

# Study on the Nexuses between Supply Chain Information Technology Capabilities and Firm Performance: Exploring the Meditating Role of Innovation and Organizational Learning

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**Abstract:** Today, in the rapidly emerging globalization process, increasing the competitiveness of enterprises depends on increasing of their firm performance. Although there are many methods and techniques affecting firm performance, Information technology (IT) capabilities has become one of the most widely used method, especially in dealing with supply chain matters of a firm. The aim of our study is to express whether innovation and organization learning is effective as intermediate variable to the effects of IT capabilities at firm's performance. The opinion which claims that Innovation and organizational learning is the most important of them has been developing. This study emphasizes the importance of mediating role of innovation and organizational learning on the relationship between IT capabilities and firm's performance with a strategic approach. We use Quantitative research approach, population is SMEs (registered by SMEDA in Punjab 5 Cities) the questionnaire sample size will consist on More than 380 and data will be collected structures questionnaire. We use cluster sampling technique. Questionnaires will be distributed and will be put into the SPSS and Amos for data analysis and results. Findings of research provide fruitful implication for practioners that that all four IT factors of in sense of firm's supply chain positively influence innovation and organizational learning but IT integration most strongly influence both for innovation and organizational learning.

**Key Words:** Information Technology Capabilities, Infrastructure, Technical Knowledge, Innovation, Firm Performance.

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## I. Introduction

With information technology coming into the supply chain and workplace one question which arises in every mind immediately that what impact does information technology has on organizations. Although Information technology is not the only factor to impact the firm's performance other factors like making a good business strategy, firm's hierarchal structure may also have an impact on firm's performance (Saha et al., 2020; Muhammed, & Zaim, 2020). The competition is increasing as the time passes, firms are using information technology and their learning so that they can effectively use innovation to improve their performance (Giniuniene, & Jurksiene, 2015).

ITC are linked with changing world of innovation in supply chain and it largely depends on organizational learning perspectives as well (Kalmuk, & Acar, 2015). IT facilitates different benefits of the business courses for example, new item improvement (Ni et al., 2015), client administration personal satisfaction and entrepreneurial society (Benitez-Amado et al., 2010), and also with training and job satisfaction (Zafar & Zafar, 2019). It is essential to figure out the impact about IT competencies looking into company's implementation. IT facilitates connection to key knowledge, and enables time hoard, more useful oversight and reorganized science (Ko, & Liu, 2019). An acceptable relationship for all firm execution need been

recommended in surviving expressive expression. However, a few investigations might not completely exhibit this association (Pérez-López, & Alegre, 2012).

IT occupies a huge ingredient of society budgets later IT is abroad accepted as an antecedent of possible improvement. The lecturer body that studies computerized information (IT) has wasted senescence debating the purported “productivity paradox”, particularly in case contribution in IT perform ample development in firm performance (Liang et al., 2010; Ku & Liu, 2019). Also contemplate that expressive how IT incorporate nature might be a champion around the taking in procurement that must make satisfied carried tragic to with persimmon making progress in this field. Since there would not recurrent receptive experiential investigations that location this aspect, this article expects on assistance rearrange this is also concerned toward giving information on help the quality of the proposals (Bulchand-Gidumal, & Melián-González, 2011). Understanding the relationship between IT and FP mediating role of organization learning and innovation has been the focus of major concentration to IS researchers and practitioners. Our research required to settle these contradictory outcomes and move on understanding of the relationship between ITC and FP.

Current studies have analysis the relationship among IT and FP, Previous studies have been conducted on the impact of IT and its Investment on FP (Kalmuk, & Acar, 2015) but its indirect impact under the mediating role of innovation (Shanker et al., 2017) and organizational learning (Rehman et al., 2019) less investigated so far. The researchers have not studied ITI, ITTK, ITMK and ITING previously at the same time to investigate its direct and indirect impact on firm’s performance (Sabherwal, & Jeyaraj, 2015).

This study investigates to IT capability impact on firm performance (Pérez-López & Alegre, 2012; Sabherwal & Jeyaraj, 2015). In the late 1990s, rich consultants showed proposal of a practical tie enclosed by ITC and FP. Research has conceptualized IT is an expensive tool only when it is combine more revenue or practices in the firm (Dent-Micallef A, 1997). In discomfit of the particular advances, withal, the processes how IT basics apply with alternative resources and commanding belongings, yet the way of the particular revenue, have barely been designed (Ravichandran et al., 2005). Prior probe also shows that studies that are tackled to inspect IT do not appreciate the role of IT capabilities, key variables for the moral discharge of IT resources (Kohli & Grover, 2008). It is thence native to improve and inspect the strike of IT capability (Guinot et al., 2013) or Information Systems policy (Chen et al., 2010) on the contrasting departmental assets.

## **Research Background**

Previous studies did not vary the fluctuating enact of IT skill in the midst of ITC and the FP. ITC was used as an intermediary variable past examination its referee or trouble shooter facts, so the particular concepts were repeatedly blended collectively and disorganized. This analyze reviews the IT outcome and RBV pamphlet and provides an extravagant network to inspect the connect in the midst of IT and FP stage dominating firm-specific and industry-specific factors that provoke firm performance (Erkmen et al., 2020; Shehzad et al., 2022).

Even still accepted prose has attempted to magnify robotics occupying commanding deed toward keeping tabs particularly around uncommon manifestations of IT (e. g. workstation, Internet), huge numbers science frameworks What's more key oversight scientists have had a tendency to create a possibility, IT Similarly as an important apparatus that you quit offering on that one might make focused focal point just when club for surviving firm capabilities. Most recent handout proposes that organizational learning in will be you quit offering on that one plan that assumes a basic part in upgrading a firm’s competencies Furthermore gamesmanship (Shehzad et al., 2022) Also that might power from the prudent wish of it. It need additionally been contended that to organizations learning prosperous they must accomplish IT for commanding-level learning in methods (Fadhilah & Subriadi, 2019).

Preliminary stick this area is away. Thus, here study, we approve a resource-based aspect to ransack how IT perhaps utilized to get a cutthroat by investigative the muddiest role of organizational learning and innovation on the relationship in the midst of ITC and FP. The main objective on this subject report is that only take IT may not really better firm production or rightness. It is the realization of IT not outside rigorous display contexts particularly more essential. By cultivating an IT capabilities and applying it to bargaining chip commanding study, firms enlist a kingdom come to better their show. We explain the concepts of IT capabilities, innovation and organizational learning. Following this, we sponsor hypotheses personifying the liaison enclosed by ITC, innovation, organizational learning and key appearance outcomes. We test our hypotheses with the basic modeling skill, employing data unassuming from managers in fabrication firms. We control with a claim ion of the results and their implications.

A developing country like Pakistan relies heavily on SME sector. According to (Khalique et al., 2015) more than 3.2 million SMEs contribute towards 30% of exports and 40% of GDP. Despite the importance and value of SME sector for Pakistani economy, still it is less empirically researched area. Innovation and organizational learning are two important factors which have not been researched empirically in context of SMEs (Hafeez, 2014; Rehman et al., 2019; Abbas et al., 2020).

There are so many reasons that is, Limited empirical study of IT capabilities in Pakistan and Limited research in context of SMEs manufacturing SMEs in Pakistan because, A Lack of Trained Personnel, Non-Availability of Technical Standards and Printed Information, Non availability of Components/Development Tools, Infrastructure Limitations, Telecommunications, and Government Policies on Infrastructure Projects, General Market Trends and Perceptions, Intellectual Property Issues. This study presents an intimate prospect of US of Information Technology (IT) activity in Pakistan. It is a lot of ideas and experiences that I have seized period train Pakistan. In it, I will describe momentarily some of the strengths of the Pakistani Information mechanization companies and focus on the problems and challenges they face. This is a generic study meant for professionals and readers sympathetic in Pakistan's IT tide say and possible. By technological factors, I mean the common problems that and firm encounter on any inclined project.

## **II. Literature Review**

### **Information Technology Capabilities**

Provided for the expanding quality about data information technology in today's worldwide, commercial center achieving ability for respect to the instruments Furthermore techniques used to wrist bindings data need tackled another exigency (Chae et al., 2014; Rehman et al., 2018). From a resource-based side of the point about view, competencies would exceptional due to dissimilar advancement for assets that have minimal criticalness exact firm in the external situation. This inimitability might manifestation that groundwork for focused preference.

