Chapter 1
Valuation of Flexibility Initiatives: A Conceptual Framework

Sushil

1.1 Introduction

The cause of flexibility has been espoused by numerous researchers who deliberated on the need to have flexibility in modern day organizations. Eppink (1978) dealt strategic flexibility as coping with unforeseen circumstances by reducing the impact of environmental changes on one hand, and increase in response capacity on the other. Over a period of time the concept of flexibility evolved into managing paradox as discussed by Sushil (1997, 2014, 2015a). A specific paradox of managing continuity and change has been developed as flowing stream strategy (Sushil 2012a, b, 2013). Sushil (2014) has outlined various types of flexibilities while deliberating on the concept of a flexible enterprise and its diverse shades are discussed in Sushil (2015b). This has resulted into the framework of flexibility maturity model (Sushil 2012c, 2016a) and the theory of flexible systems management (Sushil 2016b).

Though the literature on various facets of flexibility in organizations is vast, its impact on performance has been highlighted to a limited extent (Sharma et al. 2010). The valuation of flexibility is examined by few researchers and there lies a gap in the form of a generalized framework of valuation of flexibility, which has been addressed in this chapter.

The chapter first gives an overview of flexibility initiatives in organizations with real-life case examples. It then briefly reviews flexibility valuation and proposed a basic model for the same. It illustrates this model in the context of select flexibility initiatives such as variable capacity, multiskilling, and flexi-time/flexi-place. It then

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provides different valuation plans and compares the flexibility initiatives using interpretive ranking process (IRP) and Total Interpretive Structural Modelling (TISM). TISM is used to generate weights of benefits and cost factors in view of their respective driving power.

1.2 An Overview of Flexibility Initiatives

1.2.1 Types of Flexibility

The cornerstones of enterprise flexibility are identified as strategic flexibility, marketing flexibility, financial flexibility, human resource flexibility, manufacturing/supply chain flexibility, and information systems flexibility (Sushil 2014). Some of the flexibility initiatives in each type of flexibility are given below:

Strategic Flexibility

A number of flexibility initiatives have been taken by different organizations at strategic level. Some important ones are: decentralization, multiple product–market combinations, offering solutions, mergers and acquisitions, collaborations and alliances, and so on. These strategic flexibility initiatives use different shades of continuity-change combinations. For example, telecom service providers have decentralized their operations, e-commerce companies have used multiple product–market combinations (old product-new market, new product-old market, and so on), companies like IBM have strategically changed from product-based companies to ones that offer solutions to customers incorporating both products and services.

Marketing Flexibility

Marketing flexibility deals with multiple options and change mechanisms on various elements of the marketing mix. It deals with various types of flexibilities such as product flexibility, pricing flexibility, place or distribution flexibility, and promotion flexibility. For example, dynamic pricing is used by Indian Railways to increase the fare as it comes closer to the last date and time, keeping in view the shortage of capacity. Whereas, recently the national carrier, Air India has moved to provide low rates in last 4 hours keeping in view the vacant capacity on many routes. In case of service industries like banking and tourism, mobile technology is used to provide anytime/anywhere reach.

Financial Flexibility

Flexibility in financial system relates with capital structure flexibility, investment flexibility, and so on. Flexible budgeting is being practiced by public sector undertakings to meet the changing requirements. The most common financial flexibility initiative is in the form of real options to enhance the viability of any project; particularly the R&D investments.

Human Resource Flexibility

Flexibility initiatives at work place that are linked with human resources are *in vogue* in various organizations. Some important ones are compensation flexibility, flexible leave structures, and flexi-time/flexi-place, among others. The flexi-time/flexi-place has been applied in various forms in service organizations such as consulting firms (KPMG, PwC, McKinsey), health, and education involving telemedicine and e-learning. Another major initiative to deal with unpredictable job requirements is to resort to multiskilling, which is very common in software companies like TCS and Infosys.

