Chapter 1
Introduction

1.1 Background of the Study

The fast changing scene of liberalization, competition and globalization combined with an emphasis on quality, timeliness, innovation, customer orientation and efficiency puts a demand on accurate, super-fast and timely dissemination of information across the globe. The unprecedented developments in computing and communication technologies have indeed made such demands translatable into realizable goals. The technological developments in the areas of ICT and e-learning has provided with the opportunity to play in wider geographical locations with ‘resource-sharing’ infrastructure through cluster development by way of ‘economic-group’ formation. Such strategic arrangements prove cost-effective and operationally efficient, particularly in distance education systems.

The traditional university-colleges administration being run with 20th century tools will have to give way to modern management techniques with qualified, professionally trained and pro-active administrators suited for the 21st century requirements of e-governance. The new higher education management system has to be a modern system of governance integrating e-administration, e-education and e-resources leading to good governance of higher education as a transparent, time and money efficient, productivity-oriented system. Such a system should be taken up for implementation in the higher education institutions, which may be more economically managed through ‘cluster institutions’ as suggested in the 12th FYP. Such a system
may be envisioned as a layer above the concept of office automation/computerization and will have to function on an open source package through inter-campus networking. This will provide a smooth flow of information, commands, requests and reporting between the ‘central administration’ and the ‘students, staff and public’. And this would not only enhance the speed and quality of internal functioning of the cluster but would also provide a "user-friendly access" to outsiders across the world. A measurable outcome of this exercise would be a substantial reduction in the use and movement of paper as well as reduced need for movement of people searching for information, leading to reduced delays and cost savings. In addition, the new management system would encompass e-education portal with e-resource backbone through the National Knowledge Network (NKN) as an end to end solution for the higher education delivery and management system.

The Indian higher education system is at present witnessing some phenomenon correlated eventualities - the challenge of global competition from foreign universities and institutions, the changing trends in the government’s higher education policies, higher enrolment of students resulting from increasing population, the increasing workload in office, the acute shortage of effective man-power, infrastructure deficiencies particularly in rural and semi-urban areas, and the raised expectations of the public to get better service rendered through extensive use of information technologies that result from the technological developments in the areas of ICT, e-learning, networking and database management. To deal with these challenges, innovative strategies are needed to be taken that aim optimum utilization of resources through ‘resource-sharing’ of infrastructure, institutional cluster formations and rendering of value-added, cost-effective and operationally efficient educational support services over wide geographical locations. Such innovative strategies need the
support of effective IT-tools and the management information system to generate accurate, prompt and detailed financial data as a mean of institutional control.

1.2 Review of Literature

1.2.1 Management Information System (M.I.S.)

M.I.S. begins where computer science ends (Lee, 1999). One dimension of MIS, therefore, is that it involves not just information technology, but also its instantiation. There are the rich organizational and political processes whereby a given set of information technology is instantiated and there are the rich organizational and political processes pertaining to the continual managing, maintaining, and changing of the information technology so as to sustain the instantiation. Mintzberg (1978), refers to another commonly accepted dimension of MIS as 'either enhancing existing theory or building new theory regarding the management of information systems in organizations'. A significant element in his characterization is that (unlike computer science) MIS involves the information system and the organization. Allen S. Lee, in his article "Researching MIS" (1999) added further that an information system and its organizational context, each have transformational effects on the other. The reactive process is what leads some MIS researchers to describe MIS phenomena as 'emergent' (Kleist & Williams, 2003). Interestingly, it can be observed that the same information system can be a success in one organization but a failure in another, while the same organization can experience success with one information system but failure with another. Hence, the information system and the organization context must be studied and understood in light with the socio-economic environment to define the strategic information needs and its generation through MIS.
At multi-level organizations, an integrated MIS can generate benefits to individuals working within each area (Kirsch, Goodhue & Wybo, 2003). Program administrators can merge trend data on client contact hours with program expenditures in order to produce better budget estimates. MIS technology also can support evidence-based practice. For example, if the appropriate data are recorded, it may be possible to identify the most efficacious type of services for particular type of clients. MIS technology can assist in monitoring the effect of program-level factors on client outcomes (Kazar & Kornfeld, 1989). These data are most likely to be collected when the MIS is designed to serve as an administrative, service delivery, and evaluation tool.