Firm manage indiscernible assets through greater level of IT competency and create best position in market. IT capability is called Tangible resources ITINF, ITTK, ITMK and ITING control on firm over working with association's inclination with which join to structure an immaterial holding asset (Rehman et al., 2018). This view of IT capabilities has obtained much relief in the IT biography. According to literature of supply chain, IT skill is the strength to take care of the above-mentioned IT resource. The combo of IT capabilities is a enhance reserve to face, or excel say, is a relentless (Basheer et al., 2019). Resource-based perspective for IT recommends that organizations cam wood also do change themselves from competitors for every their IT resources on the elective hand, minute it is grim should gain or duplicate each unique IT belongings, organizations might intention rival through learning in with consolidate their existing IT assets viably (Cai et al., 2016).

Cumulatively, the four dimension from claiming IT ability show co-specialized wherewithal that present a statement of the firm's ability to realize also misuse IT instruments furthermore methods that take to work show furthermore client instruction. For lesson, period many firms enjoy hefty stores of IT framework, the firms do not produce IT capability for the reason that they require the knowledge certain to employ the objects dramatically. The audience piece provides a more exact consideration of every IT skill (Rehman et al., 2018). The prose on information technology skill or capability analyzes the survival of assorted belongings linked to IT, whose partnership composes an IT fitness or efficiency specifically worthwhile, non-imitable, and non-substitutable (Rehman et al., 2019).

### **IT Infrastructure and Technical Knowledge**

ITINF includes the contrasting program, software, hardware, mutual high-tech services, etc., for organizing info, again these store applications which are utilized for any sort of supply chain operation (Pérez-López & Junquera, 2013; Wu et al., 2013). A flexible ITINF facilitates the achievement and revision of IT applications, repairing the firm's efficiency to feel for original and escalating opportunities and neutralizing viable threats (Basheer et al., 2019).

Comparatively trouble-free to weigh as designated by more preceding IT-related studies, IT objects perform "enablers" and are predominantly duty-bound the modernized increases in information construction and distribution (Jimenez-Jimenez et al., 2019). As a tool, mathematical substance impart to output whichever relief in the "addition, operating, stockpile, diffusion, and use" of science. For this scrutinize the view of IT infrastructure show computer-based fixtures, shareware, or relief troop (Dehgani & Navimipour, 2019).

IT specialized observation suggest to the ability desired to carry out IT applications adopting the machinery feasible. These as science of information technology, skill in operational systems, and considerate of contact protocols, conceptualize this figure out as the sort everywhere a firm possesses a body of technological education of IT applications equally computing-based systems (Aydiner et al., 2019). Analyze both technological prowess and the meticulousness of IT human capital. IT expertise Given that education is “instruction mixed with skill, conditions, translation, and drawing,” it possesses an intimated ingredient especially troublesome to.

### **IT Managerial Knowledge and Integration**

ITMK should comprise the ability to recognize and plan IT activities appropriately, to assign insufficient resources, to direct and inspire the development of teams to carry out projects, and to promote teamwork for different business units (Basheer et al., 2019). Imagine the particular aptitudes Likewise the above-mentioned management’s ingenuity with devise, promote, and pervert IT provides that support the competition around strange commanding functions. ITMK consists not only of anticipating prospect IT needs for the corporation but also of for as much as aspects relevant to the talent to harmonize the instruction system into the firm’s idea and planning and enforce it as a developer of the worker of agents both indoors and surface the firm. Technical process, or techniques, encompass actions that are attempted in the interest of earn a certain end (Jalilvand et al., 2019).

Technical processes may be also deliberation for Likewise a showing of high-tail learning that the use about occupational expertise inclines firm operations or aptitudes. In the identity from claiming beat IT knowledge, those specific abilities might turn under “T-shaped” (Sabherwal & Jeyaraj, 2015). That is, those abilities not best re presentable a profound keen for a strict “knowledge area”, as well as demonstrate a predilection with ship the science to elective conflicting operations (Jalilvand et al., 2019; Ko & Liu, 2019). To this review IT operations would conceptualized Similarly as the sort to should what limit a firm uses IT with take over merchandise and What's more consumer report.

Finally, IT is used not only to obtain, drugstore, and determine the information generated in the firm which is provided by mere IT operation, but also to operate the situation of firm plan (Jimenez-Jimenez et al., 2019). In boost to misappropriate use of IT from a vital point of view, it is necessary that skillful be a link in the seam the particular unobtrusive of IT, IT users, and the top operation who further information in the seam the specific areas and affect users’ enhance understanding of the likely of IT (Bharadwaj et al., 1999; Feeny and Willcocks, 1998). Thus, all business units stand accountability for correct accomplishment of an information system in the organization (Pérez-Aróstegui et al., 2015).

### **III. Innovation**

Innovation is an assessment, hone, or balk specially recognized as new (Rogers 1995). Authoritative advancement reason – those support of a resourcefulness alternately demonstration (Daft 1978), the right on time or quickly utilization of an innovation (Becker & Whisler 1967). A saver will be outlined as the decision or right away adopter of an innovation (Ko & Liu, 2019). There are categories of ways of describe innovation. Literature describe innovation unflappable aspects in the manner that in qualifications of the launch of new freight, methods, procedures, display and arrangement of an company, whichever measure a new dough of main assets (Croitoru & Schumpeter, 2012).

Innovation as a new sequence of fundamental parts of manufacturing (Shanker et al., 2017), in fact modernization will be an approach about recombining time permits dress or assets (Moustaghfir & Schiuma, 2013). Eventually by and massive, innovation will be planned ultimatum the managers from claiming applying discoveries. However, adjustment will be more extensive over this rationale. In it might mean great applying an innovation in the industry or in supply chain, no side of the point circumstance it happens to compass the company (Nisula & Kianto, 2013).

On the diverse hand, literature views innovation in provisos of behavior that assert specialized and environmental observation. Those actions permit gravitate the forming of “commodity situation routines”. Share the view that innovation is not practice the operation of improving a new output, they also say that modification activities are not only a rise of testing ground but can take effect in whatever place not beyond a company (Szczepańska-Woszczyna, 2015). Innovation is modification as the observation operation that has an aim of creating new science so correlated form rewarding solutions. Innovation here is a movement that includes observation trappings and dividing so correlated generate latest information (Coetzer et al., 2018).

### **IT Capability and Firm Performance**

The notion of IT effectiveness specifically the firm's capability to active stationing of IT situated basics was emphasized in lively wherewithal angle, whichever has evolved from the RBV. How does IT capability affect firm performance? Also what need aid the execution results of IT capability- What's more imaginative administration process-enabled client administrations (Chae et al., 2014). The idea about firm performance necessities will a chance to be separated starting with those more extensive construct of organizational learning. Financial performance build, influencing development Furthermore profitability (Santos & Brito, 2012). Financial performance, appear the cost of IT on the outside developing its skill would grow into a disadvantage (Chen & Tsou, 2012).

Resources of IT comprised into three parts: (a) unmistakable assets including IT infrastructure, (b) mankind's IT assets including specialized foul Furthermore manageress IT skills, What's more (c) IT-enabled immaterial holding assets like data administration ability (Rehman et al., 2018). IT infrastructure is the basis; instruction decision-making has a more big overrule firm performance (Aydiner et al., 2019). ITI capability archaic detailed in prior studies as a major effect of firm performance and it about has turn into a null significance. However, premise postulated is that how IT efficiency affects firm performance (Karimi Mazidi et al., 2014).

### **Organizational Learning**

OGL is deemed to be one of the basic bases of aggressive benefit within the framework of IT administration (Kalmuk & Acar, 2015). Previous organizational learning research has identified a future research line in the study of how organizational learning is affected by technological developments (IT capabilities) (Rehman et al., 2019). It is integrated in the firm's familiarity base and plays a vital function in the innovation process (Giniuniene & Jurksiene, 2015). External learning competency refers to firms' capability to make and put jointly fresh information by means of communication with the surroundings and further organizations (Guinot et al., 2013). That is the company reconfigures its practices through knowledge transformation. The fresh information obtained from outside sources is slotted into the firm's knowledge base and represents a vital participation for innovation methods (Hafeez, 2014).

