**RES- 650- Research Methods**

**Answer of the question n. 1**

**Concept of research:**

Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue‖. It consists of three steps: Pose a question, collect data to answer the question, and present an answer to the question.

Research is defined as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes.

Research is a process of seeking out answers to a specific problem. It can be conducted for several purposes, such as to understand a phenomenon, behavior, or test a theory. Research is conducted systematically, and it adds to a body of knowledge and supports many theories.

The research idea represents the first exposure of the researcher or the researcher-to-be to the possibility of advancing the first steps of the research project. The research idea can be heterogeneous, multifaceted, and only limited by the imaginative capability of the investigator.

Research methods are the strategies, processes or techniques utilized in the collection of data or evidence for analysis in order to uncover new information or create better understanding of a topic. There are different types of research methods which use different tools for data collection.

According to the American sociologist Earl Robert Babbie, “research is a systematic inquiry to describe, explain, predict, and control the observed phenomenon. It involves inductive and deductive methods.” Inductive methods analyze an observed event, while deductive methods verify the observed event.

Research is a “systematic, controlled, empirical and critical investigation of hypothetical propositions about the presumed relations among natural phenomena.” The central concept of research is 'tentative truth'.

A concept paper is a short academic paper that explains the research plan to conduct. It covers research goals, how will carry out the research, collect data, and the questions aim to answer through research.

This general chart begins with two key concepts: ontology and epistemology, advances through other concepts, and concludes with three research methodological approaches: qualitative, quantitative and mixed methods.

A concept briefing is a short research paper over your exploration of a concept. The purpose of a concept briefing is to inform others about your topic. Report should include a definition of the concept, explanation of its purposes and implications and examples.

The Concept Document provides sufficient information to justify a decision whether or not the organization should move forward with the development of a full Business Needs Statement or Business Case. A Concept Document is expected to be no more than two pages in length.

**The ultimate objective of research:**

In user studies involving multiple conditions or groups, the ultimate objective of the researcher is to find out whether there is any difference between the conditions or groups.

Research objectives describe what research is trying to achieve and explain why are pursuing it. They summarize the approach and purpose of project and help to focus research. Objectives should appear in the introduction of research paper, at the end of problem statement.

The purpose of research is to enhance society by advancing knowledge through scientific theories, concepts and ideas. A research purpose is met through forming hypotheses, collecting data, analysing, etc.

Ultimate objective is correct and often used in written English. It can use it to refer to the end goal or the final aim of something. For example,the ultimate objective of this project is to reduce carbon emissions.

To examine the causal relationship between smoking habits and the development of lung cancer. These objectives involve comparing two or more variables, groups, or situations to identify similarities, differences, patterns, or trends.

The primary purposes of basic research (as opposed to applied research) are documentation, discovery, interpretation, and the research and development (R&D) of methods and systems for the advancement of human knowledge.

Research is the careful consideration of study regarding a particular concern or research problem using scientific methods. According to the American sociologist Earl Robert Babbie, “research is a systematic inquiry to describe, explain, predict, and control the observed phenomenon.

Characteristics of a Qualitative Research

Human understanding and interpretation.

Active, powerful, and forceful.

Multiple research approaches and methods.

Specificity to generalization.

Contextualization.

Diversified data in real-life situations.

Abounds with words and visuals.

Internal analysis.

The ultimate objective of this work is to exploit multi-agent [RL](https://www.sciencedirect.com/topics/computer-science/reinforcement-learning) and RL-based techniques to build responsive and efficient [control strategies](https://www.sciencedirect.com/topics/computer-science/control-strategy) for batch and semi-batch crystallization processes. The mathematical model associated with the first [case study](https://www.sciencedirect.com/topics/computer-science/case-study) was obtained from the literature. The growth and nucleation [kinetic parameters](https://www.sciencedirect.com/topics/computer-science/kinetic-parameter) obtained from Barik et al,2020. The 2-dimensional mathematical model associated with the second case study was obtained from Fysikopoulos et, 2019.

Both mathematical models were experimentally validated in the original studies. A few assumptions were considered to build the models which includes: (i) the vessel is assumed to be well-mixed; (ii) crystal breakage and agglomeration of fine crystals are negligible; (iii) crystals growth is size-independent. (iv) crystal growth and dissolution do not affect the total volume.

The ultimate objective for STM publishers would be to open their content to the scientific community. Inspired by the open source model, Elsevier believes that collaboration between scientists and publishers will build a new foundation for accelerating innovation.

