

**FLEXIBLE STRATEGIC FRAMEWORK FOR
THE ALIGNMENT OF
TECHNOLOGY AND BUSINESS STRATEGIES**

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by

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Submitted

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CERTIFICATE

This is to certify that the thesis titled “**Flexible Strategic Framework for the Alignment of Technology and Business Strategies**”, which is being submitted by **Prakash Kumar Kedia** to the **Indian Institute of Technology Delhi** for the award of the degree of **Doctor of Philosophy (Ph.D.)**, is a record of bona fide original research work carried out by him. He has worked under my guidance and supervision and fulfilled the requirements for the submission of the thesis, which has attained the standard required for a Ph.D. degree of the institute. The results presented in this thesis are not submitted for the award of any degree or diploma.

(Prof. Sushil)

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New Delhi

(Prakash Kumar Kedia)

ABSTRACT

Organisations have now experienced severe problems in overall performance and competitiveness across sectors, and therefore, a further progressive improvement in efficiency and effectiveness is necessary for all types of organisations. Technological change can also affect the efficiency and effectiveness of an organisation and can play a significant role. It allows organisations not just to abolish their non-productive activities and drive down costs but also enhance the quality of products and services along with customer requirements such as flexibility, reliability, lead time, etc.

Technological change is a complex and expensive process that requires lots of time and information, while an organisation's resources are limited. In addition, technological change is not crucial in its interest unless it impacts the overall performance and thus enhances an organisation's competitiveness. Therefore, it is necessary to assess the technologies incorporated in an organisation and to identify and invest in emerging technologies, which have a significant impact.

Technology management, especially strategic technology management, has arisen as a topic of interest among managers, but a framework for aligning the technology and business strategies of an organisation is still lacking. This study aims to establish a conceptual framework and proposes a flexible strategy framework for aligning technology and business strategies.

The study has been carried out in five phases. The first phase laid down the foundation by undertaking an extensive literature review that highlighted the research gaps and facilitated the identification of research constructs w.r.t flowing stream strategy crystal elements, i.e. continuity and change forces along with strategic factors (enterprise and customer) both for technology strategies and business strategies. Based on issues highlighted from the literature, a flexible strategic framework is conceptualised for the alignment of technology and business strategies.

Further in the second phase, developed the conceptual flexible strategic framework for technology and business strategies alignment using a reason-based qualitative technique called Total Interpretive Structural Modelling (TISM) to gain deeper insight into the relationships among the research constructs. Possible relationships, along with some important interpretations among Flowing Stream Strategy Crystal Elements, i.e. forces of continuity and change, and strategic factors in terms of enterprise and customer were hypothesised.

During the third phase, the hypothesised relationships were empirically tested based on opinion surveys using a questionnaire. The responses of the survey were analysed and established the validity of data (construct validity) using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). In addition, it established the reliability test through Cronbach Alpha. Finally, carried out the Univariate Analysis followed by delineating the relationships and paths of the conceptual framework using the technique called Structural Equation Modeling (SEM). These statistical

analyses of the data were conducted using statistical software, viz. SPSS 20.0 and AMOS 20.0.

Once the conceptual framework has been validated empirically, case research was undertaken in the fourth phase of the study to bring out the qualitative interpretation by applying the framework in specific contexts. Two cases were identified for an in-depth analysis which includes TATA Nano and Facebook vs Orkut.

Finally, in the last phase, the findings and learnings from the various studies and the insights from the case research have been triangulated and synthesised. Based on which a validated flexible strategic framework for the alignment of technology and business strategies has been suggested.

It has emerged from the findings that if the flowing stream strategic crystal elements are well-aligned then it will directly improve their respective performance parameters such as Core Competencies in the case of Continuity Forces; Stakeholders Needs in the case of Change Forces; Profitability in the case of Enterprise Factors; and Brand in the case of Customer Factors. In addition, the organisation will perform excellent if its enterprise factors, both w.r.t technology and business strategies are well-aligned with their respective customer factors w.r.t business strategies. Finally, the validated flexible strategic framework as obtained by using structural equation modeling and interpreted in case contexts indicates that the proposed framework model fits the data well.