1.2.2 Information Systems Strategy

Kettinger (1996), in his systems thinking approach, defines a system as “a set of elements or components that work together in relationship for the overall good and objective (or vision) of the whole”. He used three important phrases in his definition: working together, in relationship and vision of the whole. Working together is a collective effort on top of individual and professional effort put together to achieve the desired outcome. The function of information systems strategy is further described by Murdick (1996) as that which brings together the business aims of the company, an understanding of the information needed to support those aims, and the implementation of computer systems to provide that information. It is a plan for the development of systems towards some future vision of the role of information systems in the organization. This definition is qualified by Kettinger & Oth. (1996) who argues that an IS strategy is something which is essentially a planning process in the minds of the decision makers, users and developers of the systems. It is supported with written reports and plans, but they are of secondary importance.
The conceptual framework used for the definition of the components of an information strategy and the relationship between them will be taken from Grover & Galliers (1992). This approach takes a holistic, socio-technical stance, rather than the traditional mechanistic approach which places most emphasis on the information technology aspect of the information system. They state that the IS strategy has four distinct components: the information strategy, the information technology strategy, the information management strategy and the implementation strategy.

The information strategy acts as the linchpin between the academic strategy and the IS strategy. It answers the questions: what information is required? And where is the information required to support the primary tasks, or key goals, of the academic strategy. It also questions the appropriateness of the critical assumptions behind the academic strategy in the light of the changing environment and changing perceptions. This assessment and review process is one of the core concepts behind this model. Thus, for Grover (1992), strategy should have both deterministic and emergent elements.

The information technology strategy is, for Grover, of secondary importance; it is concerned with applications and platforms, the 'nuts and bolts' of how to provide the information. Thus, it is concerned with the technological infrastructure necessary to fulfill the requirements of the information strategy. The information management strategy is concerned with how the information services are organized for the different facets of the institution (i.e., centralized, distributed, out-sourced) and policy issues such as who gets access and what level of access they receive. The implementation strategy will identify what organizational change will be needed for the information systems strategy to be successful and when it will be implemented and by whom.
Importantly, those who will implement the strategy should be involved in its formulation, and specific plans and budgets should be drawn into the process. In the course of the research the following issues have been raised:

- Is there a relationship between the content of an information strategy and how it is conceptualized? What is an IS strategy perceived to be? Can the information strategy be viewed as a linchpin between the 'academic' strategy and IS strategy?
- How does organizational culture affect the process of ISS formulation. Organizational culture has been classified by a number of researchers, the most influential of whom in the information systems field has been Mintzberg (1978), whose model has been used later by Premkumar & Oth. (1994).
- Is there any noticeable relationship between the power position of those who initiated the IS strategy formulation process and its perceived success? This is seen as perhaps the core research question, as ISS formulation is seen as primarily a political process: thus, Earl (1993) states, "information systems increasingly alter relationships, patterns of communication and perceived influence, authority and control".

The thought ignited further initiative to analyze the groups or coalitions who participated in the formulation of the strategy within the institution. The attempt to address this point as made by Daft (1984) is "...as long as IS strategies are being driven solely by Directors of Computer Centres and Librarians, they will remain marginal to the concerns of the majority in the University and will be seen as little more than special pleading". The IS Strategy for educational institutions, therefore should be aligned with the laws of the state and should have a relationship with the technology that finds its applicability and acceptability.
1.2.3 Frameworks of Research to Analyze ‘Information Systems’

A number of frameworks have been used in the analysis of information systems research, like that of Blanton, Watson & Moody (1992), Burrell & Morgan (1979) and Wood-Harper (1984). These researchers observed four paradigms that can be identified, which Burrell and Morgan label as, functionalism, radical humanism, radical structuralism, and interpretative. These paradigms, they argue, can be analyzed on four dimensions: ontology, human nature, epistemology and methodology. Without doubt, the two dominant paradigms in the field are the Interpretative and the Functionalist. Grover & Simon (1992) and Orlikowski (1992) pointed out that the early work assumed technology to be an objective external force that would have relatively deterministic impacts on organizational properties such as structure. In contrast, a later group of researchers focused on the human action aspect of the technology seeing it more as a product of shared interpretations or interventions. The third and more recent work on technology has reverted to a 'soft' determinism where technology is posited as an external force having impacts but where the impacts are moderated by human actors and organizational contexts. Flores (1988), among others, have advanced the view that there is a new body of research developing in the field which takes a more pragmatic stance. This research has integrated concepts across paradigmatic boundaries.

