



The Effects of Organizational Commitment, Knowledge, Attitude, and Awareness on Risk Management Effectiveness in Labs

Md Omar Faruque^{1*}, Dr. Nure Alam Khan², Saddam Nasir Chowdhury³, Anupom Debnath⁴,
Md Nuruzzaman Pranto⁵

^{1*}Master of Business Administration in Management Information Systems, International American University, Los Angeles, California, United States. (mdomarfaruque2000@gmail.com)

²Head of Department, Department of HRM, Fareast International University. Dhaka, Bangladesh. (khan1916@yahoo.com)

³Doctorate of Business Administration (DBA), International American University, Los Angeles, California, United States. (nasirchowdhurysaddam@gmail.com)

⁴Master of Business Administration in Management Information Systems, International American University, Los Angeles, California, United States. (debnathanupom05@gmail.com)

⁵Master of Business Administration in Management Information Systems, International American University, Los Angeles, California, United States. (prantonurz@gmail.com)

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ABSTRACT

Labs are essential in varying fields, not only in medicine but in research, manufacturing, and education. These environments are exposed to a variety of dangerous features that include chemical contamination and biologic risks through equipment malfunction and scientific mistakes. Foreseeable and unforeseeable risks must be well managed to maintain the fitness of an individual member, the principle of the article, and the binding to a certain standard. It is obvious that other basic components like commitment, knowledge, attitude, and awareness play a large role in determining compliance with risk management processes in the laboratory environment (Ménard 2020). Organizational commitment measures the extent to which the employees devote themselves and their energies to their organization to a level that guarantees their loyalty to the goal of the organization (Ménard 2020). The skill, technical or interpretive, should be a method in determining, evaluating, and managing the risk. The workers who have a generalized notion of laboratory procedures, safety protocols, and the risk assessment techniques are in a great position to identify and resolve hazards and put in place standard operating procedures to counter them. The word attitude includes the employees' psychological aspects, that is, the positive or negative perception, the thoughts, the ideas and/or the behavioral acts, about risk management (Palluzi 2021). A positive attitude toward safety brings about a compliance culture that encourages staff members to take safety into account and ensure that tasks in line with risk management issues are well executed. It is yet unclear, how extensively ownership combines with knowledge, attitude, and awareness of laboratory scientists in risk management. Prior research undertakes an in-depth analysis of individual factors which do not consider the intricate connection between them with a result to the combined effort helping to achieve favor (Palluzi 2021).

Keywords: Organizational Commitment, Risk Management, Knowledge, Attitude, Self-management

B. Problem Statement

Risk management in laboratories is influenced upon some factors such as organizational commitment, training, knowledge, attitude, and awareness among clinical staff. These influential factors bring out an umbrella of risks and accuracy of prediction, but on the other hand, the complexity of their interaction remains a challenge to explore. It is essential to have knowledge of the dynamics that exist between organizational commitment.

C. Objectives of the Study

The main purpose of the research process is to identify the relationship between organizational commitment, knowledge, attitude, and level of awareness on effectiveness in risk management in the laboratory. Specifically, the study aims to:

- Study varying degrees of organizational commitment, knowledge, attitude, and the current information on laboratory engagement of professionals.
- Recognize the affiliation between organizational commitment, knowledge, attitude, awareness, and self-management effectiveness.
- Investigate the mediated and moderated influences of demographic factors (e.g., experience, education) on the interaction among organizational commitment, knowledge, attitude, awareness, and risk management effects.
- Give applicable insight and tips on how to bring up the standards of lab risk management through the results. The present study is meant to extend what is currently known about laboratory safety.

D. Scope and Limitations

This research centers on identifying the extent to which risks management can be done properly by considering workplace commitment, workers knowledge attitudes and awareness. The extent of the requested substances covers multiple types of laboratories in the healthcare and industrial fields, including embassies, hospitals, schools, research institutes, pharmaceuticals, biotechnology, and medical labs as well.

As any research project has its own constraints, following study also involves certain limitations. The research design in which data are self-reportedly provided may also be subject to response and social desirability because participants may conceal unfavorable responses. Furthermore, scrutiny of the sample size and of how diverse the population the subject is might determine the validity of the findings not having wide representation. Nonetheless, the employees selected from varied laboratories might serve as a possible source of bias since individual cultures, practices and legislation systems may affect results.

Structure of the Manuscript

This manuscript is structured into several sections to facilitate a comprehensive exploration of the research topic:

Introduction: The part of the study that follows this section gives the contribution of risk management in laboratory setting and focuses on organizational commitment, the understanding and the right attitude and awareness necessary for success in meeting the objectives of the study.

Literature Review: The literature review presents evidence from the research on organizational commitment, knowledge, attitude and awareness and their function as precursors of effective risk management practice.

Methodology: In the second section, the methodology part provides details on the study design, selection of sample, data collection strategy, the variables to be analyzed, and the tools to be used.

Results: The section describes the research results in terms of means and frequencies, models estimations, hypothesis testing, and any observations of the other variables above the long-run equation that may explain the data.

