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A Conceptual Framework on the Relationship between TOE Model Factors and Firm Performance of Manufacturing SMEs of Pakistan: Mediation of Use of Accounting Information System and Moderation of Entrepreneurs' IT Literacy

Mehboob Moosa[i], Dr. Imam Uddin[ii] & Dr. Arsalan Hussain[iii]

i) Assistant Professor, Institute of Business Management (IoBM) Karachi.
ii) Professor, Institute of Business Management (IoBM) Karachi.
iii) Assistant Professor, Institute of Business Management (IoBM) Karachi.

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ABSTRACT

Use of Accounting Information System (AIS) has become a significant research area since the computer software became prominent just over 3 decades ago. Therefore, the purpose of this study is to examine the factors determining the use of AIS and its influence on business performance in the manufacturing SMEs of Pakistan producing leather, surgical and sports goods. Drawing upon the Technology–Organization–Environment (TOE) theoretical framework, Diffusion of Innovations theory (DOI), and Resource-based theory (RBV), an interactive, comprehensive and multi-dimensional research framework was introduced. This research framework assessed the drivers of use of AIS by looking at technological, organizational, and environmental (TOE) factors as suggested in the TOE model. All these independent variables were used to predict the use of AIS and its impact on firm performance of Pakistani manufacturing SMEs producing leather, surgical and sports goods.

Corresponding Authors: Mehboob Moosa
Email: mehboob.moosa@iobm.edu.pk

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1. Introduction

Accounting information systems (AIS) are essential for any firm, but small and medium-sized enterprises (SMEs) need them most. Such systems are essential to the performance and success of SMEs (Sthembiso Msomi & Phumlani Vilakazi, 2023). According to (Akhter, 2022), the businesses are now solely dependent on AIS for record-keeping and information management. The foundation of AIS is its ability to assist managers in successfully operating and managing their enterprises, regularly coordinating appropriate operations, and upholding superior internal control (Thuan et al., 2022).

AIS capabilities are essential because they have the ability to convert corporate data into relevant and timely information based on user demands. Hadzrami and Rasit's (2021) empirical studies indicate that the implementation of AIS improves company performance. AIS is now a crucial strategic instrument for achieving business success. It is being used by many businesses to boost performance, productivity, and efficiency. (Haleem, 2021). (Abdelraheem et al., 2021) state that the operational activities that comprise AIS include gathering, processing, classifying, and reporting financial events.

As per Kareem et al. (2021), the utilization of AIS illustrates how SMEs employ these instruments to effectively handle their business dealings and enhance their ability to supervise and comprehend their activities as well as address challenges in the market. AIS can also be used by owners and managers to obtain operational clarity. Therefore, the current findings could help them in making strategic choices that affect the company's performance (Kareem et al., 2021).

This study considers the prospect of SMEs who do not use AIS, thus loosing the benefits of competitive advantage. In order to boost firms, which will ultimately improve the entire business performance of manufacturing SMEs, use of an AIS is crucial in today's changing and challenging business environment. In today's very competitive business world, SMEs are seeking ways to improve their performance. SMEs account for around 90% of all businesses in Pakistan. SMEs, which make up about 40% of Pakistan's GDP, are essential for improving the overall health of the nation's economy (Economic Survey of Pakistan, 2022-23). Additionally, it makes a significant contribution to the expansion of a wide range of job prospects for skilled and semi-skilled people.

The research framework incorporates several Technological, Organizational and Environmental (TOE model) components, such as, Technology Readiness, Efficiency Benefits, Top Management Support, Adoption Cost, Government Support, and Industry Pressure as the independent variables. This study has also taken into account the entrepreneurs' IT literacy as a moderator in order to assess the advantages of using an AIS to improve the performance of Pakistani SMEs manufacturing leather, surgical and sports items. Although it appears to be less common in emerging nations, technology use for timely creation of financial data and other key non-financial reports is becoming a global phenomenon. Less research has been done on how to improve Pakistani manufacturing SMEs' firm performance through the use of technology.