1.2.4 Educational Management System

Akscyn, McCracken & Oth. (1988) stated that the purpose of educational management is to enable the right pupils to receive the right education from the right teachers, at a cost within the means of the state, which will enable pupils to profit by their learning. Several countries in the world have launched specific programs for connecting their institutes on national/international ‘Wide Area Networks’ so as to form an Intranet of
their institutes. Countries worldwide have followed n-tier architecture principle for connecting computers installed in the classrooms to the national/international ‘Wide Area Networks’. Local area network of the institutes is generally connected to the Central Data Centre and further to Internet. The entire architecture is distributed. Institutes are connected to Main Central Data Centre, Zonal Centre and Remote Centre. The Central Data Centre keeps a repository of learning material, learning management system and authoring education tools.

1.2.5 Knowledge Management

During the last two decades, knowledge management has often been associated with computers and information systems. Indeed, during the first generation of knowledge management, many initiatives focused on finding a suitable software package that could be used to make knowledge management happen. The implicit idea in the computer-oriented initiatives was that the core problem with knowledge management was in storing and sharing of knowledge.

Michie (1983), one of the thought leaders of the knowledge-based systems movement proposed a computer-based “knowledge refinery” that was intended for codifying and synthesizing knowledge from multiple sources. The application of artificial intelligence in this area was also visualized. The focus in artificial intelligence research in the 1970s and 1980s was on automated processing of knowledge. The increasing capability to store information, however, also made possible new forms of document and database management systems. One of the most popular ideas in the 1980s was hypertext. For example, Akscyn (1988) and his colleagues (Akscyn, McCracken, & Yoder, 1988) developed a “Knowledge Management System,” also known as KMS, an interactive and collaborative hypermedia system, which become a
key inspiration for the World Wide Web. The KMS was a commercial version of an earlier hypertext system, ZOG, developed at the Carnegie-Mellon University since 1972. KMS was used, for example, to manage the large amounts of manuals at aircraft carriers. Research on software architectures that could effectively support complex organizational decision-making also led to various attempts to build large corporate-wide information repositories. The hope was that eventually such repositories could contain all the data that was needed for rational and fact-based management.

In the early 1970s, research on artificial intelligence to a large extent had rejected its original goal of finding generic and universal rules that produced intelligence. After some early successes in the 1950s and 1960s, researchers became convinced that intelligence required domain specific knowledge. This, in turn, required new approaches in representing knowledge in forms that could be processed by a computer. As a result, in the 1970s the focus in AI research moved to systems that followed a relatively simple logic but which had detailed knowledge of their domain of application (Tushman, 1978). In the 1980s, the increasing processing power and some widely published success stories has resulted in extensive interest in expert systems and knowledge-based technology. The idea that human expertise could be represented in a computer system and made available whenever and wherever needed became a commonplace truth. Expert systems were marketed as solutions to alleviate the problems of organizational downsizing, retirement of experts, and loss of critical competencies.

More modest systems appeared commercially as executive information systems, or EIS (Rainer, Watson & Koh, 1991). The underlying database structures were to allow
rapid analysis of different decision scenarios, requiring multidimensional databases and tools for interactive online analytical processing. The implicit assumption in EIS research was a somewhat traditional hierarchical information-processing model: the important information processing tasks were supposed to happen at the top of the organization. Towards the end of the 1980s, some researchers started to emphasize the communicative and collaborative possibilities of information systems. In part this was related to the increasing visibility of computer networks. Various alternative models to describe and implement organizational workflows and communication processes were developed, gradually leading to broader concepts of computer supported collaborative work, computer-mediated communication, groupware, and collaboration systems (Kittenberg, 1996).

Whereas information systems and computers were often perceived as the core substance of early knowledge management initiatives, early, it was also noted that organizations had managed their knowledge already for a long time. For example, corporate information services and libraries had employed people who were professionals in categorizing, searching, and distributing knowledge. The increasing competitive pressures had in particular increased the importance of competitive analysis. As a result, large corporations had set up competitive intelligence units, often closely associated with company information and library services. The focus in competitive intelligence was on strategic analysis of external information related to market trends and competitors (Murdick, & Oth., 1996; Porter, 1980). Whereas the information processing experts often approached organizational knowledge as a technical problem that could be solved by appropriate use of computers, the problem for competitive intelligence people was in finding, understanding, synthesizing, and disseminating relevant information. At first, this intellectual work was assigned to
back-office specialists. Their work was greatly facilitated in the early 1990’s when online access to external databases and news services became widely available. Suddenly, it was possible to know in real time everything that competitors and customers were doing, anywhere around the world. For a while, the dream of perfect information had become true. Soon, however, it was discovered that perfect information leads to information overload. As a result, systems that could categorize information based on user needs were actively studied.

