A Confirmatory Factor Analysis (CFA) of Dimensions of an Ecosystem for Sustained Organizational Growth Based on Innovation

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Abstract

The purpose of this study is to confirm dimensions of an ecosystem identified through detailed literature study and with discussion from various experts working in this domain for sustained organizational growth based on innovation through Confirmatory Factor Analysis (CFA) based on Structured Equation Modelling (SEM) of AMOS-SPSS.

A primary data is collected with a sample size of 201 valid respondents from select IT companies providing e-services in education sector through proper sampling plan as discussed in Ph.D. thesis which is base for this research paper.

This research paper confirms through confirmatory factor analysis (CFA) that all the suggested six dimensions of an ecosystem for sustained organizational growth based on innovation are reliable, valid and fit using techniques of construct reliability test, construct validity test and model fit indicators. Which can be used by the researcher and policymakers for representing the ecosystem for sustained organizational growth.

Keywords: Sustainability, Ecosystem, Innovation, CFA, Latent variables, Indicators, Model Fit, Construct Reliability & Validity.

INTRODUCTION:

**Background:** Sustainability through Innovation is the key background behind the development of various dimensions of an ecosystem for sustained organizational growth based on innovation.
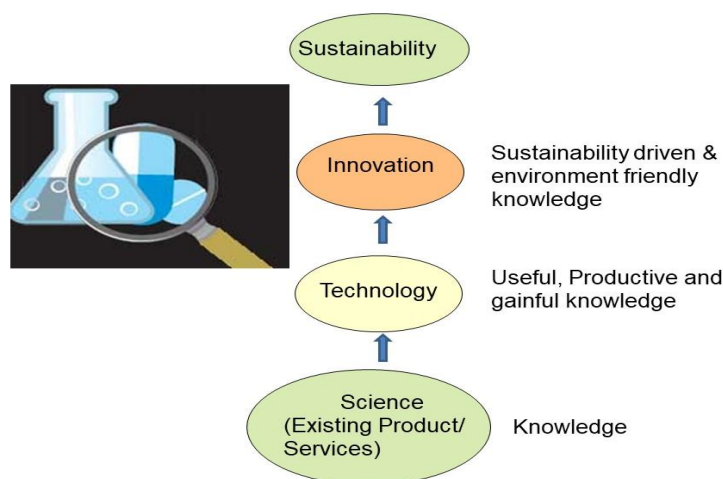
INNOVATION ECOSYSTEM AND SUSTAINABILITY FACTORS –LITERATURE AND INDUSTRY REVIEW:

An innovation ecosystem consist of the very complex but interesting relationship between economic and financial dynamics that are created between various actors or different entities whose over all goal is to enable technology development and innovation resulting in sustained organizational growth. In this context, the actors would include the material resources (funds, equipment, facilities, machinery, etc.) , the human capital (employees, staff, industry researchers, industry representatives, etc.) ,

Industry/corporate entities and institutions (e.g. corporate houses the universities, colleges of engineering, business schools, business firms, venture capitalists (VC), and finally the government policies, regulatory bodies that make up the government institutional entities participating in the ecosystem. .. Innovation ecosystem may be considered as a hybrid and complex arrangement of actors and networks; the initial research about Innovation ecosystem focused its role on private sector. Mercan and Göktas [39] (p. 102) observed that "innovation ecosystem consists of economic agents and economic relations as well as the non-economic parts such as technology, institutions, sociological interactions and the culture"
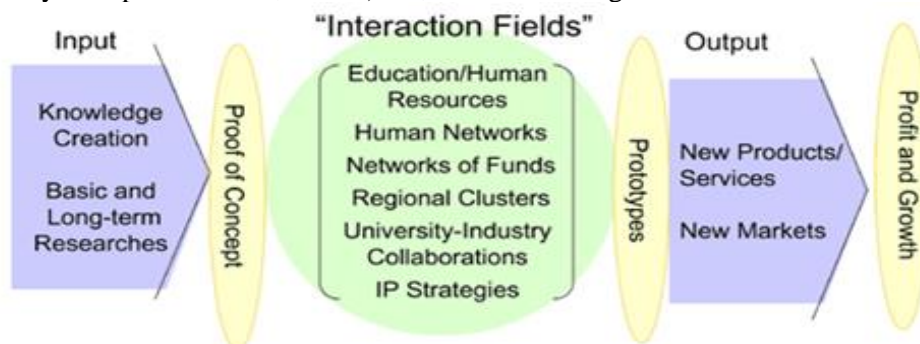
INNOVATION ECOSYSTEM:

Early March 2015 at NASSCOM event our Prime Minister Narendra Modi said that "Everyone under 18 has only one guru, Google guru,". He further said that IT industry in India flourished because government is not there and where technology base innovation plays a critical role. By saying that Indian PM echoed the widely perceived fact that state participation stifles industry growth, and derail the industrial planning and the promotion of particular sectors or corporate champions. Absence of government support and organisational commitment to R&D and innovation slows the growth. Innovation is a driver of national competitive advantage, and ultimately the individual is the primary source of

innovation. Therefore, connecting human development and government intervention becomes a crucial task in supporting growth strategies. In last 4-5 years the innovation climate and culture in India has improved a lot and thanks to various new initiatives and policies framed by Government of India. In recent report of Global Innovation Index 2019 India has up by 5 slots and stand at 52nd Rank Globally.

Recently, innovation ecosystems and sustainability approach is an emerging approach because systems of innovation approach have not made a distinction between innovation events and innovation structure leading to sustainability. In recent years, the concept of the innovation ecosystem has received increasing attention. It is considered as an

indispensable component for enhancing the innovation capabilities of individual corporations, industries, regions, and nations (Jackson, 2011).

As per my experience and Indian Industry review and various surveys, India's economic growth story can only be sustainable in the long run if its decision makers in the business sector and in the policy sphere manage to successfully address the increasing disparities, at the same time respond to the competitive pressures on India's economy in a strategic manner. In order to respond to the sustainable and inclusive imperative innovation process might need to include different stakeholders. The CII-ITC Centre of Excellence for Sustainable Development (CII-ITC CESD) has termed this form of innovation as **"Sustainable and Inclusive Innovation"**.

DIMENSIONS OF SUSTAINABLE GROWTH:

Dimensions of innovation ecosystem has various factors and various dimensions. Some of them are economic and some or non economic. These economic and non economic factors are correlated because the non-economic parts like technology, institutions, sociological interactions and thus the culture directly affects economy. Non-economic social components or social innovation structure can encourage and enable idea making, idea creation by introducing innovation and diffusion of them across industry. A highly developed innovation ecosystem helps participants to work beyond firm boundaries and its activities which enable to transformation of data into innovation. Some of the researchers have analyzed and found three dimensions and components of innovation ecosystems.

First and one of the most crucial component of the ecosystem is state of cluster creation and development. Cluster can be defined as geographic concentration of interconnected and interdependent firms, suppliers and institutions and also customers in ICT industry. One of the objectives of clusters is driving innovation with in industry and companies both. Clusters enable cumulative knowledge creation,

formation and diffusion amongst competeting firms. Some times innovative product and idea compliment each other for more value to innovation. Furthermore clustering firms extract qualified manpower pool from each other and foster innovation. In ICT industry Cluster development has strongly positive effect on innovation events. Industry- Academia collaboration is second component of an innovation ecosystem. Developing R&D and incubation centers between Industry and Academia is expected to increase innovation output.

Innovative activity is further fostered by creating a culture to innovate which is another structural component that is important. Skilled and educated pool of manpower and high skill migration from one firm to another further strengthen it and is often considered as indicators for mature state of innovation culture. In various studies researchers has elucidated the consequences and magnitude of effects of components above on innovation making supported Global Innovation Index dataset. However, some argue that the innovation ecosystem isn't yet a clearly defined concept and is usually used with an over-emphasis on economic process (Oh et al., 2016).

Governments and industrialists across various sectors of economy and industry are particularly concerned about creating innovation ecosystems that connect multiple innovation actors (e.g. Acdemia , research institutes, business firms, etc.) to cultivate favorable environments for innovators to pursue value synergistically (Frenkel and Maital, 2014; Iansiti and Levien, 2004). In addition, these organizations are expected to generate value in concert and co-evolve in sustainable ways (Adner and Kapoor, 2010).

In general, an innovation ecosystem comprises two distinct ecosystems — the knowledge ecosystem and the business ecosystem (Oh et al., 2016). The former is driven by research and development, the latter by the market economies. Knowledge creation within the knowledge community and value capturing within the business economy should both be emphasised when examining innovation ecosystems (Clarysse et al., 2014).

In addition, within the knowledge ecosystem, there also are two separate yet connected components – the creation of knowledge domain for public goods, and therefore the production of technological knowledge that is intellectually-protected and somehow private. These business, technology, and science layers form an innovation ecosystem, and that they have idiosyncrasies – understanding their specifics may help to raised assess the innovation capacities of innovation ecosystems during a holistic view; however, the relevant research remains sparse.