2. Research Gap

2.1 Theoretical Gap

Although there are numerous studies on technology, there is a research gap when it comes to linking the use of technology with the firm performance of manufacturing SMEs. (Chege & Wang, 2020). There is a gap in our understanding of how the use of AIS may mediate between organizational, technological, and environmental factors and firm performance of Pakistani manufacturing SMEs. The researcher will fill this research gap in the following ways:

1. The researcher is going to test mediator of use of accounting information system between six factors of TOE Model (Technology Readiness, Efficiency Benefits, Top Management Support, Adoption Cost, Government Support and Industry Pressure) and firm performance of manufacturing SMEs of Pakistan.

2. This is a pioneer study in which the researcher has Entrepreneurs' IT literacy as a moderator between the use of accounting information system and firm performance of manufacturing SMEs of Pakistan.

3. This study also combines RBV, DOI and TOE Model in one research framework.

4. This study is new for Pakistani manufacturing SMEs producing leather, surgical and sporting goods.

2.2 Practical Gap

Due to less or non-adoption of technology and no use of AIS, export performance is mitigated. The conclusion of this research may confirm that the use of AIS will result in increase in the export performance of Pakistani SMEs manufacturing leather, surgical and sports goods.

3. Literature Review & Theoretical/Conceptual Framework

AIS is a group of data and processing techniques that produce the users' needed information (Ahmad & Al-Shbiel, 2019). The primary goal of AIS, according to (Ahmad & Al-Shbiel, 2019), is to produce accounting information for external persons and groups including management and operational staff. According to (Fitriyani, 2019), AIS is a group of tasks performed by businesses in order to deliver financial data obtained from data transactions for use in computer-based reporting.

3.1 Benefits of Use of AIS

Utilizing AIS offers firms several benefits especially for SMEs. The following are the principal advantages:

1. Better Decision Making

AIS provides accurate and timely financial information to the enterprises to make informed decisions. This is because it is easy to have a clear view of a company's financial position and its capabilities when the two sets of information are combined (Romney, M. B., & Steinbart, P. J., 2018).

2. Healthcare Efficiency and Productivity

This is because functions such as payroll, inventory management, and account reporting when handled automatically consume less time and offer a less costly method of operation (Grande, E. U., Estébanez, R. P., & Colomina, C. M., 2011).

3. Financial Savings

AIS implementation reduces the number of administrative costs as it eliminates the performances of routine functions and also errors that may lead to loss of cash (Bagranoff, N. A., Simkin, M. G., & Norman, C. S., 2010).

4. Adherence to Regulations

AIS ensures that the organization meets all the legal aspects of finance and other financial certifications like tax compliance and audit, through providing well-presented and systematized financial information (Spathis, C., 2006).

5. Better Financial Management

AIS helps to achieve better results at managing financial activities and documentation through tracking features, and thus, minimize fraudulent situations (Gelinas, U. J., Dull, R. B., & Wheeler, P., 2014).

6. Such results lead to the need for immediate access to information.

Present-day AIS solutions give real-time reporting and analysis to enable enterprises to quickly deal with financial trends and organizational challenges (Laudon, K. C., & Laudon, J. P., 2021).

7. Scalability for Expansion

Due to the incorporation of these advanced modules such as the ERP systems, AIS can easily scale with a company's growth (Ismail, N. A., & King, M., 2005).

8. Support of Strategic Goals

Integrated with operations across the organization, AIS ensures process consistency and coherent financial support for corporate strategy through the provision of detailed data suitable for strategic planning (Hall, J. A., 2015).

9. The aggregation of more systems

AIS can work with other business systems for instance inventory, human resource and the customer relations management (CRM) systems, thus encouraging the integration of business processes (Turner, L., Weickgenannt, A., & Copeland, M., 2020).

These benefits show the primary mission of AIS in enhancing organizational and business performance and productivity where the concerns of small businesses and firms amidst the competition and shortages of funds are considered.

3.2 Conflicting and Alternative Views on AIS and Firm Performance

Here is a concise review of the literature regarding conflicting or alternative views on the benefits of using Accounting Information Systems (AIS) and their impact on firm performance, specifically in the context of manufacturing SMEs. The relationship between AIS and firm performance in manufacturing SMEs is widely discussed in academic literature, but there is no universal agreement. Researchers have presented both positive perspectives and conflicting views, influenced by contextual factors such as firm size, industry, and external environment.

1. Limited Impact in Resource-Constrained SMEs

Critics argue that the benefits of AIS may not materialize for resource-constrained SMEs, especially in developing countries. Limited access to skilled personnel, high implementation costs, and inadequate infrastructure often prevent SMEs from leveraging AIS effectively (Granlund & Malmi, 2002).