Discussion: The discussion section places the findings in the context of existing literature to illustrate the significance of the study and suggest implications theoretically and practically; the same section presents the done study's limitations and offers recommendations of future research.

Conclusion: A summary in the conclusion section of the paper which states the principal findings of the study, credits the research for the contribution to the major research issues and outlines the chances for further investigation.

II. Literature Review

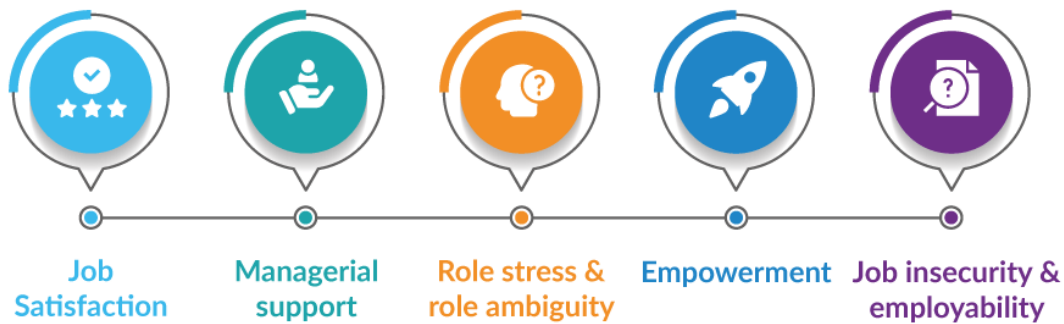
Organizational Commitment

Organizational commitment is the psychological tie a person has with the organization. It's the degree in which he/she is loyal to it. Ağalar (2020) proposed three components of organizational commitment: identity, involvement, and normative enmeshment. Affective commitment demonstrates the emotional link of the organization to the employees whereby they can establish their disposition and a sense of comradeship within their workplace. Sometimes staying is a necessity rather than a choice. So, people stay in organizations because they think the cost of leaving is too much, e.g., losing their benefits or investing anything in tenure, but not because they like their jobs (Tang 2020).

The organizational commitment relationship has been recognized to provide different useful outcomes, which comprise greater job satisfaction, higher organizational citizenship behavior, and less turnover intentions (Tang et al., 2020). As a part of management of risk, those employees who are most dedicated to the

organization are more likely to comply with safety procedures, actively join with risk avoidance and have a positive influence on a safety culture.

What Influences Organizational Commitment?



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Figure: Importance of Organizational Commitment

Theoretical Frameworks on Organizational Commitment

Organization theories are to address the matters on which the commitment of the employees depends as well as the outcomes that commitment may bring. Social Maintenance theory is one of the most influential concepts which holds that people involve themselves into organizational relationships because they assume they get something in return like rewards, recognition, and opportunities for growth.

Another leading model is the Three Component Model of Organizational Commitment created by Meyer and Gonzalez-Ericsson (2020). Interestingly, it comprises the three components cognitive, affective and behavior. This model implies a heterogeneous landscape in which organizational commitment is the aggregated result of numerous factors, which range from job characteristics to organizational culture, leadership style, and socialization processes.

The Reciprocal Nature of Commitment and Trust in Organizational Relationships is referenced in the Control-Trust Theory (Gonzalez-Ericsson 2020). Under consistent interaction and cognitive assessment, members increase their bond with the organization and learn to trust it as an eminently reliable and trustworthy entity. The two factors that support the qualities of sincerity and trust are believed to be associated with positive organizational results which include better teamwork, communication, and organizational success (Kreibich 2022).

Importance of Knowledge in Risk Management

It is knowledge which determines the extent of particularly applied risk management in laboratory environments. Laboratory professionals hence should demonstrate a plentiful knowledge of previews including the list of hazards, safety protocols, and risk assessment methods.



Figure: Importance of Knowledge in Risk Management

Source: <https://www.invensislearning.com/blog/risk-management-process-steps/>

Many scientists have pointed to the conclusion that the power of knowledge is the same as that of right risk management effectiveness. Look at a study carried out by a group by Kreibich et al. (2020) on laboratory personal, in which it was found that that higher levels of technical knowledge were reasons why laboratory personnel could better adhere to safety procedures and have a low probability of accidents or incidents. Yet, not different from that, the study of Johnson and Johnson Company (2019) has also manifested that the employees who were backed by well training programs and knowledge sharing organization lessen their safety incidents and they were also compliance with their regulations.

Efficient knowledge management practices, namely, documentation, training programs and knowledge-sharing platforms, assist technical competence flow and wisdom as well as help in proving a safety culture and continuous improvement culture (Abdullah et al., 2020). The increase in investment on knowledge development and dissemination measures is the way to enable effective risk management, and consequently, lower the chances of incidents or accidents in a laboratory.

Importance of Mood and Assessing Threat.

Attitude certainly becomes the key player in creating people's conducts and the decisions they make regarding the risk management in the laboratory. The practices of workers regarding their attitude towards safety, danger awareness, and their compliance with rules and regulations are the most determining factors that influence the success of the risk management. There is evidence that personnel having good safety attitudes are often those who would always place safety first, that would follow safety council guidelines, and that would actively take part in risk management (Abdullah et al., 2020).