Manufacturing/Supply Chain Flexibility

Manufacturing and supply chain flexibility initiatives are widely used to cater to the variability and uncertainty of demand. Some important types of flexibility are volume flexibility, routing flexibility, tooling flexibility, material handling flexibility, and so on. An important flexibility initiative taken by manufacturing companies like auto manufacturers (Maruti Suzuki, Tata Motors, Toyota, etc.) is in the form of variable capacity. Another good initiative taken on the supply chain front is by bottlers of beverages like Pepsi for tracking the movement of bottles so as to pin point the source of any deficiency spotted at the point of purchase.

Information Systems Flexibility

Flexibility in information systems is provided in terms of modularity, scalability, mobility, and so on. The integrated systems like ERP follow a modular design. The service industries information systems utilize mobile applications for anytime/anywhere use.

1.2.2 Case Illustrations

Some case illustrations from real-life flexibility initiatives are outlined in this section.

Hero Group

It first entered in a joint venture (JV) with Honda to manufacture bikes in India, which recently got expired, after which it established Hero MotoCorp. It has been regularly introducing new product lines to capture different customer segments and has been able to effectively cope with the changed situation.

Maruti Suzuki

Maruti Suzuki, which started as a JV of Suzuki Corporation and Government of India, is now a subsidiary of Suzuki in India. It has been taking various flexibility initiatives over time. Starting from a small car manufacturer, it has been introducing product variants to suit the requirements of different customer segments. It has also

been upgrading its individual models in a segment to meet changing needs of the customer. It started as an "economy" brand with the concept of a common man's car, which has been extended to "economy with style" with its new models like Dzire.

Tata Motors

Tata Motors has traditionally been a manufacturer of commercial vehicles. Keeping in view the growth in passenger cars demand, it diversified into the passenger vehicles segment with the first indigenously developed car model "Indica". It approached various collaborators and took the design help from Italy and engine technology from France. It then entered to the lowest level segment with "Nano" and also went to higher segment by acquiring "Jaguar" to induct new technology. These strategic initiatives have resulted into exponential growth in its turnover.

Honda

Honda has taken flexibility initiatives globally as well as in India. An early example of introducing flexibility in manufacturing is when Honda was introducing Civic 2001 in the trio of the developed world, i.e., USA, Europe, and Japan. For this, it was supposed to use the same assembly lines that were used for other models. It used robots to replace jigs and fixtures, so that these could be retrained rather than going for retooling, which reduced the set up time from 7 days to overnight.

In the Indian context, which is a price sensitive market, it used marketing and strategic flexibility initiatives to regain the eroding market share at two different stages. At one time, it used dynamic pricing to substantially cut the price of its all models to match with the competitors and quickly regained market share. At another stage, when the fuel prices were going high, all the major manufactures in India introduced diesel versions except Honda. This resulted to reduce it to a lower competitive ranking in sedan segment. It strategically worked with new management team to come up with diesel version which again put it back on the pedestal. In today's context, the situation has further changed due to declining fuel prices and restrictions on diesel vehicles in view of pollution.

Cisco

Cisco moved to agile product development in order to meet the dynamically changing needs of its customers. It gave up the traditional fashion of project bound teams and moved to collaboration by way of self-organizing and cross-functional teams.

McDonald

McDonald has taken a number of flexibility initiatives to enter new markets and beat the fast-food competitors. It has exhibited sensitivity to local taste and preferences and affordability to suit Indian customers' pockets. It promoted family dining experience and innovative practices such as first to start home delivery in India.

Unilever

Unilever replicated the flexibility initiatives in the developed world that were originated in its Indian operations. HUL (its Indian subsidiary) launched a sachet blitz across power brands for product penetration at the bottom of the pyramid in an effective manner.

E-commerce Companies

The e-commerce retail companies like Flipkart have taken a series of flexibility initiatives to overcome the hesitation of Indian customers (to accept e-buying) such as extended return period, extended support hours, cash payment on delivery, and try out sizes of apparel at home before you buy. This has given these e-retail companies a space out of the traditional brick and mortar retail market.