2. Complexity and Overhead Costs

Some researchers highlight that AIS implementation introduces complexity and additional administrative overheads that may outweigh its benefits for SMEs. For instance, manufacturing SMEs with informal management structures may find AIS adoption disruptive to their existing workflows (Hyvönen, 2003).

3. Context-Dependent Performance Gains

The relationship between AIS and firm performance is highly contextual, and external factors such as market competition, regulatory requirements, and IT literacy significantly influence the outcomes (Ahmad et al., 2015). SMEs in less competitive markets may see limited advantages from AIS compared to those operating in dynamic environments.

4. Mismatch with Organizational Culture

SMEs often have unique organizational cultures and practices that may not align well with standardized AIS. Studies suggest that if AIS is not customized or integrated with the firm's workflows, it may lead to resistance among employees, reducing its effectiveness (Dechow & Mouritsen, 2005).

The literature reveals a nuanced perspective on the relationship between AIS and firm performance. While the potential benefits are well-documented, the realization of these benefits is contingent upon factors such as the SME's resource base, IT literacy, organizational culture, and external environment. The conflicting views underline the need for a tailored approach to AIS adoption, considering the specific challenges and capabilities of manufacturing SMEs.

In the contemporary business environment, the utilization of Accounting Information Systems (AIS) has become imperative for the effective functioning of Small and Medium-sized Enterprises (SMEs). The purpose of this review of the literature is to investigate the relationship between the performance of manufacturing SMEs in Pakistan and the usage of AIS, with an emphasis on the moderating effect of IT literacy among entrepreneurs. Various aspects of existing and newer technologies, the institutional circumstances under which the technology is utilized, and the external environment of the institution all affect the adaptation of newer technological systems into the institution's existing framework. The field of information systems created the Technology-Organization-Environment (TOE) framework, with the core components being Technology, Organization, and Environment, as a theoretical framework to explain these factors. Some of technology's attributes impacting the aforementioned include its compatibility with the system, ease of use and access, level of complexity, and its usability. The core component, "Organization," refers to the internal setting of the institution, including factors such as size, culture, invested resources, and structure. The second component, "Environment," includes factors such as social, cultural, and traditional customs, legal binds, and current and changing dynamics of the market.

The models combined to form the theoretical foundation of this study are The Resource Based View (RBV), Diffusion of Innovation (DOI), and Technology, Organization, and Environment (TOE) Models. RBV Theory (Kor & Mahoney, 2004) highlights the significance of resources utilized for the enhancement of corporate performance. The Standard Market Dominance Hypothesis is opposed to RBV theory, which looks at firm's success in terms of varied resources rather than the market domination in the studies of (Bromiley & Flemming, 2002) and (Barney, 1991). RBV hypothesis also heavily enforces strategic management since it is regularly utilized as a managerial framework for the identification of essential resources that assist in the maintenance of a competitive advantage.

The theory provides an essential framework for constructing justifications for and predictions of the fundamentals underpinning a company's performance and competitive advantage. The RBV theory's

key tenet is resource heterogeneity, which encompasses capabilities, a range of resources, and the firm's immobility. (Mata et al., 1995). These distinctive resources share a number of qualities with other market participants, including economic value, relative scarcity, difficulty of imitation by rivals, and non-substitutability (Khan et al., 2020). (Barney, 1991) has also categorized resources in tangibles and intangibles. Thus, firms need to utilize their resources efficiently and effectively to gain a competitive advantage, which eventually enhances the firm performance (Hwang & Min, 2015). Likewise, in our study, Efficiency Benefits, Top Management Support, Adoption Cost, Government Support and Industry Pressure are categorized into intangible resources of RBV theory. However, in Technology Readiness, IT skills come under intangible resource and IT infra-structure comes under tangible resource of an organization.

The Technology, Organization and Environment (TOE) Model framework examines technological elements from Rogers' Diffusion of Innovation (DOI) perspective. The TOE model can also be used to describe an organization's internal environment (Qalati et al., 2021). Researchers have previously used broad innovation models that were modified to individual environmental and technological components to explain the adoption of new technologies in a variety of settings. To evaluate accounting information systems, enhance a company's operational effectiveness, and ultimately get a competitive edge over competing organizations, the current research will examine six TOE model components, viz: Technology Readiness, Efficiency Benefits, Top Management Support, Adoption Cost, Government Support, and Industry Pressure.