Researchers tried to develop domain specific ontologisms and conceptual models that could be used as the basis for categorizing information and organizational messages. Although the motivation for developing conceptual models and categorization tools was to improve human information processing instead of automatic processing, information technology obviously played an important role also here. For example, at MIT, Tom Malone and his colleagues developed an “information lens” that was supposed to filter and prioritize documents and messages relevant to the user (Tushman, 1978), and argued that a new “science of coordination” was about to emerge. Whereas the original focus on competitive intelligence was on top management strategic decision-making, the expanding computer networks made it obvious that organizational intelligence exists also outside executive offices and boardrooms. Indeed, in a rapidly changing competitive environment the most valuable knowledge was often distributed among the members of the organization. Moreover, top management often didn’t know who had the critical knowledge. This, again, led to an emphasis of the communicative aspects of organizational information processing. As a result, the back-office competitive intelligence analysts started to redefine themselves as business intelligence professionals. Instead of decision-making based on pre-analyzed reports and data, knowledge sharing became the central issue for
business intelligence people. Instead of information objects, organizational knowledge
was now in information flows.

This observation also highlighted a contrast between two views on organizational
knowledge. According to the mainstream information processing view, knowledge
was data and facts that were independent of people and their interpretations. This
implicit assumption made it natural to think that knowledge can be stored in
computers. Business intelligence systems, however, started to evolve toward
heterogeneous systems comprised of networked humans and machines. Information
objects were viewed as enablers of organizational knowledge processes. As such, they
perhaps facilitated organizational knowing. The critical question, however, was how
the organizational knowledge flows should be organized so that the organization
remained well informed. Relevance, a concept that conventionally remained beyond
the limits for traditional information processing, became a key issue for business
intelligence professionals.

Technology, however, pushed itself strongly to the center of organizational spotlights,
creating what one might call a temporary backlash in business intelligence. As the
World Wide Web exploded in the public consciousness around 1994, Tim Berners-
Lee’s original vision of the Web was rediscovered again and again: when all
documents would be on the Web and every document would be linked to every other
possible document, the world could become a better place. Knowledge would be free,
and available when needed. Business intelligence professionals naturally had some
reservations concerning this idea. They had learned, for example, that sometimes it
was useful to keep information secret. Another lesson was that to be useful,
information had to be “actionable.” Even the best analysis was of no value if it
remained on the analyst’s shelf or if the management was not able to do anything with the information it contained (Flores, 1988; Fuld, 1996). Indeed, the early enthusiasm with the Web often quickly disappeared into those mysterious black holes of cyberspace where time seemed to stop and ancient organizational history still was the ongoing reality.

The World Wide Web didn’t have any effective means to manage access rights or content and it didn’t have any support for making information actionable. In one sense it did, however, continue a tradition that had contested the mainstream artificial intelligence since early 1960’s. Whereas Herbert Simon and the other pioneers of AI believed that the future of computers was in intelligent processing of information, Douglas Engelbart argued that computers were a new medium that could augment human though processes. Engelbart’s Augmentation Research Center at Stanford Research Institute became one of the hot spots of innovation in computer technology, leading development in interactive computing, graphical user interfaces, and collaboration systems. The World Wide Web took this augmentation system concept to its ultimate logical end: it reduced the problem of knowledge representation to minimum by assuming that all knowledge can be represented as documents and associations between them. And the software of the World Wide Web didn’t have any intelligence whatsoever. It left all the theoretical and practical problems of thinking and sense-making to its users.

1.2.6 Indian Educational System Reforms

Higher education in India is passing through a phase of unprecedented expansion, marked by an explosion in the volume of students, a substantial expansion in the number of institutions and a quantum jump in the level of public funding. Indian
higher education is based on two landmark reports namely the University Education Commission (1948-49) (*Radhakrishnan Commission*) and the Education Commission (1964-66) (*Kothari Inclusive and Qualitative Expansion of Higher Education Commission*). The National Policy on Education (NPE) in 1986 formulated certain major goals: greater access, equal access (or equity), quality and excellence, and relevance and promotion of social values.