Since this research paper, primarily focus on innovation ecosystem of ICT industry let us understand and study trends in this sector. Information technology is not just one of the fastest growing industry in India but it also plays a major role in driving innovation across all Industries globally. In last 3 decades its has put the nation's economy onto a positive growth curve and has highly contributed in changing India's image from a sluggish developing economy to a global leader in technology on which many countries can rely for world class technology solutions. With a highly competitive market and a big requirement of IT professional it becomes very important for an organization to retain their best talent to maintain the sustainability and productivity of the organization. As we understand there are two types of Employee Turnover – functional and dysfunctional. When performing and productive employees leave the organization, it is known to be dysfunctional turnover and when the poor performers leave, it is called functional turnover. Dysfunctional turnover is the concern for growing organization. As per our experience when an employee leaves, it takes approximately six to eight weeks fill it back and in the meantime, productivity suffers. This study is an attempt to understand the impact of innovation culture in employee Retention Strategies and organizational sustainability.

Enabled by information technologies that have drastically reduced the costs of coordination, accelerated innovation ecosystems and over all become a core element within the expansion strategies of firms in almost every sector of economy. While leading exemplars tend to come from high-tech IT companies globally like Intel, Nokia, SAP, Cisco and in Indian Context TCS, WIPRO, Infosys, HCL Technologies and Accenture. Ecosystem strategies are being deployed in industries as varied as commercial printing, financial services, basic materials, and logistics provision.

The present research paper is based on case study of India's select major IT companies & other IT Company working in the education Industry viz: TCS, INFOSYS, WIPRO, HCL etc. As they are involved in the continuous innovation in education sector through developing ecosystem for sustained organizational growth, the researcher has identified six dimensions to describe the said ecosystem based on literature review and expert's opinion and his own observation as researcher himself is having more than 25 years of experience with major IT companies working in the education sector.

The Six identified dimensions for developing ecosystem for sustained organization growth are: Innovation Ecosystem (F1), Performance Evaluation (F2), Governance Structure (F3), Market Potential: IT & Education Sector (F4), Innovation in Education Sector (F5) and, Employees Rewards (F6). To confirm these Dimensions a Confirmatory Factor Analysis (CFA) technique has been used.

Tools Used: To establish said Dimensions Construct reliability, Construct validity and model fit indicators have been used.

Software Used: For Confirmatory Factor Analysis (CFA) Model AMOS 16.0 has been used.

Research Design: Descriptive Research

RESEARCH PROCESS:
- Brief Demographic profile of respondents
- Concept Model showing Indicators, Construct / Latent variables along with description of Indicator variables also known as observed variables.
- Pretesting of model through "Cronbach'sAlpha"based reliability test
- Construct of Confirmatory Factor Analysis (CFA) Model
- Construct Reliability and Construct validity
- Model fit indicators

SAMPLING PLAN / SAMPLE DESIGN:
1. **Sample Size:** - To arrive at sample online sample size calculator has been used (URL: https://www.surveymonkey.com/mp/sample-size-calculator/).Based on it**,** along with considering literature review and expert's opinion a sample size of 210 respondents were chosen for primary data collection. Finally, 201 valid respondents were taken for this research paper.
2. **Sampling Techniques**:- The random sampling technique was adopted for choosing respondents
3. **Sampling Unit:-** The sampling units were the respondents from IT companies providing e-services in education sector across various designations and experience.
4. **Sampling Instruments:-** Structured questionnaire served through google form / online
5. **Sampling Instrument Development:-** 47 questions / Items related to all six already identified Dimensions of an ecosystemhave been asked on 5-point Likert scale.

(Please refer to Annexure for detailed Questionnaireassociated with underlying Dimensions of an ecosystem surveyed on 5- point Likert Scale)

BRIEF DEMOGRAPHIC PROFILE OF RESPONDENTS:

The demographic profile of valid respondents surveyed for primary data collection are from select IT Companies working in the domain of innovation-based education as described below.

		Frequency	Percent
Valid	TCS	44	21.9
	Wipro	40	19.9
	Infosys	46	22.9
	HCL	27	13.4
	Others	44	21.9
	Total	201	100.0

		Frequency	Percent
Valid	0-5	45	22.4
	6-10	39	19.4
	11-20	52	25.9
	21-30	32	15.9
	Above 30 Years	33	16.4
	Total	201	100.0

DISCUSSION:

1. As shown above out of 201 valid respondents around 23 % were working in Infosys at the time of data collection followed by TCS and the respondents from HCL though significant but were lowest in %.
2. The respondents were experienced as shown above in second table that 16 % were having experience of more than 30 years. The maximum % belongs to experience between 11 years to 20 years which is around 26 % followed by youngsters with experience below 5 years.