1.3 Flexibility Valuation: The Basic Model

The valuation of flexibility at generic level has been lacking. Sporadic works in isolated areas are available such as effect of decision flexibility on value of information (Merkhofer 1977); valuing financial flexibility in volatile markets (Mason 1984); valuation of flexible production systems using contingent claims pricing (Triantis and Hodder 1990); value of flexibility in project selection (Kulatilaka 1993); valuation of operating flexibility (in terms of breadth) of multinational corporations (Allen and Pantzalis 1996); value of information system flexibility in terms of modification/upgradation following its initial implementation (Schober and Gebauer 2009); valuation of flexibility in international investments during economic crisis (Lee and Makhija 2009); and so on. In most of the cases, the most common approach was to carry out valuation of real options.

The flexibility valuation model, proposed in this chapter, is based on the fulfillment of needs driving flexibility and the capabilities required to fulfill the same (Sushil 2015c). In any aspect of business, flexibility is required due to uncertainty, variability, provision of choice, and requirement of speed in response or delivery mechanisms. To meet these requirements, capabilities are to be developed on the fronts of people, process, technology, supply chain, and the ecosystem. Some of the strategic goals to be achieved by flexibility initiatives in any organization and the related cost factors are portrayed in Fig. 1.1.

By meeting the needs of the organization, the benefits derived by flexibility initiatives in general are as follows:

- Capturing new opportunities
- Generating new ideas and innovation
- Opening new revenue sources

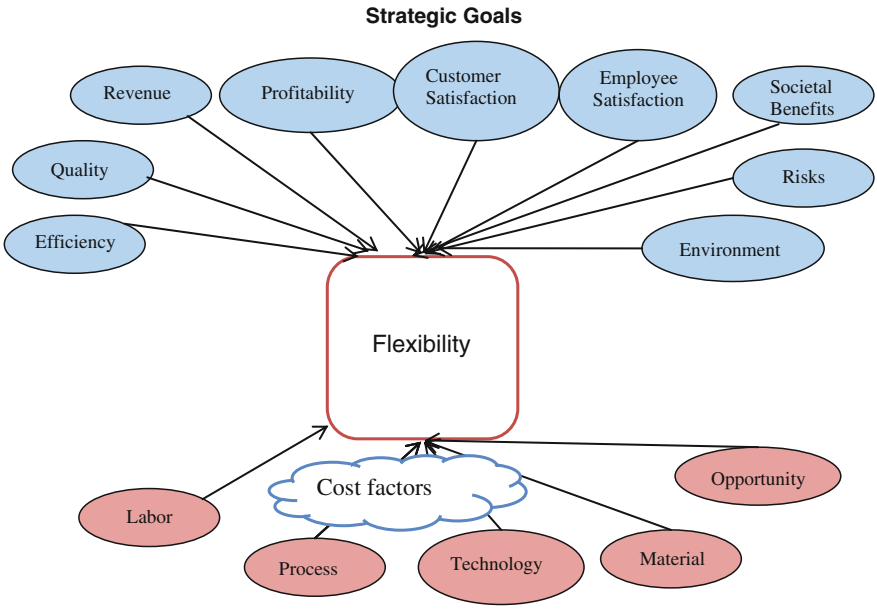

Fig. 1.1 Strategic goals and cost factors

- Hedging risks
- Reducing process cost and time (Minimizing waste)
- Anytime/Anywhere Reach
- Stakeholder involvement and Societal benefits—Inclusion

Some specific benefits linked with typical flexibility initiatives are shown in Table 1.1.

But while realizing these benefits there are both tangible and intangible costs for implementing flexibility initiatives in different areas as outlined below:

Tangible cost factors

- More options-increased costs of process and product design
- Training costs
- New technology costs

Table 1.1 Specific benefits of flexibility initiatives

Flexibility initiatives	Benefits
Customization	Improving quality
Dynamic pricing	Extracting value
Flexible capacity	Low inventory and meeting unforeseen requirements
Multiskilling	Low manpower costs and meeting unforeseen job requirements
Flexible work	Employee satisfaction

- Cost of restructuring
- Change management costs
- More initial costs-less running costs
- Cost of working capital

Intangible cost factors

- Difficulty of practicing
- Cognitive overload
- System complexities and chaos

For enhancing the value of flexibility the benefits are to be enhanced and costs are to be curtailed. The definition of value or affordability of a flexibility initiative is a ratio of the worth of the initiative to the organization in terms of benefits derived to the cost incurred for the same as given below

$$\text{Value (Affordability)} = \text{Worth}/\text{Cost}$$

The basic model of valuation of flexibility is depicted in Fig. 1.2. Any flexibility initiative is intended to fulfill certain needs for flexibility which will result in generation of certain benefits to the organization as well as stakeholders, which may be tangible as well as intangible in nature. On the other hand, for the effective implementation of that initiative the organization will require to develop certain capabilities. The capability building would entail both tangible and intangible costs. The ratio of benefits to costs would give valuation of the flexibility initiative to assess its affordability by the organizations.