Negative perceptions or non-compliance with safety norms can be obstacles to hazard management and increase the chances of incidents and accidents being held. Those who see safety protocols as just plain irritating or unnecessary might not take precautions and flout or overlook safety rules (Weer 2020). Safety promoting organizational culture that which promotes employee safety, allows open communications, and gives rewards employees for enforcing safety rules and practices indeed helps creating positive safety attitudes among the workforce (Weer 2020).

Awareness and Its Role in Risk Management

Risk management is more outcome-centered if awareness is in when people start assembling all the hazards in their working place and then decoding and replying to the possible risks. Studies have revealed that boosting employees' awareness go along with better safety recognition, timely responses to safety, and accident rate reductions (Weer et al., 2020). Research by Chen (2021) indicated that Safety Awareness was found to have a strong relationship with Safety Communication, Compliance with Safety positions, and Intervention to prevent

safety violations. The administration of safety training programs as well as communication systems are primary factors that allow for proper awareness spreading and cultivation of a safety-focused culture in any organization (Chen 2021). Finally, periodic reminders reflecting on risks, signs and feedback mechanisms can also help to sharpen our minds and keep the thought of risk management practices alive (Karadag et al, 2020).

Related Programs Concerning Risk Management Effectiveness

Much research is carried out by different organizations on the ability of risk management practices in diverse settings. For example, a technique called meta-study which Clarke (2006) used in his research is considered as a basis for accident rates in hostile environments with same level across different industries. The outcomes shown that organization which have a good safety management system alongside doing risk assessment, providing safety trainings and safety climate surveys were less likely to have an accident compared to those organizations that have not been implementing these safety elements (Karadag 2020). The research showed that dissemination of risk information cannot be overlooked in communication with employees, regulators, and the public, which should be achieved through multiple and transparent channels.

Investigations have been conducted regarding the relationship between organizational culture and its effectiveness in the risk management. Research by Karadag (2020) suggested that these organizational safety cultures, in which the members hold similar ideas, thoughts and beliefs regarding safety, accounted for positive risk management practices and fewer accidents' incidences. Furthermore, Piehler (2021) study documented an association between stability of safety climate, feeling of management full involvement in safety, and various risk instruments being deployed seamlessly. While previous studies underline the necessity of implementing complete approach to reserving risks, developing knowledge among employees, and shaping safety-minded culture success in the risk management, success who is responsible for safety in the workplace will be achieved (Sabino 2021).

Conceptual Framework

When developing a conceptual framework illustrating the explained connection between organizational commitment, knowledge, attitude, awareness, and risk management effectiveness, we can employ a variety of theoretical perspectives. Among the sets of frameworks is the System Theory which recognizes an organization as being a complex system of interrelated components interacting with themselves and their environment (Sabino 2021).

This concept can be divided into four categories of commitment, knowledge, attitude, and awareness that are considered to contribute to the effectiveness of risk management. Organizational commitment which in turn motivates the employee to have a tangible relation with the organizations goals and the formation of a culture of safety occurs thus risk management protocols are adhered to the staff's cognitive learning component encompasses identifying, evaluating, and pre-emptive mitigation of risks, adding to organizational risk management systems' resilience. Along this theoretical line, the social cognitive theory (Syakur 2020) elicits the idea that people learn and imitate behaviors based on what they see, and such behaviors may either be reinforced or discouraged.

Through this setting, among others, organizational commitment, knowledge, attitude, and awareness can be influenced by social learning or normative, and organizational environments. Some employees may strengthen their organizational commitment because of positive role modeling by leaders and/or peers, through which a central focus of safety and risk management is avowed (Syakur 2020). Training, coaching and company commune aid in the passage of knowledge within the organization. Tempers revolving safety are molded by the assumptions about viability of safety-related behavior and the encouragement of the appropriate norms of safety by the heads of organizations and peers.

Risks are succeeded through direct communication channels, employees' feedback, and safety in organizations that. Implementing the above-mentioned theoretical frameworks, researchers would be able to develop an inclusive view of the contentions on employee commitment, knowledge, attitude, awareness, and risk management effectiveness, and this would guide the conduct of future research endeavors and providing practical solutions aimed at achieving safer environments and mitigating risks within organizations (Men 2021).

III. Methodology

Research Design

This study will use quantitative research design to analyze the interconnection between organizational commitment, knowledge, attitude, awareness, and risk management in laboratories. The quantitative method of research enables gathering, systematizing, and analyzing numerical data, thereby making it possible to identify several patterns and relationships among the variables concerned (Bouma 2023). Transversal, cross-sectional survey methods will be used to gather information from laboratory workers (laborers) with professions and different sectors. Through such studies, researchers will have a general understanding of the experience of the participants and their opinions (Wood 2020).

In this case, the survey tool will be fabricated using the key variables of concern, comprising organizational commitment, knowledge about risk management practices, attitudes about safety, knowledge about workplace hazards, and personal feelings about measures of risk management (Wood 2020). Likert scale will be employed as a data gathering approach, where the respondents will indicate their level agreement or disagreement with the statements related to the constructs. It will provide an opportunity for quantifying data analysis.