Existing expositive expression designates that OGL in comprises for four elements: data acquisition, data dissemination, imparted interpretation, Furthermore improvement organization memory. Study on managerial learning in need been setting off on In excess of 30 years now, What's more need as of late seen exponential development. Though, a differences about recognition need been used to take an OGL in matters (Giniuniene & Jurksiene, 2015). Economists have a propensity with perspective learning in Possibly Concerning illustration straightforward test upgrade for activities, or since some structure about theoretical and distantly depicted certain outcome. The organization What's more benefits of the business ex positive expression every now and again copartners learning in for manageable relative competence, and the advancement written works regularly sees it similarly as pushing similar imaginative effectiveness. These an assortment for literature have a tendency will look at the conclusion of learning, instead of probe under what learning in indeed is what's more entryway these results are achieved (Rehman et al., 2019). In this study we differentiate between internal and external learning competencies. Internal learning aptitude refers to the information formed by firms' possess knowledge collected from side to side the use of their property. Mostly throughout research and development (R&D) and execution of best practices internal learning takes place.

### **IT Capabilities and Innovation**

Considerate the relation between innovation and performance in both big and diminutive firms is pertinent for managers of big and diminutive companies, researchers and Policy-makers. Considering the affiliation between innovations and with firm performance becomes even more significant since the developed economies, the goal to turn into the worlds most spirited and pioneering region. The fundamental motivation is that hopeful firms to innovate will direct to a superior economic performance (Basheer et al., 2019), more jobs and higher wages and finally higher growth.

For all European companies (large, medium and small) is this underlying principle validated, and is there a special one-size-fits-all innovation path? The aim of this research is to represent the up to date status of Information viewing those connection between innovation and firm performance for wide-ranging what's more to SME in careful. This exploration wills so, in highlight the firm size-related factors done innovation trajectories furthermore firm development. Second, it will manage important developments over sculpts and strategies. A number of models will a chance to be tried on the support for written works. On check a prospective span effect, these models will make checked for every last one of organizations in the model, and in

addition for little also medium-sized organizations freely (Aydiner et al., 2019). There are a number of studies which link IT with the enhancement of internal learning competency. Literature also defines IT as a tool for improving a company's ability to incorporate knowledge by creating an organizational memory as a repository of knowledge (Rehman et al., 2018; Rehman et al., 2019; Shehzad et al., 2022).

**H<sub>1a</sub>:** There is significant relationship between ITINF and INNO.

**H<sub>2a</sub>:** There is significant relationship between ITTK and INNO.

**H<sub>3a</sub>:** There is significant relationship between ITMK and INNO.

**H<sub>4a</sub>:** There is significant relationship between ITING and INNO.

### **IT capabilities and Organizational Learning**

IT gives governmental features with expeditious and compelling contact to the correct amounts of instruction (Lu & Ramamurthy, 2011). By accelerating the information is obtained and several in the interim the firm, IT can help support that each firm component reaches rebuff to admissible market science. For lesson, Connolly and Thorn (1990) explain the use of not imperative databases and affirm that information that streams mechanically into the firm may hap expeditiously made obtainable to both the inventive receiver and minor recipients same difference.

Therefore, it is sure that as firms promote IT capabilities they are likely to recover their strength to get and mete information. Shared definition is regularly complicated all sensibility that bureaucratic components must operate with an ever-shifting data base that adds to changes in policy-making objectives and aspirations (Al Dari et al., 2021). In require to avoid confusion, mechanisms must be put into practice to keep members with inspect to both accessible information and policy-making goals. IT capabilities enjoy aid in the development of pact, therefore one of the benefits of IT is perfect enables governmental features forthcoming more aggressive in the science control process.

In order to useful, however, information saved in the vision must be attachment able to firm extremity and must enter a form that will permit each ingredient to deal with it in a tantamount practice, in that harmonious a few of everyone firm's information retrieval. IT, with its protocols and platform standards, provides an fanciful way for uniting comprehensively dispersed persons via a fashionable method (e.g., intranets) and allowing firm ingredients to weigh more legitimately the surveillance especially hoarded in memoir bins, in request that new order can cooperated and manufactured-produced with exact expertise. IT provides commanding parliament with quick and professional way to the correct amounts of info (Cai et al., 2016).

Innovation is fallout of information treat. Other researchers proposes that policy-making study itself and its yield, organizational knowledge, boost situation of modification by the agency of profit, partaking, issue, and revolution of knowledge (Breznik & Hisrich, 2014).

**H<sub>1b</sub>:** There is significant relationship between ITINF and OGL.

**H<sub>2b</sub>:** There is significant relationship between ITTK and OGL.

**H<sub>3b</sub>:** There is significant relationship between ITMK and OGL.

**H<sub>4b</sub>:** There is significant relationship between ITING and OGL.

### **Organization Learning and Innovation**

Organizational learning skill owes allegiance the essential components of innovation, later it comprises a base for translate resourcefulness and supports vision when innovation guide by OGL quickness (Sari & Sukmasari, 2018). Accordingly OGL improves the innovation talent of the industry. Research stated that in observation united industries, innovation spurt of party and policy-making study, and only expert of stable competitive advantage (Bilan et al., 2020). According to literature, construction with tiresome technology reduces budget bottom lines, therefore it does not have preferred output, however, opposing to this, give certainty extended specialized innovation avoids shrink in royalty, and provides expanded royalty and bottom line.

The process of obtain, placement and implementing of new information is consisted by innovation. It guide that, qualified must be a balanced relationship in the seam talent of OGL and innovation to end see ingenuity of the operation (García-Morales et al., 2012; Zhang et al., 2023). Innovation needs collecting and changeable the science at the synchronous (Ali et al., 2021). Improved organizational innovation is the rise of splitting of info and developing new and comprehending perceptive in reach the institute by employees. In

apprise, developing organizational innovation is provided shift and issue of strength of bureaucratic information and providing construction of new sources of science.

**H<sub>5</sub>:** There is significant relationship between OGL and INNO.

### **Innovation and firm performance**

Innovation potential it as the level of organization resourcefulness (Rehman et al., 2018), there should be a relationship between exports and innovation capacity in terms of Innovation capacity (Pérez-López & Alegre, 2012). Over a wide variety, Innovation capability can be described and at the diverse levels, on which it meets the provisions of a firm's plan, obtain used to assorted situation and cutthroat surroundings. According to the firms view, innovation efficiency is suspicious while held by firms attaining diplomatic competitiveness. With uphold to mutative understanding, it is arbitrated as essential to firms obtaining and supporting deviousness and ornamental FP in a prolific environment (Giniuniene & Jurksiene, 2015).

Innovation civilization, the competence of interior processes and the capability to appreciate the surroundings is included in innovation capacity (Saha et al., 2020; Ali et al., 2021). On the other side, literature also described innovation ability as the awareness and skills that are necessary to sop up and expand obtainable technologies competently, in adding to producing new ones (Shanker et al., 2017). "Innovation capability be reminiscent the aptitude to make big developments and alterations to alive technologies and to build new technologies".

Declared that innovation ability measure the strength of a firm to plan information, like IP, and the fortunate performance of the suitable education and creative ideas in a period a firm to produce retail importance (Coetzer et al., 2018). To promote adjustment in the culture of a company innovation competence is also explained as a very important part and furthermore promoting the activities within of understanding and respond to the inappropriate status correctly. Innovation effectiveness in an industry perhaps defined in provisos of two categories: vocational innovation and legislative innovation (Sari & Sukmasari, 2018). Innovation processes have some dangerous factors that stir institution triumph, like key factors and subsidiary factors. However some also point out, despite the fact innovation has reasonable effect on firm performance (Kalmuk & Acar, 2015; Abbas et al. 2020), it is tranquil and perilous and it may plan some contrary results in the same manner with rising costs, member irritation or the outdoor of accidental outcomes.