This summarizes that the respondents are well diversified and proportionate in terms of their working organization and overall experience in working with leading IT companies representing whole IT industry of Indian which are also leading in Innovation based e-education services.

This concludes unbiased, quality primary data for this research paper.

CONFIRMATORY FACTOR ANALYSIS (CFA):

Confirmatory factor analysis (**CFA**) **is** a statistical technique used to verify the factor structure of a set of observed variables through testing of construct reliability, validity and model fit indicators.

In this research paper 47 indicator variables have been chosen for the construction of CFA model based on 6 dimensions as depicted below.

Concept Model of Dimensions of an ecosystem for sustained organizational growth on Confirmatory Factor Analysis (CFA) along with Reliability test for each Dimension measured through Cronbach's Alpha for given Items / Indicator variables along with code is shown below. Refer to Table 1 & Table 2 as under:
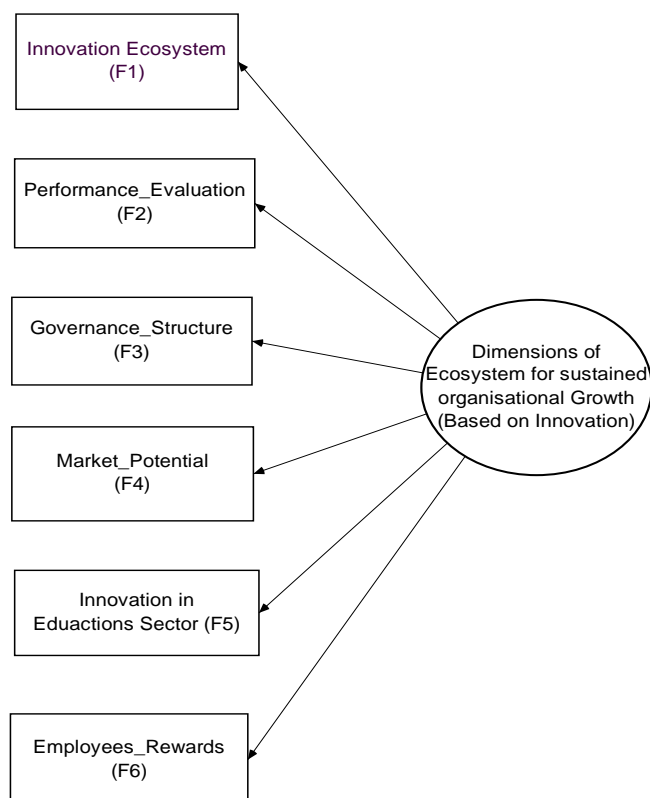
Table 1		
Constructs	**No. of Items / Indicators**	**Cronbach's Alpha**
F1	9	0.934
F2	10	0.936
F3	9	0.905
F4	5	0.860
F5	10	0.948
F6	4	0.909

| S. No.	Code for Indicator Variable	Indicator variables / Items with code and description	Indicator Reliability	Dimensions / Factors / Latent Variables / Constructs
		Table 2		
1	IE1	Technical core competence of your organization is excellent and meeting required standards for innovation.	0.57	Innovation Ecosystem (F1)
2	IE2	Employees are being involved in root cause analysis and in the process of solving problems.	0.61	
3	IE3	Employees are collaborating; engaging positively and enjoying work environment.	0.67	
4	IE4	The employees are motivated for above and beyond performance.	0.59	
5	IE5	The working groups advocate bold and innovative steps to develop new and constructive ideas.	0.69	
6	IE6	There is innovation climate in the organization which promotes taking calculative risk to achieve the goal.	0.65	
7	IE7	Fostering culture of innovation in your organization is expected to further improve project management efficiency.	0.56	
8	IE8	Adequate policies and programs are in place to support innovation in your organization.	0.70	
9	IE9	Do you agree: Innovation = invention + customer value + business model	0.43	
10	PE1	Skill-profile of employees of your organization had positively evolved significantly in last few years.	0.61	Performance Evaluation (F2)
11	PE2	Employees authentically demonstrate a genuine interest in innovation and seeking the power to make a difference.	0.64	
12	PE3	Employees are aligned with the long-term goals and objectives of the organization.	0.70	
13	PE4	Your organization had steady capital supplement in innovation activity.	0.59	
14	PE5	Your organization has good knowledge of market segments for their R&D operations.	0.50	
15	PE6	Does Employees champions changes to new work methodologies and processes to increase work output.	0.60	
16	PE7	Sub-contracting/Partnering by your organization for R&D work and support is significant.	0.55	
17	PE8	Innovative culture and set up of organization can be encouraged and enhanced through entrepreneurial strategy.	0.60	
18	PE9	Innovativeness in organizational setup can be encouraged and enhanced through organizational structure.	0.61	
19	PE10	Collaboration across different working groups and departments is encouraged and enhanced through continuous training.	0.63	
20	GS1	Perceptual lens of the top management and the team's dynamics are positioned to have a significant direct impact on the firm's commitment to innovation.	0.41	Top Management Commitment Or, Governance Structure(F3)
21	GS2	Top management in your unit directs new project selection and evaluation.	0.47	

