Analyzing Systemic Sclerosis Dynamics Using Total Variation Diminishing (TVD) Methods and Assessing the Impact of Trade Openness on Healthcare Access

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ABSTRACT

Systemic sclerosis (SSc) is a chronic autoimmune disease characterized by fibrosis and vascular abnormalities. Understanding the progression of SSc is crucial for developing effective treatments. This study employs Total Variation Diminishing (TVD) methods to model the dynamics of fibrosis in SSc, providing a detailed analysis of disease progression. Additionally, the research examines the impact of trade openness on healthcare access and outcomes, exploring how international trade policies can influence the availability of treatments for SSc patients. The paper includes a comprehensive literature review, detailed research methodology, results from the TVD method application, and conclusions on the implications for health policy and international trade.

KEYWORDS: TVD method, systemic sclerosis, trade openness

1.0 INTRODUCTION

Systemic sclerosis (SSc), also known as scleroderma, is an autoimmune disease characterized by skin thickening, fibrosis of internal organs, and vascular abnormalities. The pathogenesis of SSc involves complex interactions between immune responses, fibrosis, and vascular changes. Accurately modeling these dynamics is essential for understanding disease mechanisms and developing targeted therapies. Total Variation Diminishing (TVD) methods are numerical techniques used to solve hyperbolic partial differential equations (PDEs), making them suitable for capturing the sharp gradients and discontinuities typical of fibrosis progression in SSc. This study utilizes TVD methods to model the dynamics of SSc, offering insights into the spatial-temporal behavior of fibrotic changes. Trade openness, defined as the degree to which a country engages in international trade, can significantly impact healthcare access and outcomes. By facilitating the exchange of medical technologies, pharmaceuticals, and healthcare services, trade openness can enhance healthcare delivery and improve patient outcomes. This study also investigates the relationship between trade openness and healthcare access for SSc patients, considering how trade policies influence the availability and affordability of treatments. Systemic sclerosis (SSc), a chronic autoimmune disease characterized by widespread fibrosis and vascular abnormalities, poses significant challenges for both clinical management and research. The pathogenesis of SSc involves complex interactions between the immune system, endothelial cells, and fibroblasts, leading to excessive production of extracellular matrix and tissue stiffness. Understanding these dynamics at a detailed level is crucial for developing effective treatments. Traditional experimental methods provide invaluable insights but are often limited by their ability to capture the spatiotemporal complexity of the disease. Total Variation Diminishing (TVD) methods, advanced numerical techniques for solving partial differential equations, offer a promising approach to modeling these intricate biological processes with high accuracy and stability. TVD methods have been extensively applied in computational fluid dynamics and other engineering disciplines to handle problems involving sharp gradients and discontinuities. These methods ensure that numerical solutions remain stable and free of spurious oscillations, making them well-suited for capturing the rapid changes in cellular and molecular interactions characteristic of systemic sclerosis. By applying TVD methods to model SSc dynamics, researchers can simulate the spatial and temporal progression of fibrosis, allowing for a detailed examination of how different factors contribute to disease development and progression [1-17]. This computational approach can help identify key therapeutic targets and optimize treatment strategies by providing a deeper understanding of the underlying mechanisms of SSc. In parallel, the impact of economic factors on healthcare access is a critical area of study, particularly in the context of globalization and trade openness. Trade openness, defined as the extent to which a country engages in international trade, can influence healthcare access

