

Chapter 1

Generic Flexibility Evaluation Model



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Abstract The ability to cope up with the uncertain environment is shaped by organizational flexibility. The flexible organizations sustain the competitive advantage over the period of time. The flexibility in different contexts essentially induces speed and agility in organizational processes. The flexibility evaluation mechanism will help organizations to measure and enhance the organizational flexibility. This study proposes a generalized flexibility evaluation mechanism demonstrated by an example of workforce flexibility measurement by analyzing the impact of flexibility enablers and the business environment. The workforce flexibility contributes significantly to versatility, responsiveness, and the ability of employees to move between jobs. The flexibility evaluation mechanisms available in the literature are industry, organization, and context-specific and not generic in nature and ignore the impact of the business environment.

Keywords Employee flexibility · Flexibility · Measurement of flexibility · Workforce flexibility

1.1 Introduction

The ability to cope up with the uncertain environment is shaped by organizational flexibility. The flexible organizations sustain the competitive advantage over the period. The flexibility in different contexts essentially induces speed in the organizational processes. The flexibility evaluation mechanism will help organizations to measure and enhance the organizational flexibility. This chapter proposes a generic flexibility evaluation model demonstrated by measuring workforce flexibility. Flex-

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ibility enables the organizations to achieve the desired objectives faster and cope up with internal and external changes. The flexibility measurement techniques quantify the select flexibilities for making organizational strategies for competitive advantage. This chapter identifies various types of flexibility measurement techniques available in the literature and proposes a measurement framework which can be applied across industries by analyzing the impact of the interaction between flexibility enablers and the business environment.

1.2 Literature Review

The flexibility evaluation methods available in the literature show a definite trend. These methods examine the outcome of flexibility, while others examine the sources of flexibility for assessing organizational flexibility. Following five categories of measurement techniques of flexibility are identified from the existing literature.

1.2.1 *Broad Categorization of Flexibility*

In this category, organizational flexibility is put in different broad categories. Garavelli (2003) categorized supply chain flexibility in three categories, i.e., total flexibility, limited flexibility, and no flexibility. The flexibility aspects were mainly related to the performance of an organization. Verdu et al. (2009) proposed four types of managerial flexibility, i.e., external and internal, strategic and structural.

1.2.2 *Flexibility Measurement Using Mathematical Formula*

In this case, various formulae are proposed for measurement of select flexibilities. The operational means are defined to understand the impact or outcome of the flexibility. Beamon (1999) used the output volume, the percentage of the slack time, the number of different product types, and the delivery time for measuring the delivery, volume, and mix flexibilities. The capacity and load flexibility for manufacturing systems are measured by Teich and Claus (2017). However, the mapping of the characteristic of the manufacturing system and quantification of manufacturing flexibility is difficult (Kahraman et al. 2004). Tsourveloudis (1998) used the fuzzy logic to measure manufacturing flexibility. A rule-based flexibility evaluator has been demonstrated through prototype by Das and Caprihan (2008). Zhang et al. (2017) formulated the measurement of process flexibility of product design by considering requirement variations. Tsai et al. (2017) used entropy-based and Taguchi quality loss for flexibility measurement using a mathematical formula.

1.2.3 Measurement Based Upon Sources and Enablers of Flexibility

The enablers or sources of flexibility are examined for measuring flexibility. The example can be seen in the work of Lin et al. (2006b) who proposed a fuzzy agility evaluation method by examining business operation elements, supply chain capabilities, and agility drivers. Lee and Xia (2005) developed team flexibility measurement using capability and socio-technical perspective. Gligor et al. (2013) devised measures of supply chain agility based on swiftness, alertness, accessibility, and decisiveness. Kandemir and Acur (2012) used the resources, capabilities, and performance to frame strategic decision-making flexibility.

1.2.4 Index-Based Weighted Measurement

The index-based weighted flexibility measurement has been used by many authors, wherein Likert-type scales were used. Swafford et al. (2008) measured each function of the supply chain on this scale. The index for the agility evaluation is used by Yang and Li (2002).

