In order to meet the challenges of cut-throat competitiveness, manufacturing organizations are fronting the complications of choosing the correct manufacturing strategy in different phases of the production system life (PSLC). The selection decisions in different stages of PSLC are more complex as the managers has to evaluate a wide variety of decision alternatives on the basis of different contradictory attributes. Though, in the past few decades, decision making in certain phases of PSLC have been explored by the various authors but it is not widespread in all the phases of production system life cycle. Secondly, gap always exists in theoretical research and expectations of the managers or decision makers. Effective decision making in different stages or activities of production system life cycle has motivated the researchers to pursue research in suggesting the best method or approach for the selection of best decision alternative.

9.1 SUMMARY OF WORK DONE

This section presents the work done towards achieving the research objective. The main work done in the present research work is as follows:

- An extensive literature analysis was conducted to recognize the gaps, limitations of existing production system life cycle models and relevant quality enabled factors (QEFs) in different stages of production system life cycle (PSLC).

- Based on literature and consultations with experts (academic & industrial), a questionnaire was formulated to obtain responses from the manufacturing organizations. Responses from the manufacturing organizations were utilized for the validation of QEFs of different stages of PSLC. The survey responses facilitated to comprehend the trend of Indian manufacturing organizations towards utilization of these QEFs in decision making process.
• The issues covered in questionnaire include the quality enabled factors in different stages of production system life cycle.

• The mutual relationship among the various identified quality enabled factors for different stages of PSLC were analyzed by using the ISM approach.

• The quality enabled factors of PSLC were prioritized by using AHP approach to know their impact in PSLC decisions.

• The graph theoretic approach (GTA) was applied for the quantification of quality enabled factors of PSLC.

• Production system life cycle – decision quality index (PSLC-DQI) has been proposed by graph theoretic approach.

• A generalized methodology for the selection of best decision alternative in different stages of PSLC has been suggested.

9.2 MAJOR CONTRIBUTION OF RESEARCH

The major contributions made through the present research work are as follows:

• The present research work provides a comprehensive review of literature on the production system life cycle models. Moreover, it also articulates the distinctive features and limitation of each model of PSLC.

• A model for the production system life cycle has been suggested specifically for the manufacturing organizations.

• The different stages of production system life cycle have been particularized in detail to know the different facets of the production system.

• The key activities involved in each stage of production system life cycle have been recognized along with the department involved in performing these key activities.

• A brief overview of barriers involved in the effective decision making in different stages of production system life cycle has been presented.

• Various quality enabled factors in different stages of production system life cycle has been identified and deliberated in detail.
• The quality enabled factors of different stages of PSLC has been analyzed and modelled to comprehend their effectiveness in the particular stage of PSLC so that these factors can be effectively utilized for better decision making.

• The levels of different quality enabled factors for each stage of production system life cycle have been found by using the ISM approach.

• The quality enabled factors for different stages of PSLC have been categorized into different groups on the basis of their driving power and dependence power.

• The quality enabled factors for different stages of PSLC have been prioritized to enumerate their impact in the PSLC decisions.

• A unique comprehensive model based on AHP approach has been developed for the critical evaluation of impact of identified QEFs in decisions made in the different stages of PSLC.

• Production system life cycle decision quality index (PSLCI) has been computed to know the quality of decisions made in the PSLC. It provides an opportunity to upsurge the quality of decisions in different stages of production system life cycle.

• A generalized methodology for the selection of best decision alternative in the different stages of production system life cycle has been proposed.

9.3 IMPLICATIONS OF RESEARCH

The present research work has implication both for academicians as well as for the managers/decision makers.

9.3.1 Implications for Academicians

Some significant implications for academicians have appeared from the present research. Identified literature gaps in area of PSLC will be helpful to researchers in performing their future research. The questionnaire used for the validation of QEFs can be used as a significant tool for performing the research studies in area of PSLC. Graph theoretic approach may encourage the researchers to develop the framework
for understanding the quality of decisions. AHP approach can help the researchers to know the impact of different QEFs in the PSLC decisions. ISM methodology can assist in understanding the contextual relationship among the QEFs of different stages of PSLC.

9.3.2 Implications for Managers/Decision Makers

Managers or decision makers may drive valuable understandings from the empirical study presented in the current research work. Graph theoretic approach may be utilized by the managers for finding the quality of their decisions in different stages of PSLC. AHP approach may be used by them for prioritizing the different QEFs for their efficient utilization in the decision making process. Managers may also find the application of ISM approach in deriving relationship among the different quality enabled factors.

9.4 LIMITATIONS AND SCOPE FOR FUTURE WORK

Though a lot of efforts have been made in the present work to analyze the quality enabled factors of different stages of production system life cycle but this research is not free from the limitations. The limitations of the present work are as follows:

- The findings of the present work are not corroborated for actual industrial environment.
- The ISM/AHP/GTA based frame-work has been developed on the basis of expert’s opinion and this may result in some biasness.
- The ISM based model is not statistically validated.
- Development of permanent function equation becomes awkward due to combinatorial approach, predominantly when elements are large in number. This necessitates the development of computer software.
- Questionnaire based survey is limited to Indian manufacturing organizations.
- MCDM approaches like GTA or AHP can be used only by decision makers who are knowledgeable about it and are trained to interpret the data.
So, some work may be carried out in future and the present work can be extended in the following directions:

- More number of quality enabled factors can be identified for each stage of production system life cycle.
- Barriers identified in this study may be analyzed by using the GTA/ISM/AHP approach.
- The ISM model developed for different stages of production system life cycle can be statistically tested and validated by using the “Structural Equation Modelling” (SEM) approach.
- A comprehensive global questionnaire based survey can be carried out to know the impact of identified quality enabled factors in the world-wide manufacturing organizations.