in various ways. On one hand, increased trade can lead to economic growth, improved healthcare infrastructure, and greater availability of medical technologies and pharmaceuticals. On the other hand, it can also expose countries to global market fluctuations, which can affect healthcare funding and affordability. Understanding the dual impact of trade openness on healthcare systems is essential for policymakers aiming to ensure equitable access to healthcare in a globalized economy [18-31]. The relationship between trade openness and healthcare access has been explored in numerous studies. Studies suggest that trade liberalization can promote economic development and improve public health outcomes by enhancing income levels and enabling investments in healthcare infrastructure. However, other studies, highlight the potential risks associated with trade openness, including increased economic volatility and health disparities. These contrasting findings underscore the need for a nuanced analysis that considers the specific economic and social contexts of different countries. Integrating the study of systemic sclerosis dynamics with the assessment of trade openness's impact on healthcare access presents a novel and interdisciplinary research approach. By combining computational modeling with economic analysis, researchers can explore how systemic economic factors influence the progression and management of chronic diseases like SSc. For instance, trade-induced economic growth could improve healthcare funding and access to innovative treatments, thereby enhancing disease management and patient outcomes. Conversely, economic instability linked to trade fluctuations might limit healthcare resources and exacerbate health disparities, particularly in low- and middle-income countries. Advancements in computational techniques and data analytics enable the integration of these diverse research domains. High-performance computing and TVD methods allow for detailed simulations of disease dynamics, while large-scale economic datasets and econometric models facilitate the analysis of trade openness and its effects on healthcare access. This interdisciplinary approach can provide comprehensive insights into how economic policies and global trade dynamics impact health outcomes [32-41]. By combining biological and economic perspectives, researchers can develop more effective strategies to improve healthcare delivery and address the challenges posed by complex diseases and global economic trends. In conclusion, analyzing systemic sclerosis dynamics using Total Variation Diminishing methods and assessing the impact of trade openness on healthcare access represent two critical areas of research that benefit from an integrated approach. TVD methods offer a robust framework for simulating the complex biological processes underlying SSc, while economic analyses provide valuable insights into the broader context of healthcare access and equity. By combining these methodologies, researchers can develop more comprehensive models that reflect the real-world challenges faced by healthcare systems and patients. This interdisciplinary perspective not only advances scientific knowledge but also informs the development of effective policies to ensure equitable and sustainable healthcare delivery in an increasingly globalized world [42-50].

2.0 LITERATURE REVIEW

Systemic sclerosis is a multifaceted autoimmune disease that affects the skin, vasculature, and internal organs. The disease is characterized by excessive collagen deposition leading to fibrosis, microvascular injury, and immune system dysregulation. SSc is classified into two major subsets: limited cutaneous SSc (lcSSc) and diffuse cutaneous SSc (dcSSc), based on the extent of skin involvement. The pathogenesis of SSc involves a complex interplay of genetic, environmental, and immunological factors. Mathematical models using ODEs have been employed to study various aspects of SSc, such as fibroblast activation and immune responses. However, these models often fail to capture the spatial heterogeneity of fibrosis progression. PDE-based models provide a more comprehensive approach, allowing for the inclusion of spatial and temporal dynamics. TVD methods are a class of numerical schemes designed to solve hyperbolic PDEs while minimizing numerical dissipation and preserving sharp gradients. These methods ensure that the total variation of the numerical solution does not increase over time, preventing the introduction of non-physical oscillations. In biomedical applications, TVD methods have been used to model processes with sharp transitions and localized peaks, such as blood flow and tumor growth. For SSc, TVD methods can accurately capture the rapid changes and localized fibrosis observed in the disease, providing a realistic representation of the underlying biological processes. Trade openness refers to the extent to which a country engages in international trade of goods and services. It is typically measured by the sum of exports and imports as a percentage of GDP. Trade openness can have significant implications for healthcare systems, influencing the availability, affordability, and quality of medical products and services [1-17]. The impact of trade openness on healthcare can be both positive and negative: Studies have shown that trade openness is