1.2.5 Measurement of Flexibility Through Assessment of Organizational Output

In this category, the outcome due to organizational flexibility is examined. This includes observation of visible characteristics of flexibility. Lin et al. (2006a) have introduced fuzzy principles to evaluate the agility of an organization based on performance and importance of agile capabilities. Gong (2008) suggested analytical models describing the relationships between the degree of flexibility and system-level performance. Ganguly et al. (2009) proposed the agility evaluation using responsiveness, cost-effectiveness, and the market share. The study done by Sheffield and Lemétayer (2013) has identified the factors indicative of software development agility in the organization. Rastogi et al. (2016) indicated the flexibility as a predictor of work—family enrichment. The association between firm performance and HR flexibility is demonstrated by Sekhar et al. (2016).

It can be seen from the literature review that flexibility measurement has taken progression from the basic categorization of flexibility to fuzzy measurement of different types of flexibilities. The flexibility evaluation mechanisms available in the literature are industry and context-specific and not generalized. A generalized model of flexibility evaluation using business, environmental factors, and flexibility enablers is lacking in the extant literature.

1.3 Methodology

The flowing stream strategy by Sushil (2012, 2013) has been used in this chapter for providing theoretical support to flexibility measurement method. This framework compares characteristic of the flowing stream with organizational growth. This framework is used for identifying different types of forces acting on the organization. In the framework of “Flowing Stream Strategy”, the major forces that pull the organization toward its continuity are existing infrastructure core ideology, customer base, core competence, brand, technology, and distribution network, culture, and performance. The push toward the change is facilitated by mergers and acquisitions, changing customer needs, competition, globalization, new opportunities, new technology, e-business, government policies, and environmental factors. The result of the assessment is further used for measuring flexibility. The flowing stream strategy operates under seven guiding principles. These principles emphasize strategic changes by leveraging the benefits of the continuity in a dynamic manner. The underlying methodology behind the framework and its principles gives enablement of flexibility. To achieve the next level of performance, the organization requires creative discontent with the present situation and the desired change is enabled by flexibility. The organizations have to show flexibility to incorporate opposite options. During organizational growth, the energy is drained and it needs to be continuously vitalized. The organization encounters a number of hurdles on the way and finds its way by circumventing these hurdles using suitable flexibility. The use of four key strategic channels, i.e., shift, partition, divert, and integrate, is proposed for the organizations. The proposed measurement framework of flexibility requires identification of various forces acting on the organization which are identified as flexibility enablers. The visual depiction is made in Fig. 1.1 for impact of the business environment and flexibility enablers on the organization. The entire process of flexibility evaluation using the example of workforce flexibility has been described in four steps.

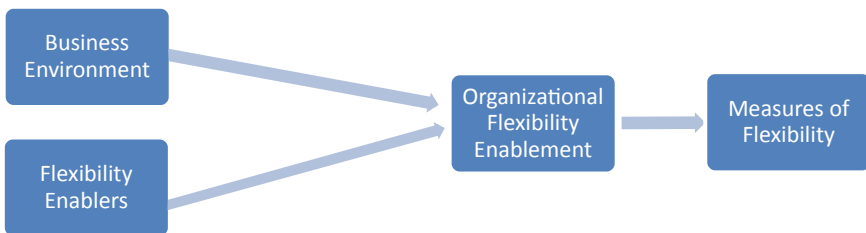


Fig. 1.1 Interaction among business environment and flexibility enablers

1.3.1 Step-1: Identification of Business Environmental Factors Impacting Flexibility

Twenty business environmental factors impacting flexibility are identified using the flowing stream strategy framework (Sushil 2012, 2013). Following are the major continuity and change forces.

- i. New opportunities,
- ii. E-Business,
- iii. Mergers and acquisitions activities,
- iv. Product lifetime shrinkage,
- v. Quicker delivery time,
- vi. Customer needs,
- vii. New technology (software),
- viii. Government policies and legislation,
- ix. New technology (methods),
- x. Environmental concerns,
- xi. The increasing rate of change in product models,
- xii. Competitors,
- xiii. Increasing pressure on cost,
- xiv. Economies of scale,
- xv. Increasing pressure of global market competition,
- xvi. Impact of globalization,
- xvii. Quick time to market,
- xviii. The growth of niche market,
- xix. Rapidly changing market, and
- xx. Increasing quality expectation.

1.3.2 Step-2: Identification of Enablers of Flexibility Within Organization

Within the given business environment, there are enablers present in the organization which induces the flexibility. The workforce flexibility in information technology (IT) industries plays a major instrument of growth. The enablers of workforce flexibility are utilized from the study done by Yusuf et al. (1999). Ten such enablers to induce flexibility are listed below:

- i. Education and skill upgrade,
- ii. Integration,
- iii. Competence,
- iv. Quality,
- v. Team building,
- vi. Partnership,

- vii. Technology,
- viii. Change,
- ix. Market, and
- x. Welfare.