Applications are the ultimate objective of the software [development process](https://www.sciencedirect.com/topics/computer-science/development-process), which transforms a relatively general computing device into a specialized purpose-built machine. Hence, we show it at the top element in our framework. However, as argued previously, in practice there is almost always interplay between the elements in this framework, such that dependencies exist in both top-down and bottom-up directions. This favors an [iterative development](https://www.sciencedirect.com/topics/computer-science/iterative-development) process, as our understanding of the ramifications of such dependencies gradually increases with experience.

**Answer of question n. 2**

**Different types of research conducted in Bangladesh:**

BRID is a research and study center in development arena. The institute conducts interdisciplinary research on policy and development to solve the problems, and to mitigate the challenges, and to improve the living standards of Bangladesh.

Top Research services companies in Bangladesh Bangladesh Clinical Trials Ltd. Bangladesh Council of Scientific and Industrial Research (BCSIR) Bangladesh Forest Research Institute (BFRI) Bangladesh Livestock Research Institute (BLRI) Bangladesh Rice Research Institute (BRRI)

The Policy Research Institute of Bangladesh (PRI) is a private, nonprofit, nonpartisan research organization dedicated to promoting a greater understanding of the Bangladesh economy, its key policy challenges, domestically, and in a rapidly integrating global marketplace.

The National Agricultural Research System (NARS) is composed of Bangladesh Agricultural Research Council (BARC) and 10 national agricultural research institutes.

Bangladesh Research Institute for Development (BRID) is a thriving partner in knowledge-based community and network building. BRID, a faster growing research and education center in Bangladesh focusing on desired socio-economic changes with knowledge-based community and network building. The head quarter is located in Thakurgaon, Bangladesh. BRID is a research and study center in development arena.

The institute conducts interdisciplinary research on policy and development to solve the problems, and to mitigate the challenges, and to improve the living standards of Bangladesh. The institute develops original approach in research and development as well as follows the required original approaches to research, training, and knowledge sharing for the development of the country and the international communities.

Working for the behavioral change of the people through different methods such as audio documentary, video documentary, popular theatre, modeling, communication and other methods of behavioral change, and organizing different events such as seminar, workshop, symposium, roundtable and conferences are the important activities of the institute. The motto of the institute is **“Mind and World”** that signifying the searching of knowledge and application for development as well as for the purpose of solving the problems of practical world.

Only few of them had reasonably strong graduate programmes. Most of the newer universities struggle to start graduate studies and end up having a second-tier programme to justify calling themselves a university instead of a college. So, the culture of research never really took off.

Evaluating faculty members for review, promotion and tenure is a challenging job that has evolved with time. In the early eighties, effective teaching was considered the principal task of a faculty member. Now, it is necessary but not sufficient. More emphasis is given on strong research and publication over excellence in teaching and services.

The Times Higher Education ranking started in 2004 and The QS University Ranking started in 2011. It takes a long time (maybe 10-12 years) and coordinated, sustained efforts from all stakeholders to develop a healthy and active research culture.

To create new knowledge, develop new products and services, or improve the old ones for human benefit requires research. The onus of doing research is not only on the universities.

In 2016, the global industry spent 15 percent of its revenue on Research and Development (R&D). Both academia and industry need to cooperate and collaborate closely for the advancement of the civilisation. The Oxford-AstraZeneca Covid-19 vaccine development is an example of such cooperation that led to a great success.

In Bangladesh, no one talks about professional or industry research because it almost does not exist. There are a few private think tanks, non-profits and NGOs that are doing research on socio-economic issues, and a few government agencies like BRRI, BARI, BIDS, AEC, BCSIR, etc. in other sectors. Industry R&D in science, engineering and technology is non-existent.

No one expects much basic research in a low-income country, but none of the industries in Bangladesh has even an active R&D department that conducts applied research to solve local problems. Most importantly, industries rarely approach universities to solve such problems. It implies that either they don't have any problem, or it is solved by local/overseas consultants.

The majority of the published research in Bangladesh are conducted by university faculty members and students. The quality of every faculty position is ensured by setting up qualifications in terms of academic results, publications and experience.

Outside teaching experience, the publication requirement for assistant professor, associate professor and professor positions increases with the hierarchy from a minimum of three to fifteen publications. The quality of these publications varies and is judged differently in different universities. Generally, very few can attain associate or full professorship without a PhD degree.

A research company's chief aim is to discover and analyze data to report to clients. As a research company leader, he can use education and experience to ensure the organization delivers information that is accurate, relevant and easy to understand.

It can be exploratory, descriptive, or explanatory; however, explanatory research is the most common. Basic research generates new ideas, principles, and theories, which may not be immediately utilized but nonetheless form the basis of progress and development in different fields in Bangladesh.