The valuation of any flexibility initiative is contingent on the context, i.e., type of industry, maturity of processes, and maturity of actors. If an industry is facing high turbulence such as telecom, the flexibility is likely to get high valuation in contrast to comparatively stable industries such as fertilizers and chemicals. The

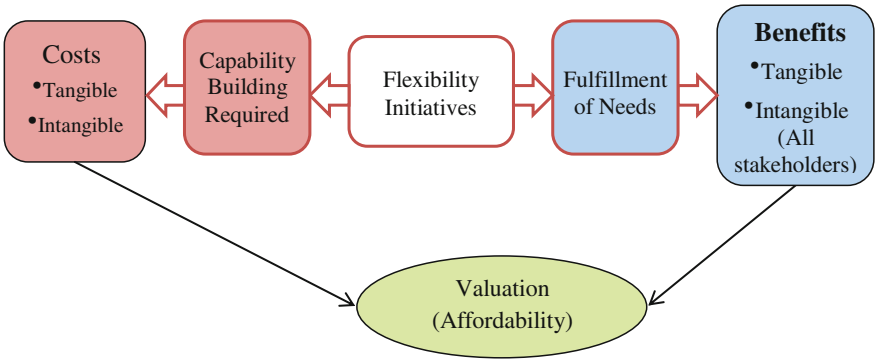

Fig. 1.2 The basic model of flexibility valuation

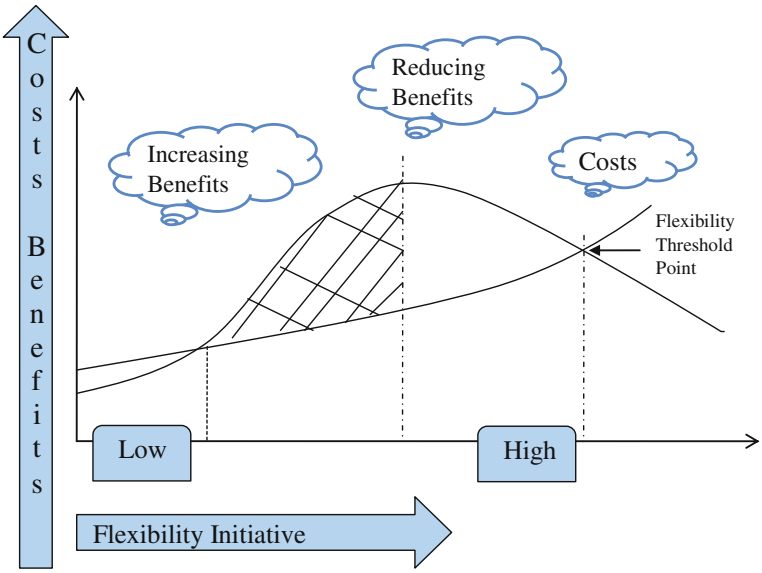

Fig. 1.3 Optimize benefits with costs

maturity of processes as well as actors would generate higher benefits than costs incurred. As shown in Fig. 1.3, in the beginning for any flexibility initiative the benefits would be low which would increase with an increasing rate with the maturity, but the rate of growth of costs would be lower than the benefits, which would make it more viable after some time.

The valuation also depends upon the perspective from which it is carried, i.e., organizational perspective or stakeholder perspective. The stakeholder perspective would be different for different stakeholders such as employees and customers. A particular flexibility initiative might not be of that high value to the organization but would be of great value to employees, e.g., flexi-time/flexi-place work practice. In some cases, it may be of high value to both the organizations and the stakeholders. In this chapter, the valuation is primarily done from the view point of the organizations.