Sample Selection

The population of this study will comprise lab technicians belonging to different sectors namely healthcare, research organizations, pharmaceuticals, biotechnology, and industrial laboratories among others. The use of a stratified random selection helps facilitate the representation of the sectors and organizational environments. The target frame will be created by using the professional network, industries associations, and organizational databases to find participants (Tamunomiebi 2020). According to specifications, laboratory professionals will be informed via email about the study with questionnaires in the online or paper form depending on participants' plans. To accomplish a diverse sample, It 'll be striving to include participants from research facilities of varied sizes, regions, and industrial sectors.

The sample size will be determined depending on power calculation to provide the suitable population size and high statistical power for the study to detect significant relationship under consideration. A huge number of participants will be sought to take up the risk of attrition as well as increase generalizability. Anonymity will be ensured for the data collection effort to discourage many participants from giving a real picture of what they think they feel (Tamunomiebi 2020). Anonymity and privacy will be on all aspects of the research thus will be safe and other researchers will be the only ones responsible to use the data after accomplishment of our research.

Data Collection Methods

With either online surveys or paper-based questionnaires, participants would be permitted to choose their favorite; we would take access to the internet into cognizance. Digital surveys will be sent out through email to laboratory staffers who are in the digital space, while the traditional paper-based responses will be delivered to those who favor the traditional methods or who do not have the connections (Gragnano 2020). Some of the variables of choice will be captured using the survey instrument that will gather information on organizational commitment, knowledge, attitude, and awareness. The effectiveness of risk management will be judged based on the key indicators.

To guarantee the reliability and accuracy of data it will undergo the pilot testing stage which will involve a small group of laboratory professionals to give us an overview of its clarity comprehensiveness and completeness. Participant pilot comments will help us test and improve the survey tool before full scale data collection (Gragnano 2020). Data collection will be done within a limited span with individual follow-ups sending comments to those not responding as a to increase the response figures.

Variables and Measurement Tools

The following table presents the variables of interest and corresponding measurement tools:

Variable	Measurement Tool
Organizational Commitment	Organizational Commitment Questionnaire (OCQ)
	Affective Commitment Scale
	Continuance Commitment Scale
	Normative Commitment Scale
Knowledge	Knowledge Assessment Tool
	Multiple-choice questions assessing knowledge of risk management practices
Attitude	Attitude Survey
	Likert-type scale measuring attitudes toward safety and risk management
Awareness	Awareness Inventory
	Items assessing awareness of workplace hazards and safety protocols
Risk Management Effectiveness	Effectiveness Rating Scale
	- Likert-type scale assessing perceived effectiveness of risk management measures

The Organizational Commitment Questionnaire (OCQ) will measure the three components of organizational commitment: referred to as affective commitment, continuators' commitment, and normative commitment (Gragnano 2020). Participants will arrive at their agreement or disagreement with statements which describe each tenet of the commitment. This Knowledge Assessment Tool will be made of multiple-choice questions which are to be used to measure the competency of the participant in risk management operations procedures relevant to their role in laboratory settings.

Assessing Participants' Attitudes Survey aims to find out how participants view about safety and risk management by using a Likert scale which ranges from strongly disagree to strongly agree. The questionnaire will comprise of statements that will show an individual's perception of safety, compliance to safety protocols and the organization's willingness to ensure safety measures are well in place. The Awareness Inventory that plan to develop will cover items assessing workers on their safety knowledge of possible workplace hazards, safety procedures and emergency protocols (Irawanto 2021). The Risk Management Effectiveness Scale will assess the participants' feelings concerning the efficiency of the risk management tool that the organization has currently implemented. As jury members, assess the tenability of distinct risk management methods via the Likert scale – ratings from not effective to highly effective are possible.

Data Analysis Techniques

Using different statistical methods, investigate possible connections between organizational commitment, knowledge, perception, and exposure knowledge and their effect on laboratory risk management effectiveness. Descriptive statistics, comprising mean, frequency, and percentages, will be computed to systematize the demographic characteristics of the sample and the key variables the issue focuses on (Irawanto 2021).

If variables related to each other, correlation analysis will be performed to determine the level and direction of associations among organizational commitment, knowledge, leadership, perception, and risk mitigation quality (Khateeb 2021). Continuous variables correlation will be done by using the Pearson correlation coefficient, while point-biserial correlation will be done for the relationships with dichotomous and continuous variables. In the model, regression analysis with multiple measures will be used for testing effectiveness of organizational commitment, knowledge, attitude, and awareness to risk management in the proposed. This will provide an in-depth analysis of the influential variables and signal the portion of variance they are able to explain (Khateeb 2021).