Diffusion of innovation (DOI) studies aim to understand what stimulates the adoption of a resource, such as an idea or product, and how such a decision can affect a social structure and context. The prior literature serves as the foundation for the study's research framework. DOI was regarded as a supporting theory in this study, while the framework was constructed on the basis of literature and is primarily based on the Resource-Based View (RBV) theory.
According to (Rogers, 2003), who provided the theory of DOI, "A technology is a practical action plan that reduces the level of ambiguity in the cause-and-effect relationships required to produce the intended outcome". Hardware and software are the two parts. Software is "the information base for the tool," but hardware is "the tool that embodies the technology in the form of a material or physical object."

Additionally, DOI theory between TOE model and Firm Performance of manufacturing SMEs supports the mediating influence of AIS use. Finally, RBV theory supports the moderating variable (entrepreneurs' literacy). Figure 1 depicts the six independent factors, one mediating variable, one moderating variable, and one dependent variable that make up the theoretical framework of the current research as follows:

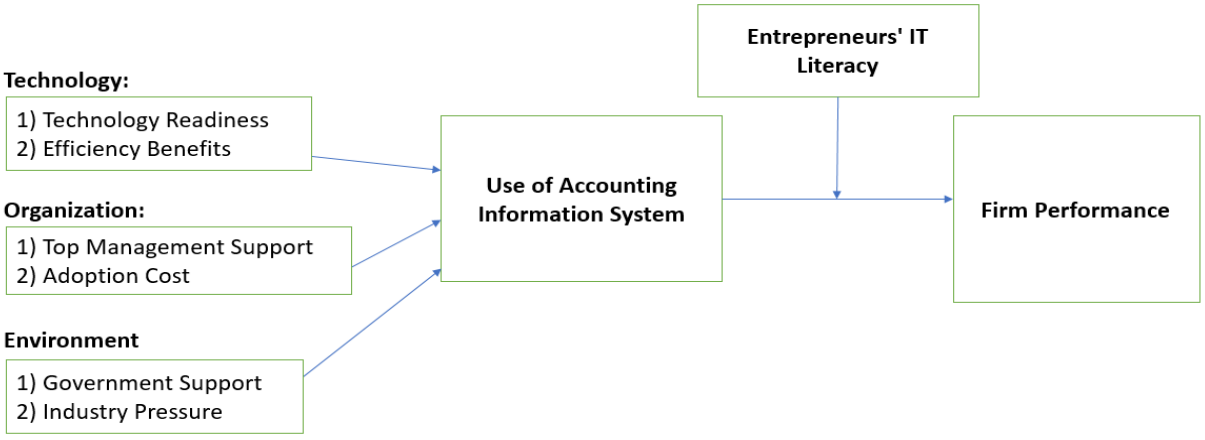

Figure 1 - Source (Author)

3.3 Relationships of independent variables with mediator

1. **Technology Readiness with Use of AIS**:

Manufacturing SMEs that are more technologically ready are likely to invest in and effectively use AIS to improve their operational efficiencies, financial reporting accuracy, and decision-making processes. Therefore, the hypothesis for this relationship is formulated as follows:

Hypothesis: Higher levels of Technology Readiness (TR) among manufacturing SMEs lead to a greater utilization of AIS.

2. **Efficiency Benefits with Use of AIS**:

By enhancing operational efficiency and supporting strategic decision-making, AIS can contribute to better financial management, resource utilization, and overall competitiveness of SMEs in the leather, sports goods, and surgical goods sectors. Therefore, the hypothesis for this relationship is formulated as follows:

Hypothesis: Greater utilization of AIS leads to improved firm performance indicators such as profitability, productivity, and growth in manufacturing SMEs.

3. **Top Management Support with Use of AIS**:

Support from the top management communicates to the rest of the company the value of AIS in accomplishing strategic goals like increasing operational effectiveness, strengthening decision-making skills, and guaranteeing regulatory compliance. As a result, the following is the formulation of the hypothesis for this relationship:

Hypothesis: Higher levels of Top Management Support lead to greater adoption and effective utilization of AIS in manufacturing SMEs.