22	GS3	Top management in your unit created a culture of commitment and enthusiasm to achieve results.	0.59	
23	GS4	Budget allocations vis-à-vis Budget request for projects are appropriate.	0.55	
24	GS5	Leadership can tolerate uncertainty and ambiguity when making decisions.	0.40	
25	GS6	Leadership is committed of providing resources by recruiting and retaining highly qualified Technical Experts.	0.62	
26	GS7	Governance is a response to the prevailing institutional environment and affects the innovation and commercialization strategies.	0.64	
27	GS8	Employees are receiving support and encouragement when presenting new ideas.	0.58	
28	GS9	Top management's commitment or lack of it, has a significant impact on the R&D effectiveness.	0.56	
29	MP1	Rising income levels are path to economic development.	0.59	
30	MP2	Laboratory for frugal innovations (the mindset of using ingenuity to make more with less) is becoming popular.	0.59	
31	MP3	MNCs are investing in innovation for the Indian market, alongside their contribution to global products.	0.62	Market Potential (IT & Education Sector): F4
32	MP4	India has adopted policies that have stimulated consumer demand and fostered entrepreneurship.	0.47	
33	MP5	Foreign R&D Organizations follow strategies for concerning innovation in India (e.g. local adaptor, local developer or global developer).	0.53	
34	ES1	Technology Infusion in Education sector is necessary	0.40	
35	ES2	How Much Digital learning platforms are effective	0.74	
36	ES3	Content of any Digital Learning tool is very important	0.71	
37	ES4	Marking, Evaluation and assessment should be made Digital for ease of operations	0.71	
38	ES5	Marking, Evaluation and Assessment should be made transparent and fast through technology.	0.75	
39	ES6	Digital Evaluation, Marking and assessment should be secured	0.76	Innovation in Education Sector (F5)
40	ES7	Building effective capacity among Indian corporations, public education and research institutions.	0.71	
41	ES8	Objective of certain innovation activities in education sector are also to find solution to global challenges.	0.68	
42	ES9	Digital Campus/University management system is important for University.	0.50	
43	ES10	General preference for standard ERP Packages rather than customized package	0.66	
44	ER1	Employee received recognition and rewards for their contribution.	0.71	
45	ER2	Your Organization has written procedure implemented for employee recognition and reward, which can be validated.	0.79	Employees Rewards (F6)
46	ER3	Process of recognition transparent and ethical in your organization.	0.80	
47	ER4	Your organization distinguishes between the various types of employee rewards, including compensation, benefits and relational returns.	0.59	

DISCUSSION:

1. Reliability test for all the six Dimension measured through Cronbach's Alpha for given Indicator variables / Items shown in above table (Table 1) is **greater than 0.7** and therefore it can be concluded that preliminary investigation / test qualifies for detailed Confirmatory Factor Analysis (CFA) to establish the Factors / Dimensions/ Constructs of an ecosystem designedbased on literature review and expert's opinion for sustained organizational growth.

2. Indicator reliability must be greater than 0.4 but if it is greater than 0.7, it is perfect. The indicator reliability in this research work is greater than 0.4 (Refer to Table 2) and therefore data structure is reliable for Confirmatory Factor Analysis (CFA) to confirm Construct reliability and Construct validity.