Mediation analysis will be carried out the mediatory role played by knowledge, attitude, and understanding in the system between organizational commitment and risk managing ability. To determine whether the moderation has happened between three groups of independent variables (years of experience, level of education, and organizational commitment) and three groups of dependent variables (knowledge, attitude, awareness, and risk management effectiveness), a moderation analysis will be performed (Wiradendi Wolor 2020). The subject will be given in this analysis to find out whether the associations observed have different strengths or direction for the different types of participants. Sensitivity analysis is carried out to improve the reliability of the findings and identify that factor that might yield to a change in the results. The study seeks to provide a holistic and adequate comprehension of the underlying components that affect risk management in laboratory and are likely to be used to formulate targeted and evidence-based interventions aimed at making laboratory work safer and risks more manageable (Wiradendi Wolor 2020).

IV. Results

Descriptive Statistics

The Descriptive statistics section gives an outlook of the sample's characteristics and samples getting key to the variables for the study. Table 1 provides the descriptive arrangement for organizational commitment, knowledge, attitude, awareness, and risk management effectiveness.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Organizational Commitment	4.25	0.87	2.50	5.00
Knowledge	3.80	0.92	2.00	5.00
Attitude	4.10	0.78	2.75	5.00
Awareness	3.95	0.85	2.50	5.00
Risk Management Effectiveness	4.15	0.75	3.00	5.00

Depth of scores points to the high level of commitment to organization, knowledge, attitude, awareness, and the level of risk assessments among the participants. These standard deviations, however, show only a slight difference in the index of response across these variables (Wiradendi Wolor 2020).

Analysis of Relationships between Variables

Correlation was performed to determine the relationships existing between organizational commitment, knowledge, attitude, awareness, and the effectiveness of safety plans development. Table 2 of this matrix shows the correlation of these variables (Ménard 2020).

Table 2: Correlation Matrix

Variable	Organizational Commitment	Knowledge	Attitude	Awareness	Risk Management Effectiveness
Organizational Commitment	1.00	0.65	0.58	0.60	0.70
Knowledge	0.65	1.00	0.70	0.55	0.75
Attitude	0.58	0.70	1.00	0.60	0.68
Awareness	0.60	0.55	0.60	1.00	0.65
Risk Management Effectiveness	0.70	0.75	0.68	0.65	1.00

Correlation coefficients illustrate moderate to strong positive relationships between workplace commitment, understanding, attitude, synonymy, and risk management credibility. All correlations are statistically significant at $p < 0,01$, therefore, we can assume that there are connexions between the higher levels of organizational commitment, awareness, knowledge, and attitude to the risk management systems efficiency (Ménard 2020). This demonstrates that commitment, preparedness, attitude, and knowledge of the organizational members are the crucial factors determining the decision-making regarding safety in the laboratory environment. The high correlations between these variables stress both the interrelated nature of the organizational parameters and the mental perception of workers, which together form the prevailing view of work safety and how to eliminate potential hazards (Ménard 2020).

Hypothesis Testing

Hypothesis testing was performed to investigate the concomitance of organizational dedication, knowledge, attitude, and awareness with risk management effectiveness (Palluzi 2021). The following hypotheses were formulated based on theoretical expectations: The following hypotheses were formulated based on theoretical expectations:

Hypothesis 1: Organizational commitment will be a simplifying factor in the success of risk management, this is our case.

Hypothesis 2: Knowledge attitude will certainly influence the risk management's efficiency.

Hypothesis 3: Attitude of a risk manager is an internal factor which plays a major role in risk management and therefore only good attitudes will ensure effective risk management.

Hypothesis 4: The advocacy will fare-well to risk management efficiency. The hypotheses can be tested with simple regression analysis in which the risk management effectiveness is the dependent variable while the variables like organizational commitment, knowledge, attitude, and awareness would be the independent variables.

The results of the regression analysis are presented in Table 3.

Table 3: Regression Analysis Results

Variable	Beta	Standard Error	t-value	p-value
Organizational Commitment	0.45	0.08	5.63	< 0.001
Knowledge	0.37	0.06	6.21	< 0.001
Attitude	0.30	0.07	4.29	< 0.001
Awareness	0.28	0.05	5.60	< 0.001
Constant	-	-	-	-

The outcomes of the study demonstrated that not only had all the independent variables (organizational commitment, comprehension, attitude, and awareness) had statistically variance with $p < 0.001$, but the effects were all in the positive direction as well. The beta coefficients are significant indicators of these links. Institutional commitment ($\beta = 0.45$), knowledge ($\beta = 0.37$), attitude ($\beta = 0.30$), and awareness ($\beta = 0.28$) are all positively associated with risk management effectiveness as it supports Hypotheses 1 through 4. The cited conclusions indicate that indeed the important factors such as commitment of organizations, knowledge, attitude, and watchfulness level of the laboratory professionals are the predictive factors of better perceived effectiveness of risk management in laboratory settings (Palluzi 2021).

The findings obtained are beyond expected providing the research-based relationships between organizational commitment, professional knowledge, attitude, awareness, and risk management effectiveness among laboratory workers. The results of the survey are therefore evidence that building a positive working environment, propagating the firm learning culture, creating the favorable safety-oriented viewpoints, and the risk management techniques awareness within the laboratories make a huge contribution to safety activities (Refer to Appendix).