The 11th FYP laid a good deal of emphasis on the reforms agenda in higher education. Guided by the recommendations of the National Knowledge Commission, and later as suggested by the *Yashpal Committee*, it prescribed a series of measures for reforming the higher education system. Some of the key focus in this regard has been the reforms in the regulatory system in higher education. Aimed at reviewing the regulatory mechanism for higher education at the national as well as state level, the major initiative was to address the issue of multiplicity of regulatory bodies and thereby making higher education better governed and regulated. Driven by that consideration, the following five legislative proposals have been developed.

- The Educational Tribunals Bill, 2010;
- The Foreign Educational Institutions (Regulation Entry and Operations) Bill, 2010; The National Accreditation Regulatory Authority for Higher Educational Institutions Bill, 2010;
- The Prohibition of Unfair Practices in Technical Educational Institutions, Medical Educational Institutions and Universities Bill, 2010;

According to the seven goals and issues identified under the XI Plan, the University Grants Commission took up the issue of “Reforms relating to the affiliating system”, in view of the nation-wide consensus that the affiliating system of colleges with
universities in India has become a major burden, impacting significantly on the quality and innovation outputs of the university system. A twelve-member Expert committee was constituted by UGC on August, 2008 under the chairmanship of Prof. S.P.Thyagarajan. The terms of reference for the Committee were: (a) to administratively streamline the existing affiliating system by bringing in ‘good governance’ and accountability-linked autonomy; (b) to design “innovative alternate models” to the present system of affiliation of colleges which may ultimately lead to perceptible changes in the character and quality of the higher education system of the country and (c) to explore the possibilities of different models of reducing the load of colleges from the present affiliating universities, along with financial sustenance, so as to synchronously promote access, equity and quality in the Indian higher education system. Some others relevant documents for study in the subject include:

- Report of the Committee to Advise on Renovation and Rejuvenation of Higher Education, 2008
- Report of NSS 61st and 64th Rounds, 2007-08
- Higher Education in India, UGC, 2008
- Annual Report of the UGC, 2009-10
- Approach to the 12th FYP - Policy Document of the Planning Commission, Government of India
• *Proceedings of the Conference of the Vice-Chancellors of Central and State Universities, 2011*

• *Report of the UGC Committee to Review the Existing Schemes for Enhancing Participation of the Scheduled Castes (SCs) in Higher Education, 2011*

• *Report of the UGC Committee to Review the Existing Schemes for Enhancing the Participation of the Scheduled Tribes (STs) in Higher Education, 2011*

• *Report of the UGC committee to Review the Existing Schemes for Enhancing the Participation of Minorities in Higher education, 2011.*

The All India Higher Education Survey, which has been recently launched by the MHRD, is expected to develop the M.I.S. that will facilitate outcome-based assistance, better monitoring and implementation of the Plan proposals, besides linking the UGC to the Universities and Colleges through the web-based software.

1.3 Research Gap

1.3.1 Choice of Information Technology for University Affiliated Indian Colleges

A look in the available literatures viewed so far reveal that the development of management information systems in educational institutions has already matured in many parts of the world, and also that in the premier institutions of India like IIT, ISI, etc. However, the premier Indian institutions run mainly as departmental institutions rather than affiliating organizations. It is felt necessary to review the scenario of the application of information technology in the business of the affiliating Indian Colleges under Universities, considering the ground realities of the socio-economic conditions of the Indian States. It must be noted that the affiliating colleges under universities serve more that 89% of the student force (*MHRD Reports, 2013*) and
therefore the modernization of such structures have far reaching impact in the development of the State.

To review the scenario, firstly, it is needed to review the present and futuristic organizational and management system of the higher education institutes (Indian Colleges under different categories situated in urban and semi-urban areas). Secondly, it is needed to review the technological developments in information systems, and then to look for the technologies that suit the grass-root level Indian Colleges in the best possible way, considering its easy availability and access in the Indian context. The choice of information systems applicable in Indian context and the formulation of strategy for its implementation may be the final outcome of the research.

1.3.2 Refining the Dimension of M.I.S. in Indian Context

The survey of the existing literatures on M.I.S. reveals that M.I.S., so far, outlined four interrelated dimensions:

(i) M.I.S. involves not just information technology, but also its instantiation;
(ii) M.I.S. involves, as reactive and inextricable elements, both an information system and its organizational context;
(iii) M.I.S. involves information technology as a form of intellectual technology;
(iv) M.I.S. involves the activities of a profession or corporate function which are integral to the essence of what 'M.I.S.' is.