**Answer of the question n. 3**

**Description of rsearchers dealing with research problems:**

Research problems can be identified by reviewing recent literature, reports, or databases in the field. Often the section on “recommendations for future studies” provided at the end of journal articles or doctoral dissertations suggests potential research problems.

Formulation of the problem includes: i) stating the problem in the form of statements or questions which make the problem clear and understandable, ii) identification and operationalisation of the variables concisely, and iii) evaluating the problem in terms of its significance, novelty and feasibility.

Some research problems include:

The impact of social media on mental health.

The effectiveness of different teaching methods in improving student learning.

The causes of climate change and potential solutions.

The relationship between diet and chronic diseases.

The effects of technology on human relationships.

A research problem is a specific question, problem, or difficulty that needs to be investigated or analyzed. It is a concise statement that expresses the difference between what is currently known and what needs to be known or the difference between a current situation and a desired state.

The key components of a research problem include the necessity for the research, development of ideas/topics, formulation depicting what is to be determined, scope of the study, key concept definitions, and questions to be asked. Additionally, a well-designed research project starts with conceptualizing the problem. The selection of a research problem is based on the key criteria of: (1) interest; (2) expertise; (3) data availability; (4) relevance and; (5) ethics.

Research methodology is the specific procedures or techniques used to identify, select, process, and analyze information about a topic. In a research paper, the methodology section allows the reader to critically evaluate a study's overall validity and reliability.

Managing multiple projects and deadlines successfully is among the most common research challenges. Careful time management, prioritizing work, and setting realistic goals and deadlines are simple ways for researchers to manage their many responsibilities.

A good research problem should have the following characteristics: It should address a gap in knowledge. It should be significant enough to contribute to the existing body of research. It should lead to further research.

Research is crucial for academic and scientific progress, but it comes with challenges. Researchers often face obstacles that can slow them down and affect their work quality. In this blog post.

Selection of research problem depends on several factors such as researcher's knowledge, skills, interest, expertise, motivation & creativity with respect to the subject of inquiry. It is believed that most of the good research studies need lots of time for selection of a research problem.

Research is a vital skill for many academic, professional, and personal projects. However, it can also pose various challenges and pitfalls that can affect the quality, validity, and relevance of findings.

Social science researchers who are interested in evaluating ongoing behavior are confronted with several methodological challenges. Salient ones concern whom to observe, when to observe, where to observe, what to observe, and how to observe.

Research methodology is a difficult area of study because research itself is unpredictable and somewhat indefinable. Those that study research methodology face the following challenges: It's incredibly difficult to quantify the benefits of research in terms of a dollar value.

The pursuit of research excellence is not for the faint of heart; you have to overcome several challenges faced by researchers to map a path to excellence. From formulating research questions to gathering data, writing research papers, and getting them published, researchers grapple with complexities that demand their unwavering dedication and perseverance.

By shedding light on the challenges faced by researchers, we aim to help academics navigating the path of knowledge and foster a deeper understanding of the challenges in conducting research.

A career in scientific research can be highly rewarding and fulfilling for those who enjoy intellectual pursuits, value continuous learning, and want to make a positive impact on society. It offers exciting opportunities to unravel the mysteries of the world, push the boundaries of knowledge, and contribute to the collective understanding of humanity.

However, one requires dedication, hard work, and perseverance to overcome the many research challenges will encounter along the way. While each research journey is unique, the challenges faced by researchers share common threads that bind them together. By acknowledging and understanding these research challenges, academics can equip themselves with the knowledge and strategies needed to conduct research effectively.

The scientific process is often slow and iterative, and progress sometimes can only be measured in small increments over many months or years. Research takes time to execute, and oftentimes the results are uncertain. This can be frustrating for researchers who may have invested significant time, money, and effort into these projects.

One of the biggest challenges faced by researchers is securing adequate funding for their work. Grants can be highly competitive, and the process of applying can be time-consuming and complex.

Managing multiple projects and deadlines successfully is among the most common research challenges. [Careful time management](https://researcher.life/blog/article/time-management-tips-researcher-productivity/), prioritizing work, and setting realistic goals and deadlines are simple ways for researchers to manage their many responsibilities.

Experts suggest using strategies like breaking larger projects into smaller tasks and scheduling regular breaks to avoid burnout, a very real challenges faced by researchers.

Researchers have different working styles or conflicting priorities, which can lead to tension and conflict when working with larger teams. To overcome this challenge in conducting research, scientists should set the right expectations from the start, establish clear communication channels, and be willing to work together to achieve shared goals.