4. **Adoption Cost with Use of AIS**:

SMEs are encouraged to use AIS functions more efficiently in order to recoup their original investment, particularly if they face significant adoption expenses. As a result, AIS features for financial management, reporting, inventory control, and decision assistance are frequently used more extensively. As a result, the following is the formulation of the hypothesis for this relationship:

Hypothesis: Higher adoption costs may initially deter SMEs from investing in AIS; however, once implemented, the level of utilization tends to be higher as SMEs seek to maximize their return on investment (ROI).

5. **Government Support with Use of AIS**:

SMEs are more inclined to invest in AIS technologies when governments offer financial incentives and encouraging policies. This assistance can lower financial obstacles, promote creativity, and give SMEs the tools and incentives they need to adopt AIS more thoroughly. The hypothesis for this relationship is as follows:

Hypothesis: Higher and more effective utilization coupled with increased adoption of AIS amongst SMEs is dependent on higher levels of Government Support.

6. **Industry Pressure with Use of AIS:**

Due to strong industry demands, SMEs are required to incorporate AIS and stay aligned with all custom requirements, enhance cost efficiency, enhance operations, and stay competitive in the market. This motivates SMEs to invest in AIS solutions that improve data accuracy, enhance workflows, and support better decision-making. As a result, the following is the formulation of the hypothesis for this relationship:

Hypothesis: Higher and more effective utilization coupled with increased adoption of AIS amongst SMEs is dependent on higher levels of industry pressure.

7. **Relationship of Use of AIS with Firm Performance**:

In the industrial sector, the incorporation of AIS leads to improved decision-making, cost reduction, enhanced operations, and accurate financial reporting for SMEs (Alnabsha et al., 2018). The efficient use of AIS facilitates and supports strategic planning and resource allocation due to timely access to financial information (Kertayuga, D., Santoso, E., & Hidayat, N. (2021). Hence, it is noticed that businesses that implement AIS experience greater growth and profitability compared to businesses that rely on traditional manual accounting methods. As a result, the following is the formulation of the hypothesis for this relationship:

Hypothesis: The implementation of AIS impacts firm performance indicators such as profitability, productivity, and growth.

8. **Entrepreneurs' IT Literacy as a Moderator Between Use of AIS and Firm Performance**:

The level of IT literacy among entrepreneurs highly impacts AIS implementation in SMEs. Entrepreneurs with strong IT literacy can make informed decisions since they are better equipped to understand and enhance AIS functions (Putro & Aziz, 2023). Moreover, entrepreneurs with IT knowledge ensure a smoother implementation and effectively address any issues that may arise during AIS integration efforts (Valentino et al., 2021). Therefore, the IT literacy of entrepreneurs plays a

critical role as a moderator in the relationship between AIS usage and business success. As a result, the following is the formulation of the hypothesis for this relationship:

Hypothesis: Entrepreneurs' IT literacy acts as a key moderator in the relationship between AIS usage and firm performance.

4 Research Methodology

This study is a Quantitative Research in which the researcher will choose the stratified proportionate random sampling method. To collect data, survey method will be used. In general, survey research is used to explain what is present, in what quantities, and in what circumstances. Surveys are used to answer questions that have been put forth, address issues that have been expressed or noticed, assess needs and define goals, ascertain whether or not certain objectives have been fulfilled, establish baselines for future comparisons, and track trends over time (Isaac & Michael, 1995). The demographic information needed to explain the make-up of the sample can be collected via surveys effectively. It is cheap to design and administer surveys, and generalizations are quite simple to make. There are many different sorts and numbers of variables that can be studied using surveys (Glasow, 2005). By ensuring that the information obtained is reliable and current, primary research enables the display of precise trends. Primary research also gives the organization ownership of the data. Primary study has the advantages of being current because the researcher has current data and correct because it should directly address your research issue.

The demographic data should be collected utilizing the questionnaire, which is crucial for understanding the nature of the sample and whether the conclusions drawn can be considered generalizable. The following are the basic elements that should be included when designing a survey meant to capture demographic data.

Essential Demographic Data to Gather Fundamental Personal Information

- Age: Use age brackets (such as 18-24 years, 25-34 years) to respond to respondents' comfort and analysis ease.
- Gender: Offer male, female, non-binary, prefer not to state, and allow permits customization for specific demographics if needed.
- Educational Attainment: Levels such as primary, secondary, diploma, a bachelor's degree, a master's degree, and a doctoral degree.