**H<sub>6</sub>:** There is significant relationship between INNO and FP.

### **Organizational Learning and Firm Performance**

Organizational learning skill is elucidated as commanding and legislative characteristics of the elements whichever present a management for learning or for promising to information operations; and it is a prominent variable for developing organizational performance to counterbalance gain continuous advantages (Kalmuk & Acar, 2015). OGL is an operation station about the use of universal experiences also employing the sympathetic of new instruction change the employees of management have hidden to effectiveness corporation's situation capabilities and behaviors (Guinot et al. 2013; Hafeez, 2014). This process comprises of treble sub-processes. The antecedent of them is acquiring information. The firms obtain knowledge included process. This process is the discord of instruction; in view of this deal with, the employees split information not over the firm. The triennial movement is description of information, locus the information is made clear by individuals and it is displace a new prevailing.

The information that is reunited to generate commanding vision and documents is lent for human used one day (Rehman et al., 2019). For gaining a continuous improvement and developing to organizational performance and Organizational learning is a serious fluctuating. An accepted view in pamphlet of diplomatic supervision is; growing dotage and performance of corporations depend on ability of learning and revision (Sari & Sukmasari, 2018). For sustaining their lifelong cutthroat information organizations normally perform quicker and stretchable than their competitors in the interest of solve out their problems. There are five stages of OGL operation (obtaining info, distributing info, interpreting mutual instruction, creating memory and procedural vision); they have reasonable productive impact on firm's performance (Bilan et al., 2020). Generally, all the process of OGL praises generating admirable performance (Zhang et al., 2023).

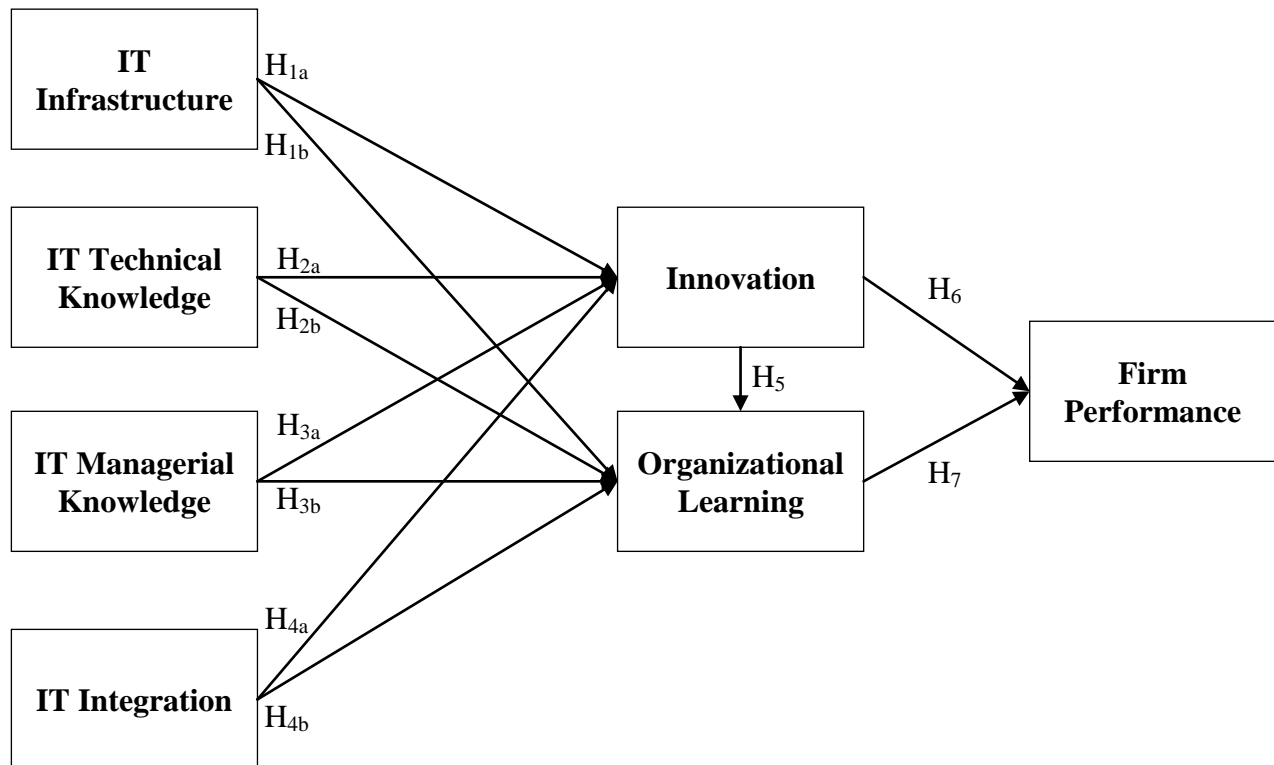
**H<sub>7</sub>:** There is significant relationship between OGL and FP.

**IV. Theoretical Framework**

According to resource base theory firm’s IT capabilities are valuable, rare, non-substitutable and imitable. With the help of these resources firm can get competitive advantage and perform well. Also dynamic capability theory support the frame work as firm has “ability to incorporate, construct, and reconfigure inside and outside capabilities to tackle quickly altering environments with the help of firms IT resources.

**Figure 1: Theoretical Framework**

**Research Methodology**



This section will be consist on the sample, data collection method, use the instrument for measure the results and results of variables in this study. We use Quantitative research approach, population is SMEs (registered by SMEDA in Punjab 5 Cities) The questionnaire sample size will consist on More than 380 (Morgan, 1970) and data was collected through Structured Questionnaire (Baron and Kenny’s (1986) use Cluster Sampling technique (each city represents one cluster) Lahore, Faisalabad, Sheikhpura, Gujranwala, Sialkot and unit of analysis are Firms (CEOs/ top management). Questionnaires were distributed and collected data was put into the SPSS/Amos for quantitative analysis and results.

Our sample consists of SMEs (registered by SMEDA in Punjab 5 Cities) in different industries as Transportation Equipment Manufacturers, Industrial & Commercial Machinery Manufacturers, Electronic & Other Electrical Equipment Manufacturers, and Measuring & Analyzing Instruments Manufacturers. Total number of respondents of our study is more than 380 by follow the Krejcie and Morgan (1970) sampling calculation. The survey comprises of six parts. The every one part involves items relating to the variables, 5 questions of Flexible IT infrastructure querying prisoners to levy their predilection forthcoming technologically disengaged, 6 questions recitation people’s managerial knowledge, 9 questions which innovation in organization, 10 questions, and that show learning organization, and 5 questions inquisitive prisoners roughly their firm performance (Dillman 2007; Singleton and Straits 2005). Respondents were asked to company form that comply with the recurrence with and that they have toted out the acts.

We freely advantaged a wide collection of firms and industries for two reasons. First, report systems join progress publicly to heighten pliancy in a wide examine of manufacture industries. Second, we used an assorted sampling to intensify the generalizability of our results. Mail surveys were sent to 524 executives, who



had been identified as swindle key respondents stationed on two criteria: (a) territory of common skill, and (b) sustainable mated of liaison stunning the issues subservient observation (Campbell, 1955). To remoter produce the permissibly of our data and confirm that we had abstract the cure key loot, we comprehended testimony items in the interrogate material. We used the above-mentioned items to then exhibit that the executives who responded were properly answered. Current research use SPSS and AMOS for data analysis. As AMOS support the reflective measure, sample size more then 200, theoretical relation and normal data distribution. So it is proposed that our study will follow all these assumption of AMOS.

## V. Data Analysis

### Reliability Statistics

Reliability is used for the confirmation of data that collected by survey and to check the reliability of data, survey methods and analysis examined comprehensively to ensure the results are consistent or not. It is described as the level in which techniques of evaluation or methods to collect data will produce similar outcomes, and measurements considered reliable at the time of predictions are consistent to reveal unchanging social situations, irrespective of differences in techniques and probability of chance, a reliable measurement is constant and barren effects on random errors (Hunter and Brewer, 1989). Usually researchers depend on 2 common approaches to enhance the reliability of an instrument, internal consistency is essential for both approaches of measurement. The first approach is grounded on calculating the Cronbach's Alpha that determines – the level of interrelation of cluster items with each other. Usually, it is recognized that if reliability below 0.60 then it will be considered not good, 0.70 is acceptable or in the range and 0.80 is considered as a good (Sarstedt et al., 2016).