CONSTRUCT OF CONFIRMATORY FACTOR ANALYSIS (CFA) MODEL:
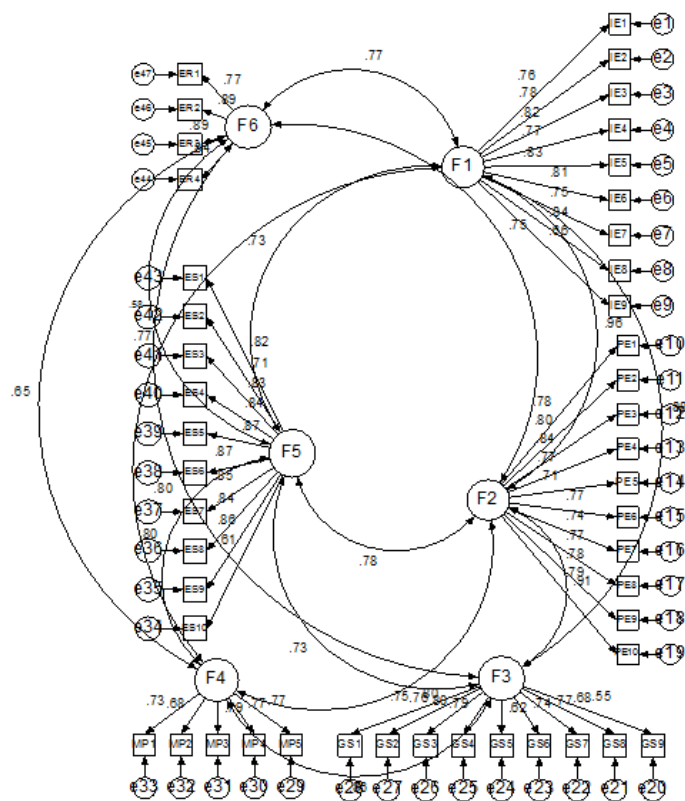
Estimates (Group number 1 - Default model)
Maximum Likelihood Estimates
Standardized Regression Weights: (Group number 1 - Default model)

Table 3

			Estimate
IE1	<---	F1	.757
IE2	<---	F1	.782
IE3	<---	F1	.818
IE4	<---	F1	.765
IE5	<---	F1	.830
IE6	<---	F1	.809
IE7	<---	F1	.749
IE8	<---	F1	.839
IE9	<---	F1	.658
PE1	<---	F2	.779
PE2	<---	F2	.799
PE3	<---	F2	.835
PE4	<---	F2	.766
PE5	<---	F2	.707
PE6	<---	F2	.774
PE7	<---	F2	.739
PE8	<---	F2	.773
PE9	<---	F2	.778
PE10	<---	F2	.794
GS9	<---	F3	.550
GS8	<---	F3	.685
GS7	<---	F3	.770
GS6	<---	F3	.742
GS5	<---	F3	.623
GS4	<---	F3	.790
GS3	<---	F3	.797
GS2	<---	F3	.763
GS1	<---	F3	.749

MP5	<---	F4	0.77
MP4	<---	F4	0.765
MP3	<---	F4	0.787
MP2	<---	F4	0.682
MP1	<---	F4	0.729
ES10	<---	F5	0.609
ES9	<---	F5	0.859
ES8	<---	F5	0.842
ES7	<---	F5	0.845
ES6	<---	F5	0.865
ES5	<---	F5	0.873
ES4	<---	F5	0.845
ES3	<---	F5	0.826
ES2	<---	F5	0.707
ES1	<---	F5	0.815
ER4	<---	F6	0.841
ER3	<---	F6	0.889
ER2	<---	F6	0.892
ER1	<---	F6	0.769

CONSTRUCT RELIABILITY AND CONSTRUCT VALIDITY:

1. Construct Reliability and validity measures the quality of Dimensions / constructs in CFA model

for given data structure and are two sides of same coin.

2. The Construct Reliability and construct validity of Model is assessed through following tests:
   - Construct reliability is measured through composite reliability - CR (Construct reliability must be assessed in the light of Cronbach Alfa means in case CR is less than 0.7 and Cronbach alfa is > 0.7 then latent or construct variable should be seen as reliable)
   - Construct validity is measured through Average variance extracted (AVE).