Managing and analyzing large datasets can be a time-consuming and complex process. To overcome this research challenge, researchers should develop effective data management strategies, such as using cloud-based tools for storage and analysis and implementing best practices for data security and privacy.

The collection, analysis and management of research data is critical to scientific study and career advancement, which makes it important to know [how to develop an effective data management plan for researchers](https://researcher.life/blog/article/tips-for-creating-an-effective-data-management-plan/).

**Identification of research problem:**

Identifying a research problem involves choosing an area of genuine interest, reviewing existing literature for gaps, staying attuned to real-world issues, and discussing ideas with peers.

The criteria for identifying research problems are grouped under the following four sub-themes: (i) nature of the problem, (ii) personal criteria, (iii) the literature and (iv) academic relationships.

The key components of a research problem include the necessity for the research, development of ideas/topics, formulation depicting what is to be determined, scope of the study, key concept definitions, and questions to be asked. Additionally, a well-designed research project starts with conceptualizing the problem.

A research problem, or phenomenon as it might be called in many forms of qualitative methodology, is the topic would like to address, investigate, or study, whether descriptively or experimentally. It is the focus or reason for engaging in research.

Identify the problem: State your problem as clearly as possible, and be specific about the situation. Include background, context, and symptoms of the issue when identifying the problem. Form a hypothesis: Hypothesize what is causing or maintaining the conditions around the problem.

As the name implies, problem-identification research helps pinpoint what types of problems potentially. Problem-solving research helps identify ways to solve those problems through marketing mix and segmentation.

Problem identification strategies were coded using multiple techniques. Coding techniques were deductive, inductive, and hybrid approaches. Strategies included Resource Management, Elaboration, Analysis, and Manipulation. Students most frequently used lower level processing strategies.

Many organizations think that the most important thing to do when faced with a problem is to solve it as quickly as possible – but they couldn’t be more wrong.

One of the most important steps in the problem-solving and decision-making process is to identify and define the business problem first. This involves diagnosing the current situation so that can focus on the real problem and not on its symptoms. And since this critical task doesn’t usually get the attention it deserves, I want to shed some light on how can identify the problem and why this step is crucial to success.

Problem-solving is an important form of critical thinking. It’s part of our role as Business Analysts to recognize and acknowledge challenges and opportunities, and commit ourselves to resolving them.

During this process, we should periodically be asking ourselves, “What problem are we solving and why is it important- Being clear on the problem and why we are tackling allows us to identify the problem at its root and devise a solution that will most efficiently and effectively meet the needs of the business.

Regardless of how the problem is initiated, digging into the root of that problem is an essential process for Business Analysts. Because in order to generate the most value, we must first [identify and define the problem](https://thebaguide.com/course_landing_page/identify-and-define-the-problem/). It is only through proper problem identification that we’ll be able to create a plan and truly solve it, providing the much-needed value that Business Analysts are known for in organizations.

**Answer of the question n. 4**

**Basic processes of a business research:**

The five stages in the business research process are problem formation, research design, data collection, data analysis, and presentation of results (Leedy & Ormrod, 2014). This article aims to describe each of these stages and discuss key issues involved in each.

The research process is comprised of 5 steps: identifying the purpose, designing a research plan, collecting the data, interpreting the data, and reporting the findings. There are two key types of research with their own research methods: qualitative and quantitative research.

The research processes include selecting a topic, problem identification, research question, research design formulation, and writing a proposal.

The first step is Investigating. This involves identifying what it is you need to research, understanding the parameters of assignment, and stating research need as either a focused research question or thesis statement.

A research purpose is met through forming hypotheses, collecting data, analysing results, forming conclusions, implementing findings into real-life applications and forming new research questions.

Research process refers to the systematic and organized series of steps taken to investigate and study a specific topic or problem in order to gain knowledge and find answers to questions. It is a methodical approach followed by researchers to collect, analyze, and interpret data to arrive at meaningful conclusions and contribute to the existing body of knowledge in a particular field.

Throughout the research process, researchers must maintain objectivity, rigor, and ethical considerations to ensure the validity and reliability of the results. Each step contributes to a comprehensive understanding of the research topic and the generation of new knowledge in the field.

Basic process of business research are as follows:

Formulating the Research Problem: Identifying and defining the research question or problem that needs to be addressed.

Literature Review: Conducting a thorough review of existing literature and research related to the topic to understand what has already been studied and discovered.

Developing the Hypothesis: Creating a clear and testable statement that predicts the relationship between variables in the research.

Research Design: Planning the overall structure and approach of the study, including selecting the research methods and data collection techniques.

Sample Design: Determining the sample size and selecting the participants or subjects that will be part of the study.