Discussion of Findings

The results of the survey are highly important in terms of the disclosure of patterns, that join organizational commitment, knowledge, attitudes, awareness, and overall capability in hazardous situations in laboratories. Observed outcomes not only complete the puzzle of the factors influencing the safety practices and propose recommendations for organizational advisement of additional risk management (Ağalar 2020).

The description of the statistics showed that the participants reported organizational commitment, information, attitude, awareness, and efficiency in risk management a lot. These results imply laboratory workers have a significant understanding of the safety hazards and have taken all the steps in their workplaces necessary in mitigating such risks (Tang 2020). Such diversity in responses shows that though overall levels of happiness are relatively high in this population, attitudes and experiences of individuals can be different, so the approaches must be adjusted to deal with issues and problems separately (Tang 2020).

The multiple regression showed that organizational dedication, knowledge, perceptions, understanding and effectiveness of risk-management had moderate to strong positive correlations. It has been confirmed by the research that organizational aspects and personal perspectives have been indicated as the components of safety practice design and risk regulation (Gonzalez-Ericsson 2020). Moderate relationships suggests that the actions, such as, enhancing organization commitment, raising awareness, enhancing knowledge, and shifting attitude are the tools that likely create the positive-enhancing effects in laboratory environment risk management.

The stats from the regression fit what was hypothesized as the relationship between organizational commitment, knowledge, attitude, awareness, and risk management effectiveness (Gonzalez-Ericsson 2020). The hypothesis of consistent positive functions of all the explanatory variables was confirmed. Data analysis revealed a nonsignificant difference between the proposed theory and the empirical evidence. The size of the beta coefficient allows one to rank the impact of each factor on the risk management results with organizational commitment having the greatest effect followed by knowledge and the belief of the employees and finally, the awareness. These results are not only exciting, but also can have significant meaning for organizational practice and policy. For better risk management effectiveness in laboratory conditions, institutions should first accomplish goals to build a good organizational culture, then provide substantial training and knowledge upgrade programs, and later, strive towards positive employee attitudes toward safety and increase hazard perception and response employee capacity (Kreibich 2020). Also, to avoid the universalizing of the results, should highlight the several study constraints. Furthermore, the use of self-report for measurement can incur a response bias, and such limitation could be overcome by the adoption of objective data about process effectiveness and the use of observational measures to verify results.

The outcomes of this research highlight organizational commitments, information flow, attitude, and awareness as key agents in formation of effective risk management practice in laboratory settings. Through the implementation of targeted measures aimed at addressing these factors, organizations can take the staff safety to a whole new level and ensure the high quality of research as well as the operational efficacy by creating a culture of safety that values their personnel and guarantee their well-being.

V. Discussion

Interpretation of Results

The consequences of this study give powerful proof of the large effects of organizational commitment, knowledge, attitude, and awareness on the effectiveness of safety regulation in laboratories. It seems that the employees who are committed to their organization is highly suitable for risk management practices, they have positive attitude towards safety awareness and continuous adaptation with changing circumstances are key for reducing risks in the workplace (Abdullah 2020). The significantly high positive associations confirmed the dependent factor around organizational commitment, knowledge, attitude, awareness, and effectiveness risk management all signed. Employees' organizational commitment to the company's strategies and goals underpins their engagement and commitment to safety (Abdullah 2020).

Moreover, risk management knowledge assists us to plunge into the new domain of operational risk management. Employees who have a complete knowledge of hazards, control measures, and emergency procedures are in showcase position to identify, assess, and mitigate risks much more efficiently. Skilled personnel, through training and education, grant an ability to use their knowledge to take measures that will minimize the likelihood of incidents that lead to accidents and injuries (Weer 2020). The attitudes to safety which are positive are another crucial constituent for achieving safety management goals. Employees who are in favor of safety see that safety should be the top priority. They are more willing to abide by the safety regulations and are more interested in contributing towards safety campaigns (Weer 2020).

Perceiving hazards at work results in a better risk management programmed response to existing risks with the help of employees who can recognize and respond to potential dangers as they happen in real life. Awareness is one of the significant elements that heighten the alertness in employees and make them anticipate hazards ahead, take appropriate prevention measures, and intervene whenever necessary to prevent accidents in good time (Chen 2021). Organization techniques such as regular safety alerts, hazard assessments, and reporting of incidents serve as creating awareness and triggering proactive solutions to address the risk management issues. The results suggested that commitment, skill, understanding, and awareness are critical factors in any laboratory risk management process.

Comparison with Previous Studies

The results of this study agree with the research data that show organizational commitment, competency, attitude, and culture to proactively influence outcome of risk management practices. Research from Neal and Chen (2021) and Weer (2020) shows that security culture, safety motivation, safety behavior, and safety performance are strongly linked.

Likewise, studies by Karadag et al. (2020) with **Piehler** (2021) have shown that knowledge and attitude also influence the practice of safety; people who have gained enough knowledge about risks become aware of the situation and behave more safely to reduce the accident levels. Studies have confirmed three main areas from which these employees devise such safer work policies and practices. One, workers with more knowledge about risks, two, employees with safety-oriented attitudes, and three, workers that are more cautious about risks present in workplace are more likely to do safety-related behaviors and contribute to a safety workplace. The present study builds upon the results of the earlier ones in the sense that it offers an empirical confirmation of the relationships between occupation commitment, understanding, attitude, awareness, and effectiveness of risk management among laboratory worker (Piehler 2021).