The Formula to calculate CR and AVE are as under:

1. Composite reliability (CR)

$$CR = \frac{[\Sigma \text{ (Standardized Loading)}]^2}{[\Sigma \text{ (Standardized Loading)}]^2 + \Sigma \text{ (ME)}}$$

Where, Measurement Error (ME) = 1- (Standardized Loading)^2

2. Average Variance Extracted (AVE)

$$AVE = \frac{\Sigma \text{ (Standardized Loading)}^2}{\text{Number of Indicator variables}}$$

Table 4

Dimensions / Construct variables	Composite Reliability (CR) > 0.7	Average variance Extracted (AVE) > 0.5
Innovation Ecosystem (F1)	0.933	0.609
Performance Evaluation(F2)	0.938	0.601
Governance Structure(F3)	0.907	0.523
Market Potential:IT & Education Sector (F4)	0.863	0.559
Innovation in Education Sector (F5)	0.951	0.660
Employees Rewards(F6)	0.912	0.721

- Construct reliability is a measure of internal consistency in scale items. Whereas construct validity is about ensuring that the method of measurement matches the construct researcher wants to measure.
- The values higher than 0.5 denotes high level of reliability and validity of Dimensions / Constructs
- As shown in above Table 4 the construct reliability measured through composite reliability (CR) is higher than 0.7 for all the constructs / Dimensions and therefore it can be concluded that all the six dimensions are reliable.
- Also, as shown in above Table 4 the construct validity measured through Average Variance Extracted (AVE) are higher than 0.5 and therefore all the dimensions or constructs are said to be valid.

DISCUSSION:

Model Fit Summary: Table 5
BASELINE COMPARISONS

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.719	.689	.803	.779	.800
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA				
Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	**.092**	.088	.097	.000
Independence model	.196	.193	.200	.000

DISCUSSION:

- A model fit indicatoris important to check fitnessof model**.** As shown in above model fit summary Table 5 the NFI, TLI and CFI indicators have value close to 0.8 (value greater than 0.9 is desirable) which can be accepted as Confirmatory Factor analysis (CFA) model is theory driven model and therefore it can be concluded that the model is fit.

- RMSEA **should be `less than 0.08'**. In above mentioned table 5, the value is 0.092 which is slightly more than 0.08 and therefore based on this error-based indicator, it can be also be concluded that the model is Fit.

CONCLUSIONS AND SUGGESTIONS:

Based on the research process and subsequent data analysis using appropriate tools and techniques following conclusions have been drawn to fulfill research objective.

1. The demographic profile of respondents surveyed belongs to diversified background in terms of designation, experience and expertise in their domain and therefore the primary data structure is said be unbiased.

2. Based on Confirmatory Factor Analysis (CFA) process the model is fit and all the six dimensions of an ecosystem identified based on literature review and expert's opinion for sustained organizational growthare reliable and valid confirmed through construct reliability and construct validity calculated and depicted through structured equation modelling (SEM).

3. This research paper confirms through confirmatory factor analysis (CFA) that all the suggested six dimensions of an ecosystem for sustained organizational growth based on innovationare reliable, valid and fit which can be used by the researcher and policymakers for representing the ecosystem for sustained organizational growth.

SCOPE OF THE STUDY:

These dimensions, after getting confirmation, of an ecosystem will help the researchers and Policy makers in system designing and measuring operational efficiency of the whole ecosystem.

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Annexure: Questionnaire / Response sheet
<u>**Section 1: Respondent Profile**</u>

	Demographic Profile of the Respondent – Employees					
1.	Name of the Respondent (Optional)					
2.	Name of the Organization (Large/Medium/Small)					
3.	Your present place of working					
	Please Tick Mark the Relevant Box					
4.	Total Experience / Service Period of the Respondent (Years)	0-5	6-10	11-20	21-30	>30
5.	Experience in Product development/R&D/Innovation	0-5	6-10	11-20	21-30	>30
6.	Designation	Executive/Sr Executive	Manager	Department Head	Sr. Manager	Director/ Decision Maker
7.	Sector/Industry Segment In which the organization is working	Government/ E-GOV	BFC	Manufacturing	Education	Health Care
8.	Experience in working with Education Sector or Government Vertical	0-5	6-10	11-15	16-20	>20

<u>**Section 2: Rating Scale for Dimensions of Ecosystem**</u>

Description for Likert Scale:
1. Strongly Disagree; 2. Disagree; 3. Neutral; 4. Agree; 5. Strongly Agree