The flexibility in systems could be both flexibility to use and flexibility to change. The flexibility to use is linked with current requirements in terms of options and freedom of choice, whereas flexibility to change is related with anticipated as well as unanticipated future requirements. The high technology systems with short life cycle would normally have higher value for flexibility to use than to change. In case of long life systems, such as buildings, flexibility to change may also be of high value.

1.4 Examples of Flexibility Valuation

In this chapter, the valuation of following three flexibility initiatives is depicted using the basic model given in Fig. 1.2.

- Variable capacity
- Multiskilling
- Flexi-time/flexi-place

The basic model is applied in all the above three cases and illustrative models are shown in Figs. 1.4, 1.5 and 1.6 respectively.

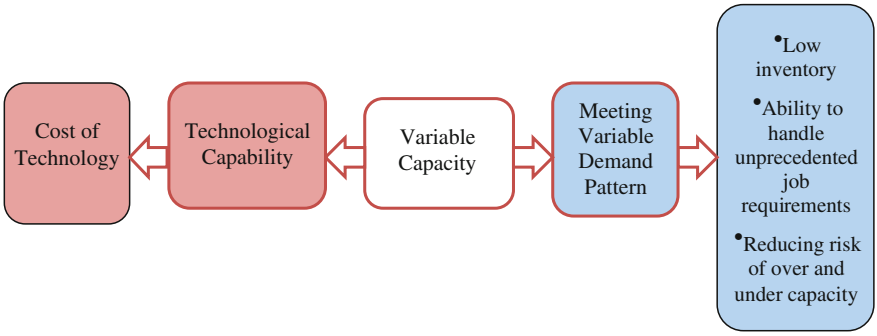

Fig. 1.4 Valuation of flexibility initiative 1

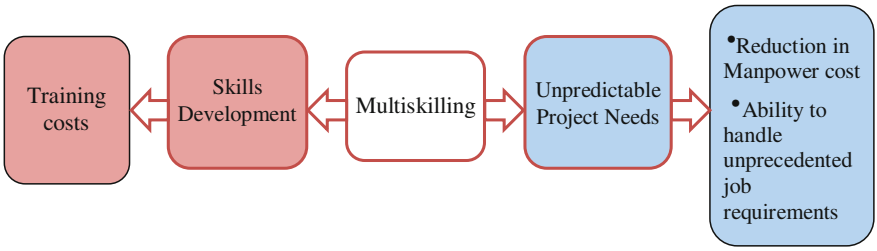

Fig. 1.5 Valuation of flexibility initiative 2

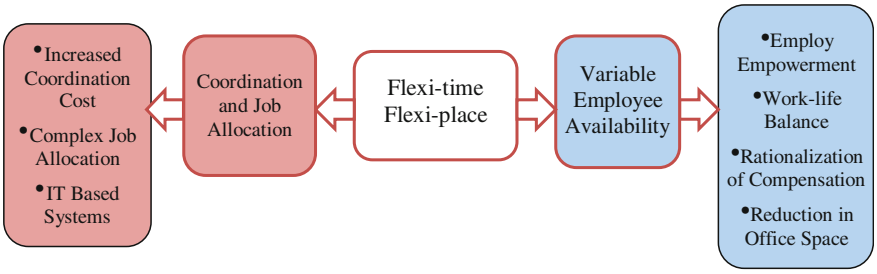

Fig. 1.6 Valuation of flexibility initiative 3

1.5 Different Valuation Plans

The valuation of flexibility could be done in multiple ways. Some of the possible valuation plans are outlined in this section, out of which one is illustrated in the next section.

(i) *Go–No-Go Flexibility Initiative*

The valuation would give either to adopt the flexibility initiative (affordability index greater than 1) or not to adopt it at this juncture (affordability index less than 1). In case of affordability index equal to one, the decision could be either way depending upon other considerations, such as future requirements, cruciality of area, and so on.

(ii) *Assessing Extent of Flexibility*

Initially, with introduction of some flexibility the affordability would be low. As the flexibility index is enhanced the affordability is also expected to grow, but after an extent of flexibility it might mature and this may start tapering down, as shown in an expected relationship in Fig. 1.7. This needs to be validated in individual cases and the valuation plan would be to assess the extent of flexibility to be introduced in that area.