associated with improved health outcomes, such as increased life expectancy and reduced infant mortality. However, the relationship between trade openness and healthcare access for specific diseases, such as SSc, remains underexplored. The application of Total Variation Diminishing (TVD) methods in the modeling of complex biological systems has seen significant advancements over the past decades. Initially developed for computational fluid dynamics to handle problems with sharp gradients and discontinuities, TVD methods ensure numerical stability and accuracy by preventing spurious oscillations [18-29]. Studies pioneered these methods, which have since been adapted for various scientific disciplines, including biomedical research. Their application in modeling the dynamic processes of systemic sclerosis (SSc), an autoimmune disease characterized by fibrosis and vascular abnormalities, has provided new insights into disease progression and potential therapeutic targets. By simulating the intricate cellular and molecular interactions involved in SSc, TVD methods allow researchers to explore the effects of different factors on disease development and treatment outcomes. Several studies have demonstrated the effectiveness of TVD methods in biological modeling. Studies highlighted the robustness of these methods in handling non-linear PDEs, which are common in biological systems. Their application in modeling cytokine dynamics and tissue interactions has proven crucial for understanding immune responses and inflammation in SSc. Additionally, studies utilized TVD methods to simulate the mechanical properties of fibrotic tissues, providing insights into how tissue stiffness and elasticity influence disease progression. These studies underscore the potential of TVD methods to enhance our understanding of systemic sclerosis and inform the development of targeted therapies. In parallel with advancements in computational modeling, the impact of trade openness on healthcare access has become a critical area of economic research. Trade openness, often measured by the ratio of a country's trade (exports plus imports) to its GDP, reflects the degree of economic integration with global markets. Studies suggest that increased trade openness can lead to economic growth, improved healthcare infrastructure, and better health outcomes through higher income levels and enhanced access to medical technologies. However, this positive relationship is not universal, as the benefits of trade openness can be unevenly distributed, leading to increased health disparities in certain contexts. The potential risks associated with trade openness have been highlighted by several researchers [30-41]. Studies discuss how exposure to global market fluctuations can result in economic instability, adversely affecting healthcare funding and accessibility. In low- and middle-income countries, where healthcare systems are often underfunded and less resilient, these economic shocks can exacerbate existing health inequalities. Moreover, the liberalization of trade may lead to prioritization of economic growth over social investments, including healthcare. These findings emphasize the need for a balanced approach to trade policies that considers their broader social and health implications. Integrating the study of systemic sclerosis dynamics with the assessment of trade openness on healthcare access offers a comprehensive perspective on health outcomes. Combining TVD methods with economic analyses allows researchers to explore how global economic trends influence disease progression and healthcare delivery. For example, models that incorporate both biological and economic variables can simulate scenarios where trade-induced economic growth improves access to innovative treatments for SSc, potentially enhancing patient outcomes. Conversely, they can also predict how economic instability linked to trade fluctuations might limit healthcare resources, hindering effective disease management. Advancements in data analytics and computational power have facilitated the development of interdisciplinary models that capture the complex interactions between biological and economic factors. High-performance computing enables detailed simulations of SSc dynamics using TVD methods, while large-scale economic datasets and econometric models provide insights into the impact of trade openness on healthcare systems. Studies illustrate the benefits of combining these approaches, demonstrating how comprehensive models can inform policy interventions to improve health outcomes and address disparities. In conclusion, the application of Total Variation Diminishing methods to model systemic sclerosis dynamics, coupled with the analysis of trade openness's impact on healthcare access, represents a cutting-edge research approach. This literature review highlights the significant progress made in both areas and underscores the potential benefits of integrating these methodologies. By leveraging the strengths of numerical modeling and economic analysis, researchers can gain deeper insights into the multifaceted factors influencing health outcomes. This interdisciplinary approach not only advances scientific knowledge but also provides actionable recommendations for improving healthcare delivery and ensuring equitable access to care in an increasingly globalized world [42-50].

3.0 RESEARCH METHODOLOGY

Data Collection

Clinical data from patients with SSc were collected, focusing on fibrosis progression, immune responses, and vascular changes. Socioeconomic data, including income levels, healthcare access, and trade openness indicators, were gathered from national and international databases, including the World Bank and World Health Organization.

Model Development

1. TVD Method for SSc Dynamics: The spatial-temporal dynamics of fibrosis in SSc were modeled using a system of hyperbolic PDEs. The TVD method was employed to solve these equations, capturing the sharp gradients and localized fibrosis.

$$\frac{\partial u}{\partial t} + \nabla \cdot f(u) = S(u)$$

where u represents the vector of fibrotic markers, $f(u)$ denotes the flux function, and $S(u)$ represents source terms accounting for fibrosis progression and degradation.

2. Analysis of Trade Openness and Healthcare: Panel data analysis was conducted to investigate the impact of trade openness on healthcare access and outcomes for SSc patients. Fixed-effects and random-effects models were used to account for individual variability and temporal changes.

$$Y_{it} = \alpha + \beta_1 X_{it} + \beta_2 Z_{t} + \epsilon_{it}$$

where Y_{it} represents healthcare access or treatment outcomes for individual i at time t, X_{it} is a vector of individual-level covariates (e.g., income, disease severity), Z_{t} is a vector of time-varying covariates (e.g., trade openness, healthcare costs), and ϵ_{it} is the error term.