In the course of the literature review, the following questions were explored:

- Can the information strategy be viewed as a linchpin between the 'academic' strategy and IS strategy?
• What role does the information strategy play in the formulation of the information systems strategy?
• How does organizational culture affect the process of ISS formulation?
• Is there any noticeable relationship between the power position of those who initiated the IS strategy formulation process and its perceived success?

Though some general observations and opinions in the global context are available from the literature review, specific answer in the Indian context needs further exploration. In common sense, the IS Strategy for educational institutions should be aligned with the laws of the state and should have a relationship with the technology that finds its applicability and acceptability. The dimension of M.I.S. needed further review through a research to be refined to include transaction processing system at the core and cluster-driven central monitoring system at the front-end to fit best in the Indian context.

1.4 Objectives of the Study
The research work primarily intends to review the Management Information System of some selected under-graduate Colleges in West Bengal, and to redesign, for the cluster-interlinked educational institutions, an appropriate ‘Logical Model of M.I.S.’ that support a user-friendly uniform mechanized office maintenance system in active operation, keeping in view the present and future scenario of organizational and management system of the institutions that comply the government’s higher education policies. The study also examines the scope of automation of some routine administrative functions, through logical analysis and design of the Management Information System.
For this purpose, the study specifically aims at:

a) Identifying the areas of activities in office where Mechanized Office Management & Information System can be implemented; [chapter 4]

b) Looking into the feasibility of integration of information between departments; [chapter 4]

c) Determining the type of reports needed by each department; [chapter 5]

d) Identifying problems and bottlenecks that exist in the current system; [chapter 2]

e) Finding out the feasibility of introducing MIS through computerization as the solution. [chapter 3, 4, & 5 - sections 3.2, 3.4, 4.0, 4.3, 5.1, 5.2].

The research work aims to study the nature of the organizational and management system of colleges in West Bengal in general and review the case of automation of some of the routine administrative functions through logical analysis of management information system of educational institutions. Such a study may be viewed as an ingredient for the development of an integrated inter-organizational office communication system that help to increase organizational integration, improve organizational communication, provide timely reporting, improve the quality of service to the public at large, reduce expenses and increase profitability. It also aims to review the scenario of the application of information technology in the business of affiliating Indian Colleges through system analysis of the management information systems of some selected institutions in West Bengal. The design of a ‘Logical Model of Management Information System’ for cluster- interlinked educational institutions is the ultimate outcome of the research. Such a model is considered helpful for easy access and exchange of valuable information and data amongst the colleges and institutions, thus helping the institutions and the colleges in the cluster to operate
economically in wider areas and with better technological and operational effectiveness. Such an attempt of a logical design of a M I S that support user-friendly *Uniform Mechanized Office Maintenance System*, keeping in view the organizational and management system of the institutions in West Bengal, may thus be considered as a step to think of the development of an ‘Educational Sector ERP’.

### 1.5 Research Methodology

The proposed work is intended to review the current management environment of higher education system and the technological aspects of transaction processing based ‘Management Information System’ that substitutes the manual procedures to computer-based processing and dealing with well structured routine processes in higher education system. The present study is an *exploratory research based on interpretive case study*, following the ‘*Waterfall Model*’ of research on system analysis and design. *Yourdon methodology* of structured techniques is used in some places for documentation of the functions performed by the system (through Data Flow Diagrams and Entity-Relationship Diagrams). The methodology thus followed a data oriented approach where the focus is on system output, which is first defined and then analyzed backward to define all the inputs and the processes required to transform them.

Though the primary objective of the research work is to develop a MIS Model suitable for affiliated under-graduate colleges in ‘University-Colleges’ cluster, various other categories of institutions are also covered in the review for systems analysis. The justification for making such wider coverage is to explore the various work schedules and work processes of different types of institutes and to amalgamate their
best practices, that they adopt to meet their strategic needs. The exploration of multi-leveled work processes of the various types of institutions found usefulness in developing a futuristic MIS Model suitable for multi-location based cluster of educational institutions under the organizational model of ‘University-Affiliated Colleges’ cluster. For selecting only eight institutes from amongst 857 colleges and 236 stand-alone institutes in West Bengal\(^1\), *purposive sampling method* is adopted, as the study is intended to review only the workflow of operations that take place in these institutions (which follow basically more or less the same entities relationships and the same rules and regulations), rather than reviewing their operating performance through statistical figures (*details in Annexure 9*). The institutions visited for *on-site observation of systems workflow* include:

(i) **Government sponsored/ aided Colleges**

   *Sree Chaitanya Mahavidyalaya, Habra (semi-urban based affiliated college)*
   *Krishnanagar Government College, Krishnanagar (urban based government college)*
   *Baruipur College, South 24 Parganas (semi-urban based affiliated college)*

(ii) **Autonomous College with multi-disciplinary curriculum**

   *St. Xavier’s College, Kolkata (urban based autonomous college)*

(iii) **Multi-campus based University with affiliating colleges under its control**

   *Calcutta University*

(iv) **Multi location based Open University**

   *IGNOU Eastern Regional Office*

(v) **Technology Institute offering on-line lectures & e-learning modules**

   *IIT Educational Technology Dept., Kharagpur & Kolkata campus*

(vi) **Research based Institute**

   *Indian Statistical Institute, Kolkata campus.*

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\(^1\) *Annual Status of Higher Education in States and UTs 2013, MHRD(GOI)*
The first stage of the work include the review of legislative and administrative manuals of MHRD, UGC and others to have an understanding of the futuristic higher education system of India, and of West Bengal in particular. Technological developments in the field of educational management, networking, database systems and enterprise resources planning are reviewed through secondary information sources. A *systems analysis* is then undertaken to review the current system of management and management information system (MIS) of selected colleges and institutions in West Bengal through field survey which spanned for five years. In this phase of the study, the following aspects are examined:

- Review of the system of management
- Requirement Analysis & Requirement Specification
- Work Processes and Modules specifications
- Feasibility Analysis of mechanization of work processes

At this stage, some tools and techniques used in the analysis are Data Flow Diagrams, Hierarchical Input-Process-Output Analysis, State Diagrams, E-R Diagrams, interviews and on-site observations through unstructured questionnaires.

In the second stage, a futuristic Logical Model of Management Information System suitable for cluster-interlinked educational institutions is conceptualized, that generates through *systems design* of the *uniform mechanized office maintenance system*, considering the scenario of organizational and management system of the institutions that comply the government’s higher education policies. At this stage, the areas of mechanization, reports and other output requirements, and the input data profiles as identified in systems analysis by way of normalized distributed database design, are reviewed. The detailed designs are documented by way of Data Flow Diagrams, IPO Charts, Program Flow-Charts, and the like.
The methodology as followed is pictorially presented in Fig. 1.1 as below.

**Figure 1.1**: Methodology followed in the Research
1.6 Chapter Planning

The research work involves an elaborate literature review which address the academic studies on inter-disciplinary subjects, such as, educational systems and organization structure, ICT in educational management, cluster organizational system of educational institutes, future education system, distance educational system and the technical studies on the developments in information technology and the MIS development process. The discussion chapters and the findings outline and summarize the research findings and compare them to the research objectives. Finally an observation is made on the feasibility of a M.I.S. Model that work good in educational institutions of present and of future, particularly in the state of West Bengal, India. The limitation of the present research work is highlighted and the possible areas for further research on the subject, is also explored at the end.

Keeping in view the objectives of the study, the whole research work has been divided into the following chapters.

Chapter 1: Introduction
(to cover the background of the study, review of literature, research gap, objectives of the study, research methodology and chapter planning).

Chapter 2: Organizational & Management System of Higher Education Institutes of India
(to examine the government policies on Indian higher education system and enumerate the required features to be incorporated in the MIS Model).

Chapter 3: Technological Developments in Information Systems Relevant to Management of University-Colleges Cluster
(to explore the available and affordable IT Tools & Techniques to make the MIS Model feasible).
Chapter 4: System Analysis & Design of Uniform Mechanized Office Administration System of Colleges - a Case Study of Select Under-Graduate Colleges in West Bengal

(to review the scenario of the application of information technology in the business of affiliating Indian Colleges through system analysis of the management information systems of some selected institutions in West Bengal; and present the systems design of the suitable uniform mechanized office management system that cover the modular transaction workflows of the MIS-model).

Chapter 5: Logical Model of Management Information System for Cluster based Educational Institutions

(to cover the findings of the research work which describe the M.I.S. Model).

Chapter 6: Conclusion and Recommendations

(including the limitations of the study and scope for further research on the subject).