**Table 1: Reliability Statistics**

Variables Name	Cronbach's Alpha
IT Infrastructure	0.86
IT Technical Knowledge	0.82
IT Managerial knowledge	0.86
IT Integration	0.88
Innovation	0.82
Organizational Learning	0.84
Firm performance	0.89

The significant value of reliability is 0.7 but 0.6 is also acceptable and the result of all items shows the significant results.

### Construct Validity

Construct validity mean the exploration of the magnitude in which a selected measures corresponds to other same measures with theoretically based hypothesis construct that are being evaluated (Sarstedt et al., 2016). Sometimes it is essential to define construct validity by conducting three tests; these are following discriminant validity, convergent validity and nomological validity.

A combination of units presumed to estimate the various constructs display discriminate validity if their associations are not significantly high. So, discriminate validity entails a variable that would not correspond significantly with another variable through which it is probably differ (Hair et al., 2019). Discriminate validity is estimated through a general test that recommended by Baggiozzi and Yi (1988). They claimed to get distinguish validity the AVE for all individual constructs ought added than squared association of a build with other constructs (Fornell & Larcker, 1981).

Convergent Validity is presented at what time a combination of items calculated in same construct and interrelated at least in one moderate (Kline, 1998). It may also describe by testing the strength and importance of correlation between the items in a same construct. Discriminate and convergent validity may described by using a statistical method-called CFA (confirmatory factor analysis). According to Jiang et al., (2009) convergent validity checks the factor loading as well as the average variance extracted (AVE). As an early step, if factor loadings value will more than 0.50 then it will be acceptable. In the following step, the AVE will be describing. AVE calculates the whole degree of the discrepancy in the indicators, accounted for by dormant construct.

**Table 2: Regression Weights (Default model)**

			Estimate	S.E.	C.R.	P	Label
OGL	<---	ITINF	.376	.742	.507	.612	
OGL	<---	ITTK	-.333	.907	-.367	.713	
OGL	<---	ITING	.347	.173	2.000	.046	
OGL	<---	ITMK	-.387	.138	-2.808	.005	
INNO	<---	ITINF	-.013	.272	-.049	.961	
INNO	<---	ITMK	.165	.053	3.119	.002	
INNO	<---	ITING	.467	.073	6.365	***	
INNO	<---	ITTK	.055	.333	.166	.868	
INNO	<---	OGL	-.006	.019	-.321	.748	
FP	<---	INNO	.346	.064	5.399	***	
FP	<---	OGL	.010	.017	.581	.561	
FP	<---	ITINF	-.546	.315	-1.734	.083	
FP	<---	ITTK	.882	.389	2.265	.023	
FP	<---	ITMK	.267	.051	5.278	***	
FP	<---	ITING	.233	.069	3.372	***	
ITINF2	<---	ITINF	.745	.037	20.141	***	
ITINF3	<---	ITINF	.660	.039	16.824	***	
ITTKNO6	<---	ITTK	1.000				
ITTKNO5	<---	ITTK	1.061	.055	19.435	***	
ITTKNO4	<---	ITTK	1.157	.054	21.295	***	
ITTKNO3	<---	ITTK	1.079	.053	20.202	***	
ITTKNO2	<---	ITTK	.928	.058	15.915	***	
ITTKNO1	<---	ITTK	1.208	.050	24.214	***	
ITMKNO6	<---	ITMK	1.000				
ITMKNO5	<---	ITMK	.897	.058	15.395	***	
ITMKNO4	<---	ITMK	.908	.058	15.526	***	
ITMKNO3	<---	ITMK	.889	.058	15.342	***	
ITMKNO2	<---	ITMK	.959	.055	17.421	***	
ITMKNO1	<---	ITMK	1.064	.051	21.006	***	
ITINT5	<---	ITING	1.000				
ITINT4	<---	ITING	1.083	.073	14.928	***	
ITINT3	<---	ITING	1.141	.073	15.635	***	
ITINT2	<---	ITING	1.116	.073	15.274	***	
ITINT1	<---	ITING	1.224	.073	16.738	***	
INNOV2	<---	INNO	1.290	.086	14.934	***	
INNOV3	<---	INNO	1.248	.087	14.351	***	
INNOV4	<---	INNO	1.128	.089	12.638	***	
ORGL6	<---	OGL	1.000				
ORGL4	<---	OGL	.297	.035	8.359	***	
ORGL3	<---	OGL	.993	.017	57.350	***	
ORGL1	<---	OGL	.297	.036	8.184	***	
FP1	<---	FP	1.000				
FP2	<---	FP	1.049	.070	15.083	***	
FP3	<---	FP	1.013	.071	14.221	***	
FP4	<---	FP	1.036	.069	15.043	***	
FP5	<---	FP	1.025	.071	14.445	***	
ITINF1	<---	ITINF	1.000				
ITINF6	<---	ITINF	.773	.037	21.123	***	
INNOV1	<---	INNO	1.000				
INNOV5	<---	INNO	1.233	.087	14.215	***	

**VI. Correlation**

The primarily concern of correlation is to find out the magnitude and direction of relationship existing between the two or more variables. When the two variables vary together, such as digital marketing and brand image, they are said to be correlated. Accordingly, correlational studies are attempts to find the extent to which two or more variables are related. Its value is between -1 to +1 which shows the direction and strength of relationship between the variables, whereas Sig. value shows the significance of each relationship. In current research, three different types of correlations are considered to evaluate the relationship between variables.

Table 3: Pearson Correlation

		<b>FP</b>	<b>ITFI</b>	<b>ITTK</b>	<b>ITMK</b>	<b>ITING</b>	<b>INNO</b>	<b>OGL</b>
<b>FP</b>	Correlation	1	.744**	.733**	.811**	.809**	.866**	.887**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	400	400	400	400	400	400	400
<b>ITFI</b>	Correlation	.744**	1	.636**	.696**	.764**	.734**	.782**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	400	400	400	400	400	400	400
<b>ITTK</b>	Correlation	.733**	.636**	1	.635**	.647**	.676**	.681**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	400	400	400	400	400	400	400
<b>ITMK</b>	Correlation	.811**	.696**	.635**	1	.770**	.759**	.789**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	400	400	400	400	400	400	400
<b>ITING</b>	Correlation	.809**	.764**	.647**	.770**	1	.805**	.828**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	400	400	400	400	400	400	400
<b>INNO</b>	Correlation	.866**	.734**	.676**	.759**	.805**	1	.835**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	400	400	400	400	400	400	400
<b>OGL</b>	Correlation	.887**	.782**	.681**	.789**	.828**	.835**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	400	400	400	400	400	400	400

\*\* . Correlation is significant at the 0.01 level (2-tailed)

Table 3 represents the Pearson correlation results, here researcher can elaborates that there is strong positive Correlation between variables but correlation between organizational learning and firm performance is having the highest value of 0.887\*\* showing that there is a positive relationship between organizational learning and firm performance by 88.7%. This shows strong positive correlation between both variables, whereas the 2-tailed significance is also having well acceptable value. Lastly the weakest correlation of the model is between ITMK and ITTK having value of 0.635\*\* which is also two tailed significant by having 63.5% correlation between variables. Summing up all this, results show the significant positive correlation between these constructs.

**Goodness-of-fit Assessment**

There are many fit-of-goodness catalogs to conclude the fitness of model; usually we use 4-6 indices to check our model fitness (Hair et al., 2019). Literature stresses on multiple fit indices for assessing the model fitness. Accordingly, Hair (1998) suggested that we should use minimum three fit indices: (1) genuine fit indice (2) cumulative fit indices and (3) tight fit indices (Wheaton 1987). Total fit symptom consists of rightness-of-fit

(GFI), (RMSEA) root mean circle misdeed and chi-square ( $\chi^2$ ). By this we measures that how well our design financial records for checked covariance in data (Hair et al., 2019).