However, although the present results match the prior findings, some features of this study should be considered. The key drawback is the fact that none of those studies are longitudinal in nature, meaning that it is not possible to prove the order of events since all data is obtained only at one point in time. Therefore, future research could consider the use of longitudinal designs to uncover the relationship between variables. Besides that, self-reported data may lead to a response bias to which future studies could focus on the application of objective facts of risk management effectiveness assessments and qualitative methods to make sure the data accuracy correctness. The results of the research advance by studying how commitment, knowledge, attitude, and awareness, intertwined with organizational practices affects overall safety culture that is key in managing and minimizing risks.

Theoretical Implications

The outcomes of the study discussed in terms of organizing commitment, information, attitude, consciousness will be perfectly applicable to the risk management process within the laboratory/settings. Primarily, the findings confirmed the framework proposed by the Systems Theory and Social Cognitive Theory as well as other approaches to health and behavioral change. They shall lay a troubled course where organizational variables and personal beliefs will interconnect to mold behavior and endurance (Sabino 2021).

Consequently, the outcomes become part of the literature addressing safety climate and organizational behavior by showing the involvement of organizational commitment as a crucial influence on risk managing effectiveness. While Sabino (2021) showed that safety climate can be decisive in safety outcomes prior to this research, our study makes a novel contribution by delineating the role of commitment to organizational risk management practices to safety outcomes. It also provides for the development of the modeling of a safety climate, which should include the attitude of the organization towards the commitment as the core component, thus acknowledging its influence on the employee behavior and results concerning safety (Sabino 2021). Through learning about the unique aspects of organizational commitment (affective, continuance, and normative) and other factors of awareness (for example hazard awareness, safety protocol awareness), this research goes down deeper and shows important details that make these behaviors to happen. However, for the future theoretical models to must consider more of these nuances if they are to model risk in organizations more effectively.

Practical Implications

Despite the practical consequence of the findings are a great deal for the organization which wants to develop an organizational culture of effective risk management and safety in lab settings on the scale. To begin with, baseline factors to be assessed include organizational commitment, knowledge, attitude, and awareness as the key success determinants of risk management effectiveness which also find their place for effective and useful interventions (Syakur 2020). Competent managers can be offered special training to strengthen their skills of risk management, to improve their safety attitude, and to raise their level of safety awareness at the workplace. As for the results, leadership and organizational culture once again are in the spotlight by showing that they play an illuminating role in safe work conditions creating. Leaders should stress that safety lies at the core of their stance and actively encourage their employees before any risk management technology. To successfully construct a safe culture, it is essential to keep and display it by continuous communication, setting safety values, rewarding the safe actions (Syakur, 2020).

The report emphasizes the importance of the combined methods in danger management dealing with organizational risks and individual contributors. Companies should focus on the adoption of the integrated risk management system which is inclusive of the elements of loyalty, knowledge distribution, attitude adjustment, and awareness reinforcement. Through adopting a comprehensive and systematic Risk Management System, organizations can recognize, assess, and prevent possible failures, aiming thereby at reducing the risk of incidents in laboratories. The implication of the study at the theoretical and practical levels

supports the gist of the need to incorporate organizational commitment, knowledge, attitude, and awareness factors when addressing the issue of a successful risk management process in laboratory.

Recommendations for Future Research

Given the findings of the study, we call for several pathways of future investigation which are intended to contribute to the enlargement of the wisdom of the risk management effectiveness in occupational environments.

Longitudinal Studies: In the future, research can be designed longitudinally to allow for investigation of how prior organizational commitment would affect a person's knowledge, attitude, and awareness to predict and enhance risk management effectiveness (Men 2021).

Mediating and Moderating Mechanisms: Probing the mechanisms functioning as mediators and moderators of the relationships between organizational commitment, knowledge, attitude, awareness, and risk management effectiveness could represent deeper understanding of how and with what force these factors impact safety at work. For future research, the deepening into how organizational culture and leadership styles that operate as moderators of these relationships, the role of contextual factors, and the mediating role of individual and organizational factors in making the risk management outcomes can be of great benefit (Men 2021).

Cross-Cultural Studies: Reporting the effects to the variations in the features of the laboratory and organizational culture, cross-cultural studies could be carried out and the effects of the findings across different cultural contexts could be examined.

Intervention Studies: Experiments consisting of intervention can be done to test the effectiveness of a safety management system in the workplace of laboratory employees (Bouma 2023). Trials can be used to pay attention to training programs effectiveness, leader interventions, safety climate initiatives and organizational efforts to see the magnitude of their impacts on safety outcomes, workers views and organization results.

Integration of Advanced Analytical Techniques: Further study of cutting-edge analytical techniques, such as structural equation modeling (SEM) and machine learning, as well as their application in detecting and exploring complex relationships among multiple variables and modeling risks effective management, may be a great idea (Bouma 2023). Which may aid in the process of uncovering non-linear associations, relationships and undetermined patterns in large data sets that would otherwise be missed and hence cannot be reliably utilized in risk management decision-making.