	Innovation Ecosystem					
1.	Technical core competence of your organization is excellent and meeting required standards for innovation.	1	2	3	4	5
2.	Employees are being involved in root cause analysis and in the process of solving problems.	1	2	3	4	5
3.	Employees are collaborating; engaging positively and enjoying work environment.	1	2	3	4	5
4.	The employees are motivated for above and beyond performance.	1	2	3	4	5
5.	The working groups advocate bold and innovative steps to develop new and constructive ideas.	1	2	3	4	5
6.	There is innovation climate in the organization which promotes taking calculative risk to achieve the goal.	1	2	3	4	5
7.	Fostering culture of innovation in your organization is expected to further improve project management efficiency.	1	2	3	4	5
8.	Adequate policies and programs are in place to support innovation in your organization.	1	2	3	4	5
9.	Do you agree: Innovation = invention + customer value + business model	1	2	3	4	5

	Performance Evaluation					
1.	Skill-profile of employees of your organization had positively evolved significantly in last few years.	1	2	3	4	5
2.	Employees authentically demonstrate a genuine interest in	1	2	3	4	5

	innovation and seeking the power to make a difference.					
3.	Employees are aligned with the long-term goals and objectives of the organization.	1	2	3	4	5
4.	Your organization had steady capital supplement in innovation activity.	1	2	3	4	5
5.	Your organization has good knowledge of market segments for their R&D operations.	1	2	3	4	5
6.	Does Employees champions changes to new work methodologies and processes to increase work output.	1	2	3	4	5
7.	Sub-contracting/Partnering by your organization for R&D work and support is significant.	1	2	3	4	5
8.	Innovative culture and set up of organization can be encouraged and enhanced through entrepreneurial strategy.	1	2	3	4	5
9.	Innovativeness in organizational setup can be encouraged and enhanced through organizational structure.	1	2	3	4	5
10.	Collaboration across different working groups and departments is encouraged and enhanced through continuous training.	1	2	3	4	5

Top Management Commitment/ Governance Structure						
1.	Perceptual lens of the top management and the team's dynamics are positioned to have a significant direct impact on the firm's commitment to innovation.	1	2	3	4	5
2.	Top management in your unit directs new project selection and evaluation.	1	2	3	4	5
3.	Top management in your unit created a culture of commitment and enthusiasm to achieve results.	1	2	3	4	5
4.	Budget allocations vis-à-vis Budget request for projects are appropriate.	1	2	3	4	5
5.	Leadership can tolerate uncertainty and ambiguity when making decisions.	1	2	3	4	5
6.	Leadership is committed of providing resources by recruiting and retaining highly qualified Technical Eperts.	1	2	3	4	5
7.	Governance is a response to the prevailing institutional environment and affects the innovation and commercialization strategies.	1	2	3	4	5
8.	Employees are receiving support and encouragement when presenting new ideas.	1	2	3	4	5
9.	Top management's commitment or lack of it, has a significant impact on the R&D effectiveness.	1	2	3	4	5

Indian Market Potential (IT& Education Sector)						
1.	Rising income levels are path to economic development.	1	2	3	4	5
2.	Laboratory for frugal innovations (the mindset of using ingenuity to make more with less) is becoming popular.	1	2	3	4	5
3.	MNCs are investing in innovation for the Indian market, alongside their contribution to global products.	1	2	3	4	5
4.	India has adopted policies that have stimulated consumer demand and fostered entrepreneurship.	1	2	3	4	5

5.	Foreign R&D Organizations follow strategies for concerning innovation in India (e.g. local adaptor, local developer or global developer).	1	2	3	4	5

Objective of Innovations in Education Sector						
1.	**Technology Infusion in Education sector is necessary**	1	2	3	4	5
2.	How Much Digital learning platforms are effective	1	2	3	4	5
3.	Content of any Digital Learning tool is very important	1	2	3	4	5
4.	Marking, Evaluation and assessment should be made Digital for ease of operations	1	2	3	4	5
5.	Marking, Evaluation and Assessment should be made transparent and fast through technology.	1	2	3	4	5
6.	Digital Evaluation, Marking and assessment should be secured	1	2	3	4	5
7.	Building effective capacity among Indian corporations, public education and research institutions.	1	2	3	4	5
8.	Objective of certain innovation activities in education sector are also to find solution to global challenges.	1	2	3	4	5
9.	Digital Campus/University management system is important for University.	1	2	3	4	5
10	General preference for standard ERP Packages rather than customized package	1	2	3	4	5

Employee Rewards & Recognition System						
1.	Employee received recognition and rewards for their contribution.	1	2	3	4	5
2.	Your Organization has written procedure implemented for employee recognition and reward, which can be validated.	1	2	3	4	5
3.	Process of recognition transparent and ethical in your organization.	1	2	3	4	5
4.	Your organization distinguishes between the various types of employee rewards, including compensation, benefits and relational returns.	1	2	3	4	5