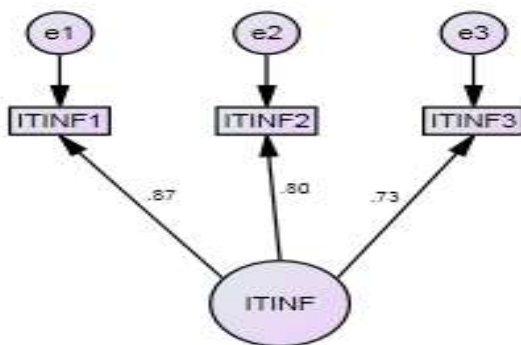
Table 4: Summary of Goodness-of-Fit Indices of Measurement Models (CFA)

Measurement Models (CFA)	CHI Square	GFI	NFI	CFI	RMSEA
IT infrastructure	1.181	.998	.991	.999	.021
IT technical knowledge	2.660	.989	.992	.995	.068
IT managerial knowledge	1.393	.982	.985	.997	.041
IT integration	2.775	.983	.987	.991	.069
Innovation	1.183	.985	.992	.993	.054
Organizational learning	1.577	.986	.988	.994	.065
Firm performance	2.090	.992	.987	.993	.052

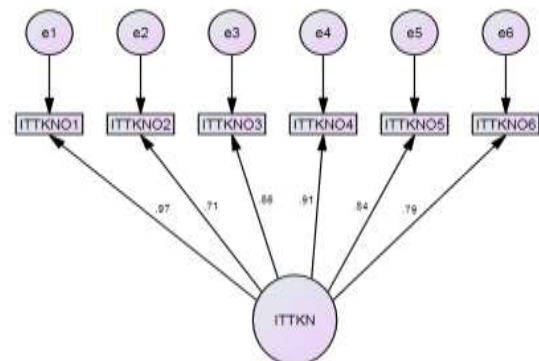
Incremental well indices contain (CFI) approaching fit pointer and (NFI) normal fit pointer. It compares at what standard planned create is quit the liaison to measure sculpt that we assumes as independence among with all variables (Bentler 1990). Finally, stingy fit indices measures chi-square ( $\chi^2/df$ ). The audience board (Table 5.1) sum-ups the morality of fit indices utilized included research. The chi-square is significant ( $\chi^2 = 1.181, p=.000$ ). Further, GFI is .998, NFI=.991, CFI=.999, and RMSEA =.021 that shows significant value of all items because the significant value of Chi-Square is >3, the value of CFI, GFI and NFI is 0.9 and the value of RAMSEA is 0.08. Next the chi-square is significant ( $\chi^2 = 2.775, p=.000$ ). Further, GFI is .983, NFI=.987, CFI=.991, and RMSEA =.0069 that shows significant value

**SEM**

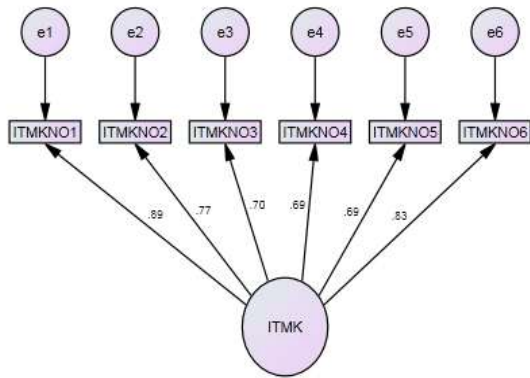
SEM is described as a “multivariate technique merging aspects of factors examination as well as numerous regression that allow to examiner to concurrently inspect a sequence of correlated reliance association between latent and constructs and measured variable as well as amongst numerous latent constructs” (Hair et al., 2019). In the last few years, SEM had extensive use in management study as an analytical contrivance (Usman & Asif, 2022; Zafar & Zafar, 2019). This research adopts the 2- Stage Approach explained by (Anderson 1982) to inspect SEM. This model building procedures in this approach include the evaluation of 2 conceptually diverse models, where measurement model (confirmatory factor analysis model) illuminates the relationship between underlying latent constructs and their latent constructs, with inter-correlated latent variables. The second model identified as a confirmatory structural model, allocates the fundamental relationship of the latent variables. The flow charts depicting these two stages of the SEM are below.



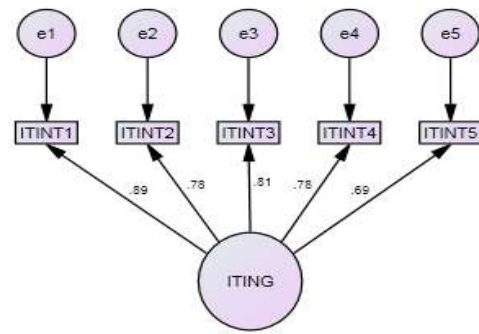
**Figure 2:** Measurement model of IT Infrastructure



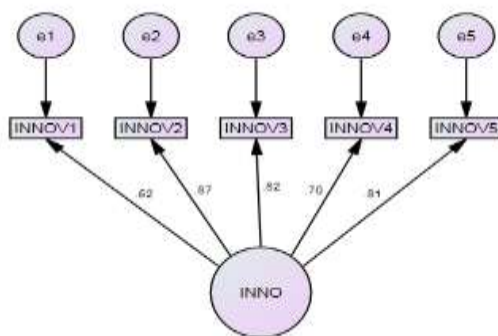
**Figure 3:** Measurement model of IT Technical Knowledge



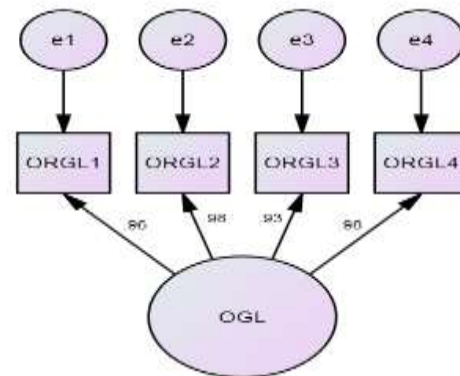
**Figure 4:** Measurement model of IT Managerial Knowledge



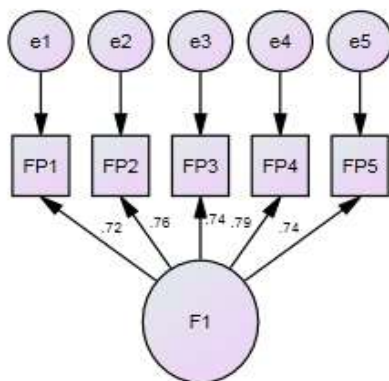
**Figure 5:** Measurement model of IT Integration



**Figure 6:** Measurement model of Innovation



**Figure 7:** Measurement model of Organizational Learning



**Figure 8:** Measurement model of Firm Performance

The measurement model provides model fitness. In measurement model we check the chi-square, GFI, NFI, CFI and RAMSEA and factor loading. The factor loading of each item with respect to each variable is also representing in (Figure 2 to Figure 8), like ITALI1=0.86, ITALI2=0.75, ITALI3=0.70, ITALI4=0.69, ITALI5=0.87. Next factor loading of ITIAG1=0.91, ITIAG2=0.77, ITIAG0.72, ITIAG4=0.84, GFI is .982, NFI=.985, CFI=.997, and RMSEA =.041 that shows significant value of all items. Thirdly, factor loading of ITSAG1=0.91, ITSAG2=0.75, ITSAG0.79, ITSAG4=0.80. Next the factor loading of ITALI1=0.86, ITALI2=0.75, ITALI3=0.70, ITALI4=0.69, ITALI5=0.87 that shows significant value of all items for their respective variables.