1.3.3 Step-3: Computing Intensity of Continuity and Change Forces

The questionnaire is prepared to make an assessment of continuity and change forces and environmental forces (external and internal) acting on the organization. The key concerns of assessing change and continuity forces for designing the questionnaire are listed below:

- Benchmarks for the planned progress,
- The overall level of understanding of the goals within the organization,
- Additional enterprise-wide support needs for change,
- Best practices from other organizations,
- Planned actions and challenges to employees' understanding,
- Current dynamics of the marketplace and its impact,
- Mechanism to capture signals from customers in advance,
- Ways to better understand customer needs,
- Key processes being worked on and their selection criteria,
- Value enhancement from the customer's perspective,
- Leveraging the strengths of the enterprise,
- Realization of economies of scale, and
- The relative intensity of continuity and change forces.

1.3.4 Step-4: Measurement of Select Flexibility

A matrix is prepared to show the strength of interaction between forces, i.e., the business environment and applicable flexibility enablers in an organization. The value of relevant flexibility is derived from these assessments.

1.4 Evaluation of Workforce Flexibility in Case Organization

The case organization had started from scratch when the information technology hardly existed in India. Currently, it has employee strength of more than one lack. It is located in the Delhi/NCR region of India. It has an enlightened approach

toward employee development. It provides the people whatever they need for success, i.e., expert guidance, talent transformation, inner peace, or empowerment. Its range of offerings span across infrastructure services, product engineering, technology services, BPO, systems integration, hardware, and distribution of technology products. The organization is trying to be the preferred engineering-led global IT service provider. The organization promotes entrepreneurial behavior. This enables to handle rapid changes in the environments and technologies.

1.4.1 Assessment of Workforce Flexibility

The method of measuring workforce flexibility has been demonstrated for case organization in two stages. In the first stage, the impact of flexibility enablers on the business environment is explained for workforce flexibility. If the environment impacts the enabler, then the value “1” is assigned to the matrix cell given in Table 1.2. In the second stage, the intensity of flexibility enablers is computed.

1.4.2 Stage 1: Determination of Impact of Flexibility Enablers on Business Environment

The business environment is used as the flexibility is the predictor of performance in the dynamic business environment (Anand and Ward 2004). The sufficient importance is given to the business environment in this work. In this section, the impact of 20 business environmental factors on ten flexibility enablers is determined and explained theoretically.

- i. **Impact of Globalization:** It is forcing organizations to adopt for workforce flexibility. The workforce flexibility is influenced by current practices in the organization like the concurrent execution of activities, multi-venturing capabilities, individuals working in cross-country and cross-functional teams, technology awareness programs, decentralized decision-making, strategic relationship with suppliers and customers, and new product introductions. The impact of globalization touches all enablers; therefore, all the enablers participate in workforce flexibility. Hence, enablers like team building, integration, change, competence, quality, technology, partnership, education, market, and workforce skill upgrade are given the value “1” in matrix cells given in Table 1.2.
- ii. **New Opportunities:** Adoption of new practices and scenarios for new opportunities are influenced by the existing skill set. The workforce flexibility is enabled by information accessible to employees, enterprise integration, business practice difficult to copy, the team across company borders, response to

market changes, and customer satisfaction supported by other enablers and accordingly marked in Table 1.2.