(iii) *Time-Based Valuation*

As initially the costs of capacity building would be high and the benefits will accrue over time, the affordability index of a flexibility initiative might take a S-shaped pattern as shown in Fig. 1.8. Thus, the valuation plan would be to assess the time at which a particular initiative would become affordable and start giving positive value.

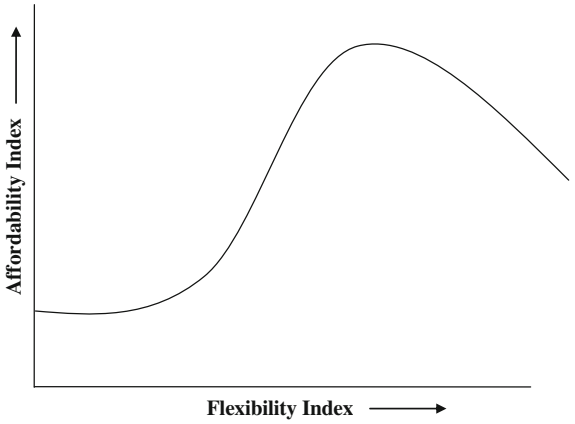

Fig. 1.7 Flexibility versus affordability

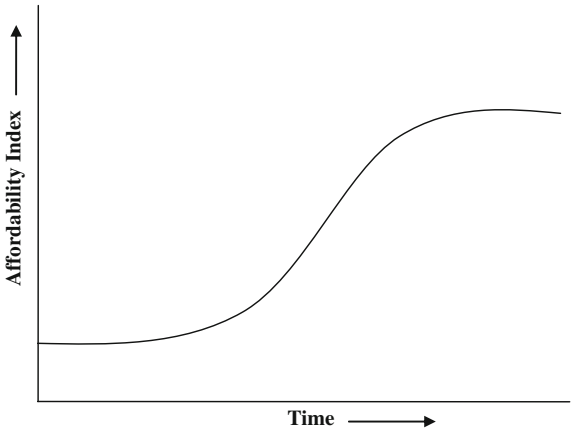

Fig. 1.8 Time versus affordability

(iv) *Valuation at Different Flexibility Maturity Levels*

The flexibility maturity model has six levels (Sushil 2012c, 2016a), i.e., (1) flexibility in individual processes; (2) flexibility in interaction of processes; (3) flexibility in actors; (4) strategic flexibility; (5) operational flexibility in value network; and (6) strategic flexibility across the ecosystem. It is envisaged that the value of flexibility would get enhanced with higher maturity levels as depicted in Fig. 1.9.

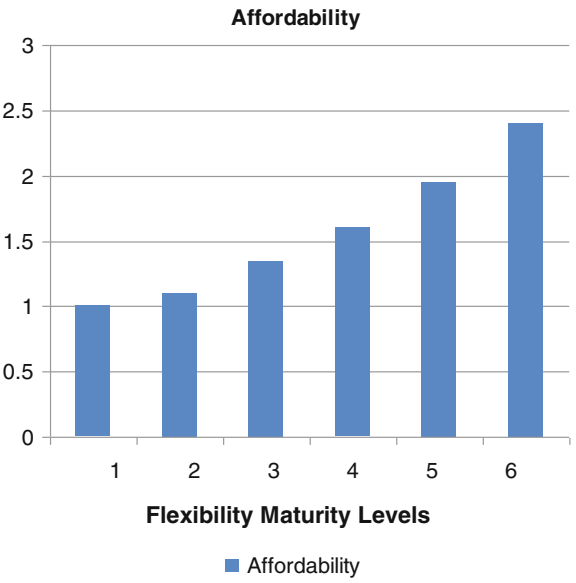

Fig. 1.9 Valuation at flexibility maturity levels

(v) *Flexibility Assessment on Value Chain*

The value of flexibility at different stages of direct as well as indirect value chain is expected to be different. It would be worthwhile to assess that flexibility at which stage in the value chain would provide maximum value.