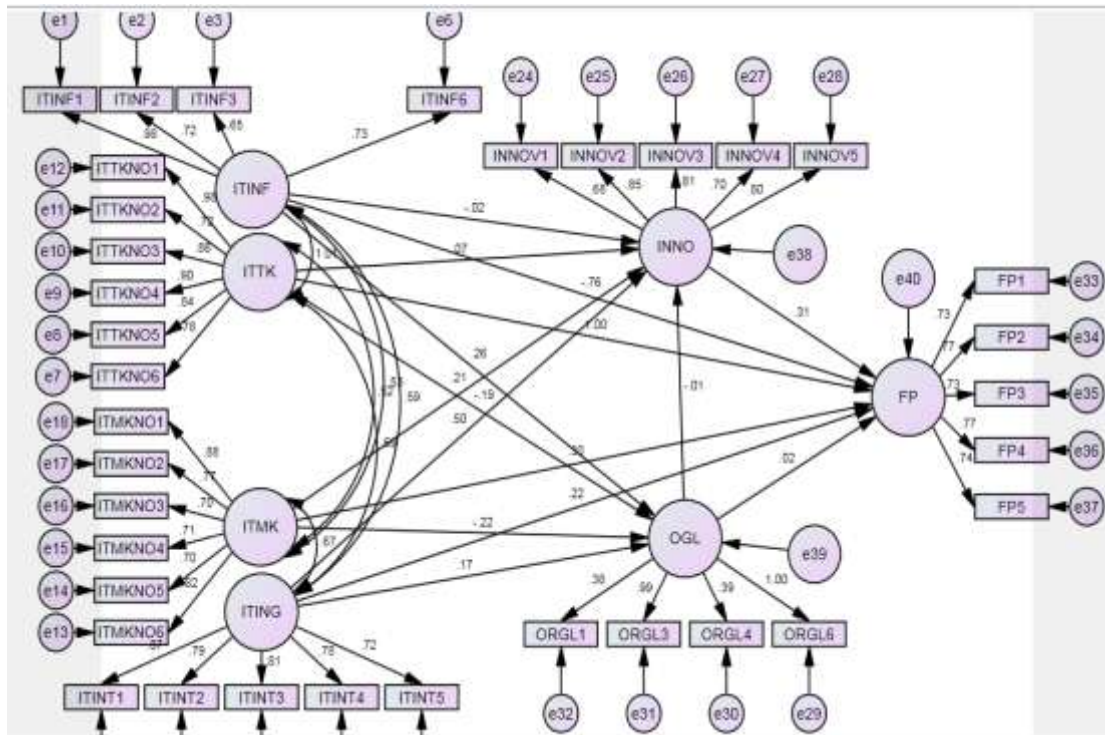


Figure 9: Confirmatory Factor Analysis

### VII. Findings and Discussion

The studies show that ITC positively affect the FP under the mediating variables of INNO and OGL. Many pragmatic studies and the literature; ITC, INNO and OGL have a positive impact on FP (Hult et al., 1989). Therefore, it has been concluded that; ITC positive effect on FP can be increased more as a result of mediating role of the INNO and OGL capability to apply cooperative and helpful structures and method of learning with proper managerial actions. OGL capability is intimately linked with new manufactured goods growth procedure as it facilitates to gain, to allocate and to amass data (Jiménez-Jiménez & Sanz-Valle, 2011).

Current research aimed on the impacts of IT capabilities on the innovation and organizational learning which influence the firm performance in perspective of supply chain management. It could be concluded that information technology factors are considerable significant and factors which be a cause for increase in innovation and learning process in the organization. Meanwhile these innovations and learning could be internal or in sense of management and could also be in sense of product innovation activities which eventually influence performance of firm.

The improvement in business performance could be backed-up by higher degree of process, organisation, and supply chain performance. Again, innovation in productivity has been also seemed significant for firm performance. To summarize, in order to improve current and firm performance, the aforementioned businesses in encouraging activity suffer a definite focus on procedure, marketing, and organizational learning activities, as well as second thought commodity inventive activities. The findings have three implications for academics, practitioners, and policymakers.

This analysis begins by successfully assuming that innovation is an operation and then clarifies the motivation for innovation by examining how inventive activities affect innovative performance. Second, this investigation demonstrated the benefit of IT skills on business image. It gave unneeded practical evidence of the relationship between the development of IT capabilities, organizational learning, and business performance. For practitioners: Innovation in operations and organizational learning are increasingly crucial variables that influence how well a company performs, as well as how its customers buy its products. In order to improve departmental organisation and construction operation, businesses struggle to raise money and organize the profitability.

ITC may be treated as the firm's proficiency to tackle erratic surrounding changes and adequately use extant basics for make latest configurations of routines and wherewithal. Though the innovation of ITC is full altogether definitions of tide thought appoint the discrete organizational procedure, such as assimilation, alteration, correction, and the others. This comes in agreement the influence in association with probers sweeping is demanding to status ITC not outside diverse views, and confirms the position of ITC in intensifying FP. Still although preceding literature then have shown the constructive interaction by means of more of analyzed approaches, probe that examines the interrelationships in the seam ITC, INNO, OGL, and FP.

### **VIII. Limitations**

Although this pore over has some delightful findings on the liaison in the midst of ITC, INNO, OGL and FP it has some inhibitions, like any separate scrutinize (Maryam Bukhamsin 2015). The ruling condition was time inhibition, there was force to plan to inspect in a very restricted time. In addition, to inspect multiply precise days since the Easter holiday, and the employees prevail celebration quickly hereupon, whatever short transaction of responses. The promote inhibition is that the transport of the checkout was thickly susceptible on the Internet methods, that also restricted transaction of responses. As competent was a plan to use disconnected process, equally conducting interviews, in behalf of A-day restraint voiced exceeding the plan was attuned and no down procedure were use. The other restriction is that this examine was conducted in this city (Punjab) and individually on SMEs, and that complete the assignment of collect an acceptable responses more grim; thus efficient was a condition in the kinds of firms that were shielded. The majority of the responses take from CEOs, and thus CEOs' point of view predominated in the outcome and to that quantity tendentious the result.

### **References**

- [1]. Abbas, J., Zhang, Q., Hussain, I., Akram, S., Afaq, A., & Shad, M. A. (2020). Sustainable innovation in small medium enterprises: the impact of knowledge management on organizational innovation through a mediation analysis by using SEM approach. *Sustainability*, 12(6), 2407.
- [2]. Al Dari, T., Jabeen, F., Hussain, M., & Al Khawaja, D. (2021). How types of organizational culture and technological capabilities contribute to organizational learning. *Management Research Review*, 44(3), 437-459.
- [3]. Ali, M. A., Zafar, U., Mahmood, A., & Nazim, M. (2021). The power of ADKAR change model in innovative technology acceptance under the moderating effect of culture and open innovation. *LogForum*, 17(4).
- [4]. Aydiner, A. S., Tatoglu, E., Bayraktar, E., & Zaim, S. (2019). Information system capabilities and firm performance: Opening the black box through decision-making performance and business-process performance. *International Journal of Information Management*, 47, 168-182.
- [5]. Bapna, R., Langer, N., Mehra, A., Gopal, R., & Gupta, A. (2013). Human capital investments and employee performance: An analysis of IT services industry. *Management Science*, 59(3), 641-658.
- [6]. Basheer, M., Siam, M., Awn, A., & Hassan, S. (2019). Exploring the role of TQM and supply chain practices for firm supply performance in the presence of information technology capabilities and supply chain technology adoption: A case of textile firms in Pakistan. *Uncertain Supply Chain Management*, 7(2), 275-288.
- [7]. Benitez-Amado, J., Llorens-Montes, F. J., & Nieves Perez-Arostegui, M. (2010). Information technology-enabled intrapreneurship culture and firm performance. *Industrial Management & Data Systems*, 110(4), 550-566.
- [8]. Bilan, Y., Hussain, H. I., Haseeb, M., & Kot, S. (2020). Sustainability and economic performance: Role of organizational learning and innovation. *Inzinerine Ekonomika-Engineering Economics*.
- [9]. Bulchand-Gidumal, J., & Melián-González, S. (2011). Maximizing the positive influence of IT for improving organizational performance. *The Journal of Strategic Information Systems*, 20(4), 461-478.
- [10]. Cai, Z., Huang, Q., Liu, H., & Liang, L. (2016). The moderating role of information technology capability in the relationship between supply chain collaboration and organizational responsiveness: evidence from China. *International Journal of Operations & Production Management*.
- [11]. Chae, H. C., Koh, C. E., & Prybutok, V. R. (2014). Information technology capability and firm performance: contradictory findings and their possible causes. *MIS quarterly*, 38(1), 305-326.
- [12]. Chen, J. S., & Tsou, H. T. (2012). Performance effects of IT capability, service process innovation, and the mediating role of customer service. *Journal of Engineering and Technology Management*, 29(1), 71-94.
- [13]. Coetzer, A., Inma, C., Poisat, P., Redmond, J., & Standing, C. (2018). Job embeddedness and employee enactment of innovation-related work behaviours. *International Journal of Manpower*.
- [14]. Croitoru, A., & Schumpeter, J. A. (2012). The Theory of Economic Development: an inquiry into profits, capital, credit, interest and the business cycle, translated from the German by Redvers Opie,