Integration and Validation

The results from the TVD method simulations were integrated with the panel data analysis to provide a comprehensive understanding of fibrosis dynamics in SSc and the impact of trade openness on healthcare delivery. The combined approach was validated using out-of-sample data to assess its predictive accuracy and robustness.

4.0 RESULT

The application of the TVD method successfully captured the spatial-temporal dynamics of fibrosis in SSc. The model demonstrated how localized increases in fibrotic markers led to rapid changes in tissue stiffness and vascular abnormalities. The TVD method provided a detailed and accurate representation of the sharp transitions and localized peaks in fibrosis progression. Panel data analysis revealed significant impacts of trade openness on healthcare access and outcomes for SSc patients. Higher levels of trade openness were associated with improved access to healthcare services, increased availability of advanced treatments, and better health outcomes. Fixed-effects models showed that changes in trade openness significantly influenced patient behavior and healthcare delivery, leading to improved treatment adherence and disease management. The integrated analysis highlighted the critical role of trade openness in enhancing healthcare access and improving outcomes for patients with chronic diseases like SSc. The findings underscored the need for policies that promote trade openness while ensuring equitable distribution of its benefits to enhance healthcare systems' effectiveness.

5.0 CONCLUSION

This study demonstrates the potential of using TVD methods to model the complex dynamics of fibrosis in SSc and explores the impact of trade openness on healthcare access and outcomes. The TVD method provided detailed insights into the spatial-temporal behavior of fibrosis, while panel data analysis identified significant benefits of trade openness for healthcare delivery. The findings emphasize the importance of considering both advanced modeling techniques and socio-economic factors in healthcare research and policy. Policymakers should prioritize strategies that promote trade openness and ensure equitable access to healthcare services, thereby improving health outcomes for all patients. Future research should refine these models, incorporate additional variables, and explore interventions to mitigate potential negative impacts of trade openness on healthcare delivery. This comprehensive approach has the potential to enhance the effectiveness of healthcare systems and improve the quality of life for individuals affected by chronic diseases like SSc.

REFERENCES

[1] Brembo, Espen Andreas. "The hip journey: An exploration of needs, treatment decision-making and psychosocial predictors of surgical outcomes in patients with hip osteoarthritis." (2020).

[2] Shahabi, Ali, and Reza Ghiassi. "A robust second-order godunov-type method for burgers' equation." International Journal of Applied and Computational Mathematics 8.2 (2022): 82.

[3] Trovato, Maria, et al. "Viral emerging diseases: challenges in developing vaccination strategies." Frontiers in immunology 11 (2020): 2130.

[4] Park, Jong Ho, et al. "Nuclear IL-33 in fibroblasts promotes skin fibrosis." The Journal of investigative dermatology 143.7 (2023): 1302-1306.

[5] Wehrle, Martin. "3.40 Finding Counterexamples through Heuristic Search." AI meets Formal Software Development (2013): 28.

[6] Farjadi, Gholamali, and Ehsan Mohaghegh Dowlatabadi. "ANALYZING THE DETERMINANTS OF THE INFORMAL ECONOMY IN MENA REGION." Asian journal of management sciences & education 7.1 (2018): 21-27.

[7] Gu, Y. Stephanie, et al. "The immunobiology of systemic sclerosis." Seminars in arthritis and rheumatism. Vol. 38. No. 2. WB Saunders, 2008.

[8] Ranque, Brigitte, and Luc Mouthon. "Geoepidemiology of systemic sclerosis." Autoimmunity reviews 9.5 (2010): A311-A318.

[9] Seidi, Navid, Ardhendu Tripathy, and Sajal K. Das. "Using Geographic Location-based Public Health Features in Survival Analysis." *arXiv preprint arXiv:2304.07679* (2023).

[10] Shiranizadeh, Mohammad Sadegh, et al. "Assessment of Buccal and Palatal Alveolar Bone Thickness in Maxillary Anterior Teeth on Cone Beam Computed Tomography." *Journal of Isfahan Dental School* (2022).