The study has contributed by conceptualising a validated flexible strategic framework, the structural paths, and case insights and predominantly helping in setting up the right kind of technology strategies that are going to fulfil the business strategies of the organisation. Therefore, strategic factors related to the technology strategies should be aligned with the strategic factors related to the business strategies. The study is presented with a fresh approach by introducing a validated framework for the alignment of technology and business strategies.

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सार

वर्तमान समय में किसी भी क्षेत्र के संगठन को अपने उचित कार्य-निष्पादन और बाज़ार में व्याप्त प्रतिस्पर्धा के मद्देनज़र घोर समस्याओं का सामना करना पड़ रहा है। इसी वजह से संगठन की प्रकृति को बिना विचारे, हरेक संगठन के लिए अपनी सक्षमता और प्रभाविता को निरंतर कायम रखना बेहद ज़रूरी हो गया है। प्रोद्योगिकी परिवर्तन से संगठन की सक्षमता और प्रभाविता बेहतर बनती है और संगठन की प्रगति में इसका अपना एक विशेष महत्व भी हो सकता है। नयी एवं उन्नत प्रोद्योगिकी के इस्तेमाल से संगठन के कई निष्क्रिय कामकाजों की स्थायी समाप्ति संभव हो पाती है और संगठन द्वारा इस संबंध में प्रयुक्त लागतों में घटोतरी नज़र आने लगती है और साथ ही, उन्नत प्रोद्योगिकी के इस्तेमाल से संबद्ध उत्पादों और सेवाओं की गुणवत्ता में सुधार भी नज़र आने लगते हैं। प्रोद्योगिकी परिवर्तन से लचीलापन, विश्वसनीयता और उत्पादन प्रक्रिया की कालावधि जैसी ग्राहकों की संगठन से जुड़ी अपेक्षाओं की पूर्ति भी होती है।

संगठन के सीमित संसाधनों के मद्देनज़र प्रोद्योगिकी परिवर्तन एक जटिल और लचीली प्रक्रिया है जिसके लिए प्रचुर मात्रा में समय और सूचना का होना परमावश्यक है। प्रोद्योगिकी परिवर्तन तब तक महत्वपूर्ण नहीं माना जाता जब तक कि वह संगठन के समग्र

प्रदर्शन-स्तर को प्रभावित न करता हो और जिसके फलस्वरूप संगठन के स्तर पर प्रतिस्पर्धा को बढ़ावा न मिलता हो। इसलिए संगठन में जिस किसी प्रोद्योगिकी का प्रयोग किया जाता हो सर्वप्रथम उसकी जाँच-परख कर, संगठन की दृष्टि से इसकी उपयोगिता पर ध्यान केंद्रित करना ज़रूरी होता है और साथ ही, इस संबंध में उभरती नयी प्रोद्योगिकी की पहचान करने और संगठन के लाभ हेतु इस पर निवेश करने जैसे पहलुओं पर गौर करना भी बेहद ज़रूरी होता है।

प्रोद्योगिकी प्रबंधन, विशेषकर नीतिगत प्रोद्योगिकी प्रबंधन, वर्तमान समय में एक ऐसे विषय के रूप में उभरा है जिसके प्रति प्रबंधको ने काफी रुचि दिखाई है लेकिन ऐसे विषय के अध्ययन के बावजूद संगठन में प्रयुक्त प्रोद्योगिकी और व्यावसायिक-रणनीतियों के आपसी तालमेल वाले ढाँचे की मौजूदगी का अभाव अभी भी बना हुआ है। यह अध्ययन एक ऐसे संकल्पनात्मक ढाँचे की स्थापना पर लक्षित है और प्रोद्योगिकी और व्यावसायिक-रणनीतियों के आपसी तालमेल हेतु एक लचीले नीतिगत ढाँचे की स्थापना को प्रस्तावित करता है।