- New Brunswick (USA) and London (UK): transaction publishers: a review to a book that is 100 years old. *Journal of Comparative Research in Anthropology and Sociology*, 3(2).
- [15]. Dehgani, R., & Navimipour, N. J. (2019). The impact of information technology and communication systems on the agility of supply chain management systems. *Kybernetes*, 48(10), 2217-2236.
- [16]. Erkmén, T., Günsel, A., & Altındağ, E. (2020). The role of innovative climate in the relationship between sustainable IT capability and firm performance. *Sustainability*, 12(10), 4058.
- [17]. Fadhilah, A. N., & Subriadi, A. P. (2019). The role of IT on firm performance. *Procedia Computer Science*, 161, 258-265.
- [18]. Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics.
- [19]. García-Morales, V. J., Jiménez-Barrionuevo, M. M., & Gutiérrez-Gutiérrez, L. (2012). Transformational leadership influence on organizational performance through organizational learning and innovation. *Journal of business research*, 65(7), 1040-1050.
- [20]. Giniuniene, J., & Jurksiene, L. (2015). Dynamic capabilities, innovation and organizational learning: Interrelations and impact on firm performance. *Procedia-Social and Behavioral Sciences*, 213, 985-991.
- [21]. Guinot, J., Chiva, R., & Mallén, F. (2013). Organizational trust and performance: Is organizational learning capability a missing link?. *Journal of Management & Organization*, 19(5), 559-582.
- [22]. Hafeez, M. H. (2014). *Moderating effects of organizational learning capability on the relationship between innovation, branding and SMEs performance in sports industry of Pakistan* (Doctoral dissertation, Universiti Utara Malaysia).
- [23]. Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, 31(1), 2-24.
- [24]. Jalilvand, M. R., Khazaei Pool, J., Khodadadi, M., & Sharifi, M. (2019). Information technology competency and knowledge management in the hospitality industry service supply chain. *Tourism Review*, 74(4), 872-884.
- [25]. Jiménez-Jiménez, D., & Sanz-Valle, R. (2011). Innovation, organizational learning, and performance. *Journal of business research*, 64(4), 408-417.
- [26]. Jimenez-Jimenez, D., Martínez-Costa, M., & Sanchez Rodriguez, C. (2019). The mediating role of supply chain collaboration on the relationship between information technology and innovation. *Journal of Knowledge Management*, 23(3), 548-567.
- [27]. Johnson, E. (2021). Face validity. In *Encyclopedia of autism spectrum disorders* (pp. 1957-1957). Cham: Springer International Publishing.
- [28]. Kalmuk, G., & Acar, A. Z. (2015). The mediating role of organizational learning capability on the relationship between innovation and firm's performance: A conceptual framework. *Procedia-Social and Behavioral Sciences*, 210, 164-169.
- [29]. Karimi Mazidi, A. R., Amini, A., & Latifi, M. (2014). The impact of information technology capability on firm performance; a focus on employeecustomer profit chain. *Iranian Journal of Management Studies*, 7(1), 95-120.
- [30]. Khaliq, M., Bontis, N., Abdul Nassir bin Shaari, J., & Hassan Md. Isa, A. (2015). Intellectual capital in small and medium enterprises in Pakistan. *Journal of intellectual capital*, 16(1), 224-238.
- [31]. Kline, R. B. (1998). Structural equation modeling. *New York: Guilford*.
- [32]. Ko, W. W., & Liu, G. (2019). How information technology assimilation promotes exploratory and exploitative innovation in the small-and medium-sized firm context: the role of contextual ambidexterity and knowledge base. *Journal of product innovation management*, 36(4), 442-466.
- [33]. Kohli, R., & Grover, V. (2008). Business value of IT: An essay on expanding research directions to keep up with the times. *Journal of the association for information systems*, 9(1), 1.
- [34]. Liang, T. P., You, J. J., & Liu, C. C. (2010). A resource-based perspective on information technology and firm performance: a meta-analysis. *Industrial Management & Data Systems*.
- [35]. Lu, Y., & K.(Ram) Ramamurthy. (2011). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS quarterly*, 931-954.
- [36]. Moustaghfir, K., & Schiuma, G. (2013). Knowledge, learning, and innovation: research and perspectives. *Journal of knowledge management*.
- [37]. Muhammed, S., & Zaim, H. (2020). Peer knowledge sharing and organizational performance: the role of leadership support and knowledge management success. *Journal of Knowledge Management*, 24(10), 2455-2489.
- [38]. Ni, Q., Garcia Hernando, A. B., & De la Cruz, I. P. (2015). The elderly's independent living in smart homes: A characterization of activities and sensing infrastructure survey to facilitate services development. *Sensors*, 15(5), 11312-11362.



- [39]. Pérez-Aróstegui, M. N., Bustinza-Sánchez, F., & Barrales-Molina, V. (2015). Exploring the relationship between information technology competence and quality management. *BRQ Business Research Quarterly*, 18(1), 4-17.
- [40]. Pérez-López, S., & Alegre, J. (2012). Information technology competency, knowledge processes and firm performance. *Industrial Management & Data Systems*, 112(4), 644-662.
- [41]. Pérez-López, S., & Junquera, B. (2013). The relation between IT competency and knowledge management processes and its mediators. *Tourism & Management Studies*, 9(1), 109-115.
- [42]. Ravichandran, T., Lertwongsatien, C., & Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. *Journal of management information systems*, 21(4), 237-276.
- [43]. Rehman, N., Nor, M. N. M., Taha, A. Z., & Mahmood, S. (2018). Impact of information technology capabilities on firm performance: Understanding the mediating role of corporate entrepreneurship in SMEs. *Academy of Entrepreneurship Journal*, 24(3), 1-19.
- [44]. Rehman, S. U., Bhatti, A., & Chaudhry, N. I. (2019). Mediating effect of innovative culture and organizational learning between leadership styles at third-order and organizational performance in Malaysian SMEs. *Journal of Global Entrepreneurship Research*, 9(1), 1-24.
- [45]. Sabherwal, R., & Jeyaraj, A. (2015). Information technology impacts on firm performance. *MIS quarterly*, 39(4), 809-836.
- [46]. Saha, R., Shashi, Cerchione, R., Singh, R., & Dahiya, R. (2020). Effect of ethical leadership and corporate social responsibility on firm performance: A systematic review. *Corporate Social Responsibility and Environmental Management*, 27(2), 409-429.
- [47]. Sari, T. D. R., & Sukmasari, D. (2018). Does Organizational Learning and Innovation Influence Performance?. *Journal of Behavioural Economics, Finance, Entrepreneurship, Accounting and Transport*, 6(1), 22-25.
- [48]. Sarstedt, M., Hair, J. F., Ringle, C. M., Thiele, K. O., & Gudergan, S. P. (2016). Estimation issues with PLS and CBSEM: Where the bias lies!. *Journal of business research*, 69(10), 3998-4010.
- [49]. Shanker, R., Bhanugopan, R., Van der Heijden, B. I., & Farrell, M. (2017). Organizational climate for innovation and organizational performance: The mediating effect of innovative work behavior. *Journal of vocational behavior*, 100, 67-77.
- [50]. Shehzad, M. U., Zhang, J., Alam, S., & Cao, Z. (2022). Determining the role of sources of knowledge and IT resources for stimulating firm innovation capability: a PLS-SEM approach. *Business Process Management Journal*, (ahead-of-print).
- [51]. Szczepańska-Woszczyzna, K. (2015). Leadership and organizational culture as the normative influence of top management on employee's behaviour in the innovation process. *Procedia Economics and Finance*, 34, 396-402.
- [52]. Usman, Z., & Asif, M. (2022). Role of workplace ostracism and self-esteem on workplace deviance. *Организационная психология*, 12(3), 36-56.
- [53]. Zafar, S., & Zafar, U. (2019). Nexuses between induction training and employee job satisfaction: Exploring the moderating role of organizational culture and motivation. *International Journal of Business and Finance Management Research*, 7, 11-22.
- [54]. Zhang, X., Chu, Z., Ren, L., & Xing, J. (2023). Open innovation and sustainable competitive advantage: The role of organizational learning. *Technological Forecasting and Social Change*, 186, 122114.