(vi) *Comparative Evaluation of Different Flexibility Initiatives*

A multi-criteria ranking of different flexibility initiatives under consideration can be done to decide about which ones should be adopted on a priority basis. An illustration on the same is provided in the next section.

1.6 Multi-criteria Ranking of Flexibility Initiatives

The three flexibility initiatives outlined in section four are ranked using a combination of Interpretive Ranking Process (IRP) (Sushil 2009) and Total Interpretive Structural Modelling (TISM) (Sushil 2012d, 2016c). TISM is applied to develop hierarchical relationships of the criteria used for ranking, i.e., benefits and costs. This is further used to derive weightages of the criteria to be used in IRP based on their respective driving power. IRP is used to rank the flexibility initiatives with reference to the benefits and costs as multiple criteria for evaluation. The cost criteria is taken in a negative manner, i.e. lower cost means more dominance for a flexibility initiative.

The flexibility initiatives used in Sect. 1.4 and the select criteria (benefits and costs) are summarized with codes (from the models given in Figs. 1.4, 1.5 and 1.6) in Table 1.2.

Table 1.2 Flexibility initiatives and select criteria for valuation

Code	Flexibility initiatives/Criteria
Flexibility initiatives	
F1	Variable capacity
F2	Multiskilling
F3	Flexi-time/Flexi-place
Benefits	
B1	Low inventory
B2	Ability to handle unprecedented job requirements
B3	Reduction in manpower cost
B4	Work–life balance
Costs	
C1	Training cost
C2	Coordination cost
C3	Cost of technology
C4	Complex job allocation

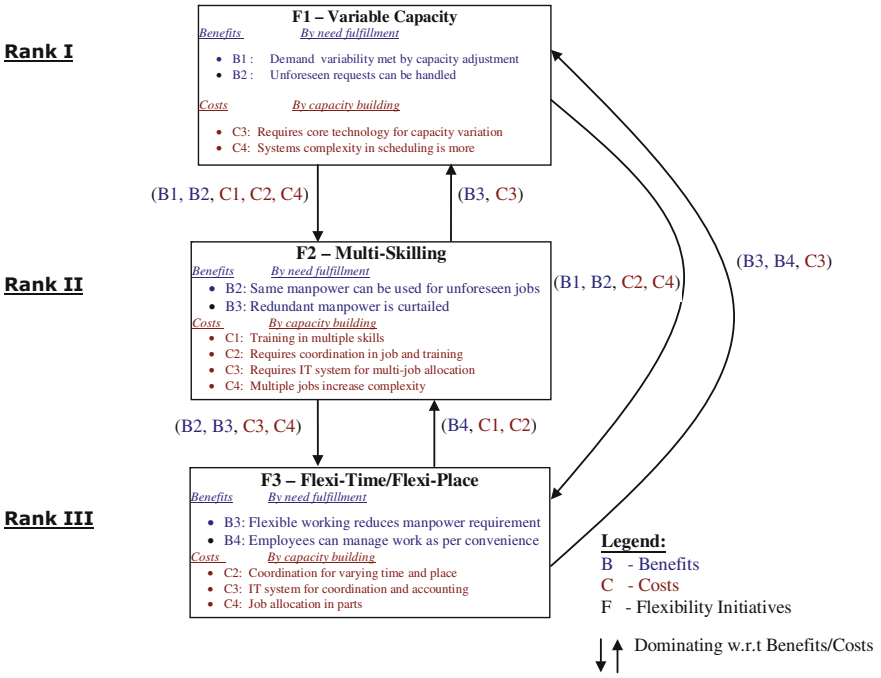

Fig. 1.10 IRP model of ranking of flexibility initiatives (*Source* Sushil 2017)

After implementing the TISM-IRP process the ranking of flexibility initiatives has been obtained as shown in Fig. 1.10 (Sushil 2017). The application illustrated here at a generic level and not with reference to a specific case organization.

1.7 Conclusion

This chapter has provided a conceptual framework of flexibility valuation. A basic model is provided, which has been illustrated in case of three flexibility initiatives. These three initiatives have also been ranked using TISM-IRP process with respect to the benefits and costs. An outline of other valuation plans is also provided. It requires to validate the proposed basic model in real life cases with empirical evidences. In future, specific models of valuation can be developed in different flexibility areas. The models with the perspectives of different stakeholders may also be explored.

