

## Chapter 2

# Application of ISM in the Manufacturing Sector

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### ABSTRACT

*This chapter discusses the application of Interpretive Structural Modelling (ISM) in the manufacturing sector. Authors provide a brief about ISM and its usage in the current scenario, and a comprehensive literature review that sheds light on the methodology used over the years in the application of ISM. The chapter assesses the method's advantages and disadvantages. It introduces the technique of ISM in the manufacturing sector, and discusses the applications of ISM in the manufacturing sector along the review of literature.*

### INTRODUCTION

The modern-day industry is evolving at a staggering pace to a time where unparalleled efforts are being put by various organisations by focusing on the manufacturing process alone in order to provide manufactured products and associated services of the highest quality and degree. Demands of the consumer are evolving along with competitiveness of the manufacturing industry, therefore its becoming extremely important for firms to implement advanced manufacturing technologies and techniques to keep pace with the increasing consumer demands and competition. Against this backdrop it is vital that the manufacturing process should be seen in an integrative manner. ISM as a method, can be very useful in this regard as it is very extensively employed as a qualitative tool in supply chain and quality management researches pertaining to the manufacturing sector (Goyal, Samalia, & Verma, 2017; Talib, Rahman, &

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Qureshi, 2011; Kureshi, Qureshi, & Sajid 2010; Dewangan, Agrawal, & Sharma, 2015; Bouzon, Govindan, & Rodriguez, 2015).

It has been generally observed and identified that individuals or a group tend to face many difficulties and bottlenecks while facing complex systems or issues. These issues or complexity majorly arise due to large number of elements and interactions of these elements with each other. The existence of various relations, direct or indirect, among various elements of a system complicates the structure of the same. Since the structure is not clearly defined, it becomes difficult to work with the system. ISM (Interpretive Structural Modelling) is a methodology which helps in identification of a structure within a system (Singh and Kant, 2008; Malone, 1975; Singh, Shankar, Narain, & Agarwal 2003; Thakkar, Deshmukh, Gupta, & Shankar, 2007; Yeravdekar and Behl, 2017).

## **BACKGROUND**

In the approach of ISM, there is a systematic application of various elements of graph theory in such a manner that conceptual, computational and theoretical aspects are fused together so as to explain certain complex pattern of an intricate system of various interlinked variables (Ravi, Shankar, & Tiwari, 2005; Janes, 1988; Singh, Garg, & Deshmukh, 2007; Singh, Shankar, Narain, & Agarwal, 2003). The idea behind the use of ISM stems from the desire to make use of structured and logical thinking in order to tackle a complex problem under consideration. The methodology is deemed as interpretive in the sense because the collective judgement of a group decides the various linkages that exist among the different variables of the system, it is structured on the various mutual relationships that exist among elements which leads to the determination of the holistic and the overall structure on the basis of all the elements that exists in the system (Bolaños, Fontela, Nenclares, & Pastor, 2005; Faisal, 2010; Warfield and Staley, 1996; Dubey and Ali, 2014). ISM as a modelling technique intends to determine and impose an order and direction on the relationships of various elements of the system. ISM is majorly a group exercise but can be used individually as well (Mangle, Phillips, Pitts, & Laver-Bradbury, 2014); Azevedo, Carvalho, & Cruz-Machado, 2013).

## **MAIN FOCUS OF THE CHAPTER**

The chapter details the journey of ISM in the manufacturing sector and its applications in the same. The first and the current section introduces ISM in the manufacturing sector and its approach. The second and the subsequent section elaborates the review of literature and applications of ISM in the manufacturing sector. Lastly, the fourth section concludes the chapter with emphasis on the limitations. ISM is an interactive tool for learning process and active management. It is a well-established methodology for determining, identifying and summarising relationships that exists among various elements, which constitute a complex system and define a particular problem or an issue. ISM helps in ensuring that an order or a structure is formed in a complex system which has various elements that are directly or indirectly related, hence ISM helps in dealing with the complexities involved in a particular system (Yeravdekar and Behl, 2018; Behl et al., 2018). Literature in the past highlighted that ISM has been used to determine competitiveness in the manufacturing sector and also in the implementation of various of manufacturing

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