अध्ययन पाँच प्रावस्थाओं में विभाजित है। पहली प्रावस्था के तहत लचीले नीतिगत ढाँचे का आधार तैयार किया गया। इस प्रावस्था में प्रोद्योगिकी-रणनीतियों और व्यावसायिक-रणनीतियों दोनों के लिए नीतिगत कारकों (उद्यम और ग्राहकों) के साथ-साथ

निरंतरता एवं परिवर्तन बल (Flowing Stream Strategy Crystal Elements) के मद्देनजर शोध अंतरालों और शोध संबंधी संरचनाओं पर प्रकाश डाला गया और इन्हें ध्यान में रख कर इन सभी की विस्तृत सैद्धांतिक समीक्षा करके उपयुक्त आधार तैयार किया गया। दूसरी प्रावस्था के तहत, इस विषय पर अधिक गहराई से अध्ययन करते हुए संपूर्ण विवेचित संरचनागत मॉडलिंग (Total Interpretive Structural Modeling) जिसे टीआईएमएम कहते हैं, विकसित की गई। यह एक तर्क आधारित गुणात्मक (reason-based qualitative) तकनीक है। इसका प्रयोग प्रोद्योगिकी और व्यवसायिक रणनीतियों के समन्वय हेतु संकल्पनात्मक लचीले नीतिगत ढाँचे को विकसित करने के लिए किया गया। इसे विकसित करने का मुख्य उद्देश्य विचारित शोध संरचनाओं के आपसी संबंधों पर एक गूढ़ अंतर्दृष्टि डालना था। इस प्रावस्था के तहत फ्लोइंग स्ट्रिम स्ट्रैटिजी क्रिस्टल एलिमेंट्स अर्थात् निरंतरता एवं परिवर्तन बल और उद्यम एवं ग्राहक की दृष्टि से नीतिगत कारकों के संभावित संबंधों और इस संबंध से निर्मित कुछ महत्वपूर्ण विवेचनाओं को परिकल्पित किया गया।

तीसरी प्रावस्था के दौरान, परिकल्पित संबंधों को आनुभाविक तरीके से परीक्षित किया गया। इसके लिए एक प्रश्नावली के प्रयोग से सर्वेक्षण करते हुए राय माँगी गई। सर्वेक्षण से प्राप्त प्रतिक्रियाओं को विश्लेषित किया गया और अन्वेषी कारक विश्लेषण (EFA) और पुष्टिपरक कारक विश्लेषण (CFA) के प्रयोग से आँकड़ों की वैधता (construct

validity) स्थापित की गई। इसके अलावा, क्रोनबेक एल्फा (Cronbach Alpha) के माध्यम से विश्वसनीयता परीक्षण स्थापित किया गया। अंततः संरचनागत समीकरण मॉडलिंग (SEM) तकनीक के प्रयोग से संकल्पनात्मक ढाँचे के संबंध और पथ पर प्रकाश डालते हुए एकविचर विश्लेषण (Univariate Analysis) किया गया। इन सांख्यिकीय आँकड़ों का विश्लेषण, एसपीएसएस 20.0 (SPSS 20.0) और एएमओएस 20.0 (AMOS 20.0) स्टैटिस्टिकल सॉफ्टवेयर का प्रयोग करके किया गया।

संकल्पनात्मक (conceptual) ढाँचे के आनुभविक दृष्टि से वैध सिद्ध होने पर, कुछ खास संदर्भों में ढाँचे को व्यावहारिक तरीके से लागू कर गुणात्मक विवेचन की प्राप्ति हेतु चौथी प्रावस्था के तहत केस रिसर्च (case study) का कार्य पूरा किया गया। गहन विश्लेषण की दृष्टि से दो मामलों की पहचान की गई और जिनमें टाटा नैनो और फेसबुक बनाम ऑरकुट सम्मिलित हैं।

अंततः अंतिम प्रावस्था में, विविध अध्ययनों के परिणामों और इनसे प्राप्त उपयोगी जानकारी और केस रिसर्च (case study) की अंतर्दृष्टि अर्थात् इन तीनों बिंदुओं को त्रिभुजन (triangulation) का रूप देते हुए संश्लेषित किया गया। इन सभी को ध्यान में रख कर, उद्यम में प्रयुक्त प्रौद्योगिकी और व्यावसायिक रणनीतियों के परस्पर समन्वय हेतु एक वैध लचीले नीतिगत ढाँचे को प्रस्तावित किया गया।