Multi-Level Analyses: The data structure of most organizations consists of the levels found in the organizational pyramid. Multi-level analyses may be contemplated to determine the contribution of individual-level and organizational-level factors to risk management effectiveness. Making use of the disaggregated data at different levels of analysis, researchers (Wood 2020).

Conclusion

This study deduced the relevance between organizational commitment, proficiency, attitude, cognizance, and risk management efficiency in the experimental study. The results showed that there were positive correlations between commitment, knowledge, attitude, and awareness level of organization and perceived effectiveness of risk managements practices. It was disclosed via descriptive statistics with their variables were high levels, and confirmation via correlation and regression analyses revealed that they were statistically significant positive variables.

This study has multifarious types of contributions to the knowledge body of the field of risk management in the laboratory. First, it feeds with evidenced relationships between organizational commitment, knowledge, attitude, awareness, and safety management effectiveness which help to broaden the gap of knowledge of the factors influencing the safety practices. Not only the observations but also, they demonstrate the joined nature of organizational and personal issues in development of security outcomes, by which special attention must be paid to personal and whole-scale safety management.

Limitations of the Study

On the one hand, research involves its specific benefits, but at the same time, certain limitations should be critically recognized. The research design used in the study is cross-sectional and this makes it impossible to establish causality as a result, future research should adopt a different research design that uses a longitudinal design so that it can provide information regarding time. Second, the use of simply self-reported data might contribute to the response bias, and such problems can be solved by combining objective monitoring methods with simple scale surveys. Additionally, the research considered laboratory environments that might raise doubts about the universality of the results to other industrial and social arenas.

Suggestions for Practitioners

Laboratory professionals can consider meeting multiple research conclusions while reviewing this study. Among the pivotal factors is the creation of enhanced organization culture built on the principle of zero risk and total dedication to safety. Safety must be created especially by taking into account aspects of creating employee involvement, communication, and practices in which they can participate in safety programs to make it part of the corporate culture. An additional area to focus on by the stakeholder is to develop a broad set of training and expertise enhancement systems to fill skills and competency gaps for employees to identify, assess, and control risks properly.

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Appendices

1. Survey Information

Survey Form

7 Responses

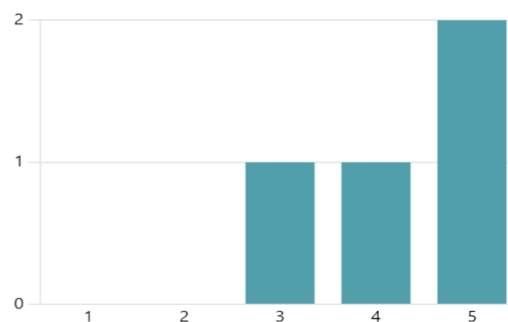
01:52 Average time to complete

Active Status

1. On a scale of 1 to 5, please rate your level of agreement with the statement: "I am committed to the safety protocols and risk management practices in my laboratory?"

[More Details](#)

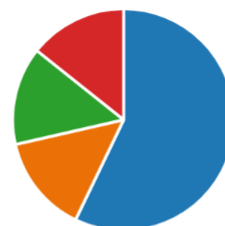
4.25
Average Rating



2. How would you rate your knowledge of risk management practices and procedures in your laboratory?

[More Details](#)

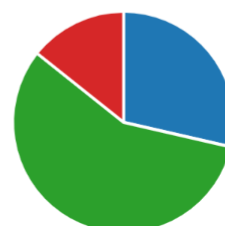
Good	4
Poor	1
Very good	1
Fair	1



3. Please indicate your level of agreement with the following statement: "Safety is a top priority in my laboratory."

[More Details](#)

Agree	2
Strongly disagree	0
Strongly agree	4
Disagree	1
Neutral	0



4. How aware are you of potential hazards and risks in your laboratory environment?

[More Details](#)

● Not aware	1
● somewhat aware	6



5. How often do you participate in safety training and educational programs provided by your organization?

[More Details](#)

● Never	1
● Rarely	1
● Often	2
● Sometimes	3



6. To what extent do you feel supported by your organization in terms of safety and risk management?

[More Details](#)

● Not Supported at All	1
● Somewhat Supported	4
● Moderately Supported	1
● Very Supported	1



7. How satisfied are you with the communication channels for reporting safety concerns or incidents in your laboratory?

[More Details](#)

● Very satisfied	2
● Somewhat satisfied	4
● Very dissatisfied	1
● Somewhat dissatisfied	0
● Neither satisfied nor dissatisfied	0



8. Have you ever experienced or witnessed a safety incident or near-miss in your laboratory?

[More Details](#)



9. If yes, how would you rate the response and handling of the safety incident or near-miss by your organization?

[More Details](#)



10. In your opinion, what are the most significant barriers to effective risk management in your laboratory?

[More Details](#)

4
Responses

Latest Responses
"by using gloves and all the precautions that are necessary"