. Inventory management and other process and eventually can gather details and information and then synthesis it into useful intelligence using DSS. In actuality, middle to high management tends to use these systems most frequently. A decision-making system (DSS) is a type of computer programmer application that helps an organization make better decisions. It analyses a lot of data and gives a business the finest solutions available. Ratio studies are statistical analyses of data from appraisals and property valuations. Nearly all states utilise them to produce quantitative measure of the proportion of current market price about which individually estimated taxable property is appraised as well as to offer assessment performance indicators. Facility lifecycle information integration, Facility management and maintenance, Decision support, Service-oriented architecture and Software agents. The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .658 which indicates 66% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

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