- iii. **E-Business:** The business environment impacting organization enablers are business practices difficult to copy, cross-functional teams, technology awareness, first-time-right design, products with substantial value addition, and response to market changes. The corresponding heads under enabler are competence integration, partnership, team building, technology, quality, market, and education; these are marked as “1” in Table 1.2.
- iv. **Competitors:** Stiff competition forces’ redeployment of resources at a certain point of time and workforce flexibility is enabled. All the enablers participate in this case.
- v. **Mergers and Acquisitions:** The enabler’s heads are competence, market, integration, team building, technology, change, partnership, quality, education, welfare, and workforce skill upgrade. All these enablers participate in workforce flexibility.
- vi. **Government Policies and Legislation:** The applicable environment and enablers are enterprise integration, information, and welfare measures along with all other enablers. Hence, enablers like integration, competence, team building, technology, quality, partnership, market, education welfare, and workforce skill upgrade are given value “1” in matrix cells.
- vii. **New Technology (Software/Hardware):** It is creating major impact, and organization’s influencers for enabling workforce flexibility are multi-venturing capabilities, technology awareness, skill and knowledge enhancing technologies, development cycle time, learning organization, the culture of change, multi-skilled, and flexible people. Hence, enablers like integration, competence, team building, technology, quality, change, partnership, education, market, and workforce skill upgrade are given the value “1” in matrix cell given in Table 1.2.
- viii. **New Technology (Method):** It is more related to process and has a similar impact as tools as described in the above section of new technology.
- ix. **Environmental Concerns:** It induces a major change in organizational business and policies. Hence, enablers like competence, team building, integration, quality, change, technology, partnership, education, market, and workforce skill upgrade are given 1 in matrix cells in Table 1.2.
- x. **Economies of Scale:** The applicable influencers, in this case, are the concurrent execution of activities, quality over product life, multi-venturing capabilities, strategic relationship with customers, products with substantial value addition, new product introduction, close relationship with suppliers, customer satisfaction, and response to market changes. Corresponding enablers are competence, integration, team building, technology, quality, partnership, education, change, market, and workforce skill upgrade are assigned the value “1” in matrix cells.
- xi. **The Growth of Niche Market:** The empowered individuals working in teams, business practice difficult to copy, technology awareness, and products with substantial value addition are contributors to this process. The enablers

like competence, integration, technology, team building, quality, partnership, change, market, education, welfare, and workforce skill upgrade participate for workforce flexibility and given the value “1” in the matrix cells.

- xii. **An Increasing Rate of Change in the Product Models:** The relevant enablers are continuous improvement, customer-driven innovations, and response to market changes. The relevant enablers participate in inducing workforce flexibility and given value “1” in the matrix cells given in Table 1.2.
- xiii. **Increasing Pressure on Cost:** The corresponding influencers are short development cycle time, and first-time-right design supported by all other flexibility enablers. The corresponding enablers are given the value “1” in matrix cells in Table 1.2.
- xiv. **Product Lifetime Shrinkage:** The major influencers are enterprise integration, concurrent execution of activities, information, multi-venturing capabilities, empowered individuals, leadership in the use of current technology, technology awareness, skill and knowledge enhancing technologies, substantial value addition in products, short development cycle time, first-time-right design, strategic relationship with customers, customer satisfaction, customer-driven innovations, response to market changes, multi-skilled and flexible people, and learning organization. Therefore, all the enablers participate in workforce flexibility and value one assigned is assigned to the matrix cells.
- xv. **Rapidly Changing Market:** A product portfolio variability driven by customer requirement is the business environment, and relevant influencers are the culture of change and continuous training and development. All other enablers are effective for inducing workforce flexibility in this case.
- xvi. **Increasing Pressure on Cost:** Customer expectation for a value of money is the driver for the adoption of improved processes. The relevant contributors participating to achieve objectives are enterprise integration information, concurrent execution of activities, multi-venturing capabilities, empowered individuals, leadership in the use of current technology, technology awareness, skill and knowledge enhancing technologies, first-time-right design, products with substantial value addition, short development cycle time, strategic relationship with customers, customer satisfaction, customer-driven innovations, learning organization, response to market changes, and multi-skilled and flexible people. All enablers participate for enabling the workforce flexibility and assigned the value “1” in the matrix, except for exceptional decision to compromise on welfare objectives.
- xvii. **Quicker Delivery Time:** The faster delivery time is a major focus of IT organizations. The variability in technology domains and experience of individual induces multiple skill sets in an employee. The risk-taking initiative impacts development schedule which is mitigated with help engineers of different technology domains. The relevant influencers for workforce flexibility, in this case, are organizational training and exposure along with other support mechanisms, and relevant enablers are given in Table 1.2.

- xviii. **Quick Time to Market:** All types of enablers are required for timely delivery of products. The workforce flexibility is enabled by leveraging the short development cycle of products.
- xix. **Increasing Quality Expectation:** High-quality product delivery requires IT organization to have individuals trained in other areas which are required for integration of products for complete solutions. It involves all enablers' support, and hence value "1" is assigned to matrix cells.
- xx. **Increasing Pressure of Global Market:** It is a major force acting on organizations to adopt for workforce flexibility due to faster expansion and collaborative work practices. Enablers like integration, competence, team building, technology, quality, change, partnership, market, education, and workforce skill upgrade are required in this case for workforce flexibility. The relevant enablers are marked as "1" in Table 1.2.