अध्ययन के निष्कर्षों से ज्ञात हुआ कि यदि फ्लोइंग स्ट्रीम स्ट्रेटेजी क्रिस्टल एलिमेंट्स उचित तरीके से समायोजित (well aligned) हो तो इससे, जैसे कि कन्टिन्यूटी फोर्सेस के मामले में कोर कम्पीटेन्सीस और चेंज फोर्सेस के मामले में हितधारकों की आवश्यकताओं; उद्यम संबंधी कारकों के मामले में मुनाफा; ग्राहकों के मामले में ब्रान्ड संबंधी पैरामीटरों का प्रदर्शन बेहतर होगा। इसके अलावा, संगठन का प्रदर्शन उत्कृष्ट होगा यदि इसके उद्यम कारक (प्रोधोगिकी और व्यावसायिक रणनीति संबंधी) और संबद्ध ग्राहकों की संतुष्टि एवं संगठन से उनकी अपेक्षाएं अर्थात् दोनों में परस्पर तालमेल होगा। अंततः संरचनागत समीकरण मॉडलिंग के प्रयोग से प्राप्त वैध लचीला नीतिगत ढाँचा और केस संदर्भों की विवेचना दर्शाती है कि प्रस्तावित ढाँचा मॉडल आँकड़ों के सुसमंजन को दर्शाता है।

अध्ययन, एक वैध लचीले नीतिगत ढाँचे, संरचनागत पथ और केस अंतर्दृष्टि और मुख्य रूप से संगठन की व्यवसाय संबंधी रणनीतियों को सार्थक बनाने वाली सही किस्म की प्रोधोगिकी संबंधी रणनीतियों का निर्धारण करने में सहायक के रूप में उपयोगी सिद्ध होगा। इसलिए प्रोधोगिकी रणनीतियों से संबद्ध नीतिगत कारक व्यवसाय संबंधी रणनीतियों के परस्पर समन्वय में होने चाहिए। अध्ययन के तहत एक नवीन दृष्टिकोण का प्रयोग करते हुए एक वैध ढाँचे की प्रस्तुति प्रोधोगिकी और व्यावसायिक रणनीतियों के परस्पर समन्वय हेतु की गई है।

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NOMENCLATURE

AMOS	:	Analysis of Moments Structures
CFA	:	Confirmatory Factor Analysis
CFI	:	Comparative Fit Index
CHB	:	Change Force w.r.t Business Strategies
CHT	:	Change Force w.r.t Technology Strategies
CMB		Common Method Bias
CMIN	:	Chi-square Mean/Degree of Freedom
CTB	:	Continuity Force w.r.t Business Strategies
CTT	:	Continuity Force w.r.t Technology Strategies
CUB	:	Customer Factors w.r.t Business Strategies
CUT	:	Customer Factors w.r.t Technology Strategies
DF	:	Degree of Freedom
EFA	:	Exploratory Factor Analysis
ETB	:	Enterprise Factors w.r.t Business Strategies
ETT	:	Enterprise Factors w.r.t Technology Strategies
FIO		Firms of Indian Origin
GFI	:	Goodness of Fit
IPO	:	initial public offering
ISM	:	Interpretive Structural Modelling
IT		Information Technology
ITeS		Information Technology Enabled Service
MNC	:	Multi-National Companies
NFI	:	Normal Fit Index
OEM	:	original equipment manufacturer
PCFI	:	Parsimony Comparative Fit Index

PNFI	:	Parsimony Normed Fit Index
PSU	:	Public Sector Undertaking
RMSEA	:	Root Mean Square Approximation Error
SAM	:	Strategic Alignment Model
SME	:	Small and Medium-Sized Enterprise
STM		Strategic Technology Management
SWOT		Strengths, Weaknesses, Opportunities, and Threats
TISM	:	Total Interpretive Structural Modelling

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