Data Collection: Gathering relevant data through various methods, such as surveys, interviews, experiments, or observations.

Execution of the Project: Implementing the research plan and collecting the data as per the designed approach.

Data Analysis: Analyzing the collected data using appropriate statistical or qualitative techniques to draw meaningful conclusions.

Hypothesis Testing: Evaluating the hypothesis based on the analysis to determine whether it is supported or rejected.

Generalizations and Interpretation: Making broader connections and interpretations of the findings in the context of the research problem.

Conclusion and Recommendations: Summarizing the research results, drawing conclusions, and suggesting potential future research or practical implications.

**Answer of the question n. 5**

**Different research designs and their implication in the research:**

Research designs are either experimental or non-experimental. Experimental research is conducted mostly in laboratories in the context of basic research. The principle advantage of experimental designs is that it provides the opportunity to identify cause-and-effect relationships.

The research design refers to the overall strategy that we choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring we will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data. Note that our research problem determines the type of design we should use, not the other way around.

Research designs are either experimental or non-experimental. Experimental research is conducted mostly in laboratories in the context of basic research. The principle advantage of experimental designs is that it provides the opportunity to identify cause-and-effect relationships. Non-experimental research, e.g., case studies, surveys, correlation studies, is non-manipulative observational research usually conducted in natural settings. While laboratory-controlled experimental studies tend to be higher in internal validity, non-experimental studies tend to be higher in external validity.

Before examining types of research designs it is important to be clear about the role and purpose of research design. We need to understand what research design is and what it is not. We need to know where design ®ts into the whole research process from framing a question to ®nally analysing and reporting data.

Research implications are the consequences of research findings. They go beyond results and explore your research's ramifications. Researchers can connect their research to the real-world impact by identifying the implications. These can inform further research, shape policy, or spark new solutions to old problems.

Research implications suggest how the findings may be important for policy, practice, theory, and subsequent research. Research implications are basically the conclusions that draw from results and explain how the findings may be important for policy, practice, or theory.

There are four main types of Quantitative research: Descriptive, Correlational, Causal-Comparative/Quasi-Experimental, and Experimental Research. attempts to establish cause- effect relationships among the variables. These types of design are very similar to true experiments, but with some key differences.

**Types of Research Design**: It is to be [science and technology](https://leverageedu.com/blog/best-science-and-tech-courses-globally/), art and culture, media studies, [geography](https://leverageedu.com/blog/branches-of-geography/), [mathematics](https://leverageedu.com/blog/mathematics-movies/), and other subjects, research has always been the route towards finding the unknown. In the circumstances when Coronavirus shattered the world, a vast amount of research was being carried out to find [vaccines](https://leverageedu.com/blog/international-students-in-uk-to-get-covid-19-vaccine/) for its treatment. In this blog, we will understand what are the various types of research design and their related components.

In descriptive Research Design, the scholar explains/describes the situation or case in depth in their research materials. This type of research design is purely on a theoretical basis where the individual collects data, analyses, prepares and then presents it in an understandable manner. It is the most generalised form of research design. To explore one or more variables, a descriptive design might employ a wide range of research approaches.

Unlike in experimental research, the researcher does not control or change any of the variables in a descriptive research design; instead, he or she just observes and measures them.  In other words, while qualitative research may also be utilised for descriptive reasons, a descriptive method of research design is typically regarded as a sort of quantitative research.

To guarantee that the results are legitimate and dependable, the study design should be properly constructed. A correlational research design looks into correlations between variables without allowing the researcher to control or manipulate any of them. Correlational studies reveal the magnitude and/or direction of a link between two (or more) variables. Correlational studies or correlational study designs might have either a positive, negative or zero.

Diagnostic research design is a type of research design that tries to investigate the underlying cause of a certain condition or phenomenon. It can assist in learning more about the elements that contribute to certain difficulties or challenges that clients may be experiencing.

Explanatory research is a method established to explore phenomena that have not before been researched or adequately explained. Its primary goal is to notify us about where we may get a modest bit of information.

With this strategy, the researcher obtains a broad notion and uses research as a tool to direct them more quickly to concerns that may be addressed in the future. Its purpose is to discover the why and what of a subject under investigation. In short, it is a type of research design that is responsible for finding the why of the events through the establishment of cause-effect relationships.

Keeping its dynamics into consideration, the research design is categorised into two different perspectives, i.e. Quantitative Research Design and Qualitative [Research Design](https://leverageedu.com/blog/research-design/). Further, there are four main characteristics of research design which include Reliability, Neutrality, Validity as well as Generalization. Further, a researcher should have a clear understanding of how their project can be implemented in the research design.