1.4.3 Stage 2: Computation of Intensity of Enablers

The study is carried out to find out various change and continuity factors impacting the organization along with the intensity of each factor. All survey items of the continuity and change forces given in Table 1.2 are measured using a 5-point Likert scale (1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree). Higher scores indicate higher levels of each force. Thirty-four respondents from case organization working in team leadership and managerial position have completed the questionnaire. The summary of observations is presented in Table 1.1.

The survey has shown that the case organization is operating under moderately high change forces and high continuity forces. The technology- and regulatory-driven forces and customer forces are experiencing high intensity.

1.4.4 Computation of Workforce Flexibility

The final matrixes of enablers and environment are given in Table 1.2 for the measurement of workforce flexibility in the case organization. The sum of all enablers in the cell is multiplied by the weight of factors obtained in continuity and change assessment which are listed in the first row of Table 1.2. The total sum of all enablers is obtained w.r.t maximum score of 1000. This normalized to the scale of 1. For all enablers and environmental forces whose weighted score is required for measurement of flexibility, the nearest value of continuity and change forces assessment from Table 1.1 is used if it is not directly available from the questionnaire.

The workforce flexibility for case organization is 0.7508 on a scale of 1 which is on the higher side. The organization is desired to be competitive. All enablers are interacting with most of the environmental factors within the organizational framework to achieve the desired flexibility.

Table 1.1 Summary of the intensity of continuity and change forces

S. no	Continuity and change forces	Average value of continuity/change forces
<i>Values of continuity forces</i>		
1	Huge customer base	4.42
2	Global supply chain and distribution network	2.90
3	Well entrenched infrastructure	4.40
4	Existing culture	3.41
5	Technology for continuity	3.82
6	Core competence	3.95
7	Internal factors (for continuity)	4.76
8	Performance	3.73
<i>Values of change forces</i>		
1	Competition	3.76
2	New opportunities	3.64
3	Globalization	3.81
4	New technology	4.12
5	Customer needs	3.84
6	Internal factors (for a change)	4.12
7	Government policies	4.20
8	Mergers and acquisitions	3.18
9	E-business	3.72

1.5 Conclusion

This framework assumes that flexibility in an organization is enabled by the external environment. The framework “Flowing Stream Strategy” captures internal and external change forces needed for flexibility and growth of an organization. To face the changing circumstances while maintaining the benefits of existing continuity forces, the flexibility is needed (adaptation flexibility, organizational flexibility, and responsiveness to target market flexibility) in the organization. The intensity of external forces impacts the degree of flexibility. The different combinations of continuity (high and low impact forces) and change forces (high and low impact forces) give the different types of flexibility enablement (strategic flexibility, structural flexibility, total system flexibility, delivery and delivery time flexibility, distribution flexibility, new product flexibility, operational flexibility, response flexibility, state flexibility, system flexibility, adaption flexibility, etc.). It also shows the interdependence among

Table 1.2 Assessment of workforce flexibility

An environment of workforce flexibility (industry influence)										
Weights of business environmental factors impacting organizations**	3.63	3.52	3.86	3.74	3.58	3.28	4.03	4.02	4.02	4.03
Enablers of Workforce flexibility	Impact of globalization	New opportunities	Competitors	Customer needs	E-business	Mergers and acquisitions activities	Government policies and legislation	New technology (software)	New technology (methods)	Environmental concerns* (govt. policies)
Integration	1	1	1	1	1	1	1	1	1	1
Competence	1	1	1	1	1	1	1	1	1	1
Team building	1	1	1	1	1	1	1	1	1	1
Technology	1	1	1	1	1	1	1	1	1	1
Quality	1	1	1	1	1	1	1	1	1	1
Change	1	1	1	1	1	1	1	1	1	1
Partnership	1	1	1	1	0	1	1	1	1	1
Market	1	1	1	1	1	1	1	1	1	1
Education and workforce skill upgrade	1	1	1	1	1	1	1	1	1	1
Welfare	1	1	1	1	0	1	1	0	0	1
Sum of all enablers	10	10	10	10	8	10	10	9	9	10
Sum of all enablers with weight	38.1	36.4	37.6	38.4	29.8	31.8	42	37.1	37.1	42
Workforce flexibility weight on a scale of 1000	750.8									
Workforce flexibility weight on a scale of 1	0.7508									