References

Allen, L., & Pantzalis, C. (1996). Valuation of the operating flexibility of multinational corporations. *Journal of International Business Studies, 27*(4), 633–653.

Eppink, D. J. (1978). Planning for strategic flexibility. *Long Range Planning, 11*(4), 9–15.

Kulatilaka, N. (1993). The value of flexibility: The case of a dual—Fuel industrial steam boiler. *Financial Management, 22*(3), 271–280.

Lee, S.-H., & Makhija, M. (2009). Flexibility in internationalization: Is it valuable during an economic crisis? *Strategic Management Journal, 30*(5), 537–555.

Mason, S. P. (1984). *Valuing financial flexibility*, NBER Working Paper, Cambridge, MA.

Merkhofer, M. W. (1977). The value of information given decision flexibility. *Management Science, 23*(7), 716–727.

Schober, F., & Gebauer, J. (2009). How much to spend on flexibility? Determining the value of information system flexibility. In *Proceedings of the Fifteenth Americas Conference on Information Systems*, San Francisco, California, August 6th–9th 2009.

Sharma, M. K., Sushil and Jain, P. K. (2010). Revisiting Flexibility in Organizations: Exploring its Impact on Performance. *Global Journal of Flexible Systems Management, 11*(3), 51–68.

Sushil. (1997). Flexible systems management—An evolving paradigm. *Systems Research and Behavioral Science*, *14*(4), 259–275.

Sushil. (2009). Interpretive ranking process. *Global Journal of Flexible Systems Management, 10*(4), 1–10.

Sushil. (2012a). Flowing stream strategy: Managing confluence of continuity and change. *Journal of Enterprise Transformation, 2*(1), 26–49.

Sushil. (2012b). Making flowing stream strategy work. *Global Journal of Flexible Systems Management, 13*(1), 25–40.

Sushil. (2012c). Flexibility maturity model: Possibilities and directions. *Global Journal of Flexible Systems Management, 13*(2), 75–76.

Sushil. (2012d). Interpreting the interpretive structural model. *Global Journal of Flexible Systems Management, 13*(2), 87–106.

Sushil. (2013). *Flowing stream strategy: Leveraging strategic change with continuity.* New Delhi: Springer.

Sushil. (2014). The concept of a flexible enterprise. In Sushil & E. A. Stohr (Eds.), *The flexible enterprise,* Flexible Systems Management (pp. 3–26). New Delhi: Springer.

Sushil. (2015a). Strategic flexibility: The evolving paradigm of strategic management. *Global Journal of Flexible Systems Management, 16*(2), 113–114.

Sushil. (2015b). Diverse shades of flexibility and agility in business. In Sushil & G. Chroust (Eds.), *Systemic flexibility and business agility,* Flexible Systems Management (pp. 3–19). New Delhi: Springer.

Sushil. (2015c). Valuation of flexibility. *Global Journal of Flexible Systems Management, 16*(3), 219–220.

Sushil. (2016a). Managing flexibility: Developing a framework of flexibility maturity model. In Sushil, K. T. Bhal, & S. P. Singh (Eds.), *Managing flexibility: People, process, technology and business,* Flexible Systems Management (pp. 3–19). New Delhi: Springer.

Sushil. (2016b). Theory of flexible systems management. In Sushil, J. Connel, & J. Burgess (Eds.), *Flexible work organizations: The challenges of capacity building in Asia,* Flexible Systems Management (pp. 3–20). New Delhi: Springer.

Sushil. (2016c). How to check correctness of total interpretive structural models? *Annals of Operations Research.* doi:10.1007/s10479-016-2312-3

Sushil. (2017). Multi-criteria valuation of flexibility initiatives using integrated TISM–IRP with a big data framework. *Production Planning and Control,* https://doi.org/10.1080/09537287.2017.1336794.

Triantis, A. J., & Hodder, J. E. (1990). Valuing flexibility as a complex option. *Journal of Finance, 45*(2), 549–565.