Labour and Career Data

- Job Title/Role: Relevant to the study targeting the owner, manager or employee of SMEs.
- Industry Experience: Measurable in terms of number of years or other timeframe (for example, 1 to 5 years, 6 to 10 years).
- Department/Function: For example, they may specialize in finance, production, information technology, sales, or general management.

Small and Medium Enterprises Business Information

- Business Size: It can be evaluated based on the manpower strength into micro, small or medium or on the basis of revenue brackets.

- Industry Sector: Industry, services, trade, etc.
- Geographical classification: City, region, or rural-urban classification.
- Type of Ownership: For instance, sole trader, partnership, family-based business, etc.

Implementation of Technology and Information Technology Skills

- Access to Technology: For instance, the devices used at the workplace (computer desktop, laptop, mobile, etc.).
- IT Literacy Level: Published or self-developed scale (e.g., 'not proficient at all,' 'proficient to some extent,' 'proficient').
- Utilization of AIS: Length of engagement and tasks managed/meet needs such as inventory, payroll, tax preparation or other accounting needs.

Further Background Information
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- Cultural Background: It is not a necessary requirement but may be crucial for research in different environments.
- Income/Financial Tiers: Regarding wages or salaries of individuals (if existing) or, corporate revenues, as the case may be.
- Willingness to Participate: Consent and willingness to share confidential information.

The researcher will distribute 500 questionnaires and expect maximum responses from the top and middle level managers of those manufacturing SMEs of Pakistan who produce leather, surgical and sports goods. This study will employ SPSS for statistical inference and PLS-SEM for hypothesis testing and empirical analysis. PLS-SEM is used because the research goal is to comprehend the theoretical implications of accepted theories, and the research framework is concerned with testing a theoretical framework from a prediction perspective. Additionally, PLS-SEM offers advantages when the sample is small and can handle causal modelling better (Sarstedt et al., 2020). The sample size of this study is comprised of small population because the research data will be collected from the manufacturing SMEs of Pakistan who produce leather, surgical and sports goods. As a result, the study population will be split into three manufacturing SMEs: SMEs producing leather goods, SMEs producing surgical equipment and SMEs producing sporting goods. The strata from which the sampling units for this probability sampling technique will be derived are all the ones that have been selected (Eriksson & Kovalainen, 2011). Survey items will be scored using a 7-point Likert scale, with 1 denoting "strongly disagree" and 7 denoting "strongly agree."

So far as independent variables are concerned, in measuring technology factors, to measure technology readiness, a seven (07) items scale will be adapted from (Somali, 2012) and to measure efficiency benefits, a three (3) items scale will be adapted from (Carnaghan & Klassen, 2007) In measuring organizational factors, to measure top management support, a four (04) items scale will be adapted from (Premkumar & Roberts, 1999) and to measure adoption cost, a three (03) items scale will be adapted from (Al-Qirim, 2007) In measuring environmental factors, to analyze government support influence, a four (04) items scale will be adapted from (Looi, 2005) and to measure industry pressure, a five (05) items scale will be adapted from (Somali, 2012). The mediator construct of use of AIS will be assessed by adapting a six (06) items scale from (Soudani, 2012) The moderator construct of Entrepreneurs' IT Literacy will be assessed by adapting three (03) items scale from (Friedman, 2016). The dependent variable construct of Firm Performance will be assessed by adapting a ten (10) items scale from (Wiklund & Shepherd, 2003).

5 Conclusion

The adoption and use of an accounting information system improves the firm performance of Pakistani manufacturing SMEs producing leather, surgical and sporting goods. The use of AIS may also be significantly impacted by organizational, technological, and environmental factors, which ultimately improve the business performance of manufacturing SMEs. In addition, the researcher had investigated the potential moderating influence of entrepreneurs' IT literacy on both business success and the adoption of AIS.

5.1 Contribution

This research will be beneficial to the stake holders of Pakistani SMEs manufacturing leather, surgical and sports goods. The firm performance with reference to exports of leather, surgical and sports goods will be increased as a result of use of AIS. It will also be beneficial to the policy makers, relevant government agencies etc.

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