(continued)

Table 1.2 (continued)

An environment of workforce flexibility (industry influence)										
Weights of business environmental factors impacting organizations**	3.63	3.52	3.74	4.04	3.52	4.04	4.04	4.04	4.04	3.63
Enablers of Workforce flexibility	Economies of scale* (performance)	Growth of niche market* (new opportunities)	Increasing rate of change in product models (technology for continuity)	Product lifetime shrinkage* (internal factors for change)	Rapidly changing market* (new opportunities)	Quicker delivery time* (internal factors for change)	Increasing pressure on cost* (internal factors for change)	Quick time to market* (internal factors for change)	Increasing quality expectation* (internal factors for change)	Increasing pressure of global market competition* (globalization)
Integration	1	1	1	1	1	1	1	1	1	1
Competence	1	1	1	1	1	1	1	1	1	1
Team building	1	1	1	1	1	1	1	1	1	1
Technology	1	1	1	1	1	1	1	1	1	1
Quality	1	1	1	1	1	1	1	1	1	1
Change	1	1	1	1	1	1	1	1	1	1
Partnership	1	1	1	1	1	1	1	1	1	1
Market	1	1	1	1	1	1	1	1	1	1
Education and workforce skill upgrade	1	1	1	1	1	1	0	1	1	1

(continued)

Table 1.2 (continued)

An environment of workforce flexibility (industry influence)										
Weights of business environmental factors impacting organizations**	3.63	3.52	3.74	4.04	3.52	4.04	4.04	4.04	4.04	3.63
Enablers of Workforce flexibility	Economies of scale* (performance)	Growth of niche market* (new opportunities)	Increasing rate of change in product models (technology for continuity)	Product lifetime shrinkage* (internal factors for change)	Rapidly changing market* (new opportunities)	Quicker delivery time* (internal factors for change)	Increasing pressure on cost* (internal factors for change)	Quick time to market* (internal factors for change)	Increasing quality expectation* (internal factors for change)	Increasing pressure of global market competition* (globalization)
Welfare	0	1	1	1	1	1	0	1	1	1
Sum of all enablers	9	10	10	10	10	10	8	10	10	10
Sum of all enablers with weight	33.6	36.4	38.2	41.2	36.4	41.2	33	41.2	41.2	38.1
Workforce flexibility weight on a scale of 1000	750.8									
Workforce flexibility weight on a scale of 1	0.7508									

Note The values of items marked with * are values of equivalent items given in brackets. These values are not directly available
 The items marked with ** are average values computed during the assessment of the intensity of continuity and change forces

various flexibilities. It can be seen that various types of flexibilities are required to handle a combination of environmental forces and organizational factors (Kara et al. 2002). The turbulent business environment has a role in shaping organizational flexibility (Camps et al. 2016).

The twenty environmental factors are analyzed for impact on Workforce flexibility, and corresponding values are indicated between (0 and 1) based on the relevance of enabler. In the ideal case, all enablers are present in all types of flexibilities giving 100% flexible organization w.r.t workforce. The workforce flexibility on a scale of 1 is 0.7508. The various continuity forces in organization show the high values due to customer-, infrastructure-, and performance-related issues. The overall intensity of continuity factors is on the higher side due to policy-driven governance and infrastructure availability.

The flexibility evaluation mechanisms available in the literature are industry-, organization-, and context-specific and not generic and ignore the impact of the business environment. The purpose of this study was to examine interactions between environment and organizational enablers to measure flexibility. This mechanism of measuring given a type of flexibility is important because it is generic and can be applied to all types of flexibility. The framework is generic and can be applied to other types of industries with slight modifications and incorporating factors relevant to the industry, but the measurement technique will remain the same. The factors impacting organizational flexibility have been identified by Jain and Raj (2013). The methodology can be applied to any organization for which continuity and change assessment is available. Some organizational surveys are needed to fully explore the given methodology. Organization enablers and industry influence factors are kept at 10 and 20 at present which can be extended. In the present survey, some of the factors are not directly measured, but their equivalent values are taken on the assumption that if these values are measured their values will be closer to assumed values. In the matrix cells, decision is taken to include and exclude a given parameter by giving binary (0, 1) values. The intermediate levels are also required to make this flexibility measurement framework more effective. The workforce flexibility contributes significantly to versatility, responsiveness, and the ability of employees to move between jobs.

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