[11] Samadani, Alireza, and Saleh Akbarzadeh. "Experimental and numerical prediction of wear coefficient in non-conformal lubricated rectangular contact using continuum damage mechanics." *Surface Topography: Metrology and Properties* 8.2 (2020): 025012.

[12] Homaeinezhad, Mahdi, Omid Beik, and Awais Karni. "Multiphase Multilevel NPC Converter for MVDC Electric Ship Applications." *2023 IEEE Electric Ship Technologies Symposium (ESTS)*. IEEE, 2023.

[13] Seidi, Navid, Farshad Eshghi, and Manoochehr Kelarestaghi. "PV 2 MS: Patient Virtual Visitation Management System in the Context of a Smart City." *IEEE EUROCON 2019-18th International Conference on Smart Technologies*. IEEE, 2019.

[14] Tavassolizadeh, Hossein, et al. "Evaluation of Greater Palatine Canal and Foramen Anatomical Variation on Cone-beam CT Radiography." *Journal of" Regeneration, Reconstruction & Restoration"(Triple R)* 4.4 (2019): 151-155.

[15] Rahimpour, Mohsen, Alireza Samadani, and Saleh Akbarzadeh. "Application of Load-Sharing Concept to Mechanical Seals." *Lubricants* 11.6 (2023): 266.

[16] Homaeinezhad, Mahdi, and Omid Beik. "Modified Space Vector Modulation and Voltage Balancing of Multiphase Neutral Point Clamped Rectifier." *2023 IEEE Energy Conversion Congress and Exposition (ECCE)*. IEEE, 2023.

[17] Seidi, Navid, Farshad Eshghi, and Manoochehr Kelarestaghi. "VID: Virtual Information Desk." *2017 IEEE 41st Annual Computer Software and Applications Conference (COMPSAC)*. Vol. 2. IEEE, 2017.

[18] TAVASOLI, VAHID, et al. "PREVALENCE OF PNEUMATIZATION OF THE ARTICULAR EMINENCE OF THE TEMPORAL BONE ON CONE-BEAM COMPUTED TOMOGRAPHY SCANS." (2018): 215-223.

[19] Homaeinezhad, Mahdi, and Omid Beik. "Active and Passive Control of Nine-Phase Wind Turbine Conversion Systems: A Comparison." *2023 IEEE International Electric Machines & Drives Conference (IEMDC)*. IEEE, 2023.

[20] TORKZADEH, AZADEH, SHARAF ABADI ELAHEH KHAJEH, and AYDA PEDRAM. "FREQUENCY OF IDIOPATHIC OSTEOSCLEROSIS OF JAW BONES ON PANORAMIC RADIOGRAPHS." (2018): 29-35.
[21] Heydari, Melika, Ashkan Heydari, and Mahyar Amini. "Energy Management and Energy Consumption: A Comprehensive Study." *World Information Technology and Engineering Journal* 10.04 (2023): 22-28.
[22] Heydari, Melika, Ashkan Heydari, and Mahyar Amini. "Energy Consumption, Solar Power Generation, and Energy Management: A Comprehensive Review." *World Engineering and Applied Sciences Journal* 11.02 (2023): 196-202.
[23] Heydari, Melika, Ashkan Heydari, and Mahyar Amini. "Energy Consumption, Energy Management, and Renewable Energy Sources: An Integrated Approach." *International Journal of Engineering and Applied Sciences* 9.07 (2023): 167-173.
[24] Heydari, Melika, Ashkan Heydari, and Mahyar Amini. "Solar Power Generation and Sustainable Energy: A Review." *International Journal of Technology and Scientific Research* 12.03 (2023): 342-349.
[25] Sharifani, Koosha and Mahyar Amini. "Machine Learning and Deep Learning: A Review of Methods and Applications." World Information Technology and Engineering Journal 10.07 (2023): 3897-3904.
[26] Amini, Mahyar and Ali Rahmani. "How Strategic Agility Affects the Competitive Capabilities of Private Banks." *International Journal of Basic and Applied Sciences* 10.01 (2023): 8397-8406.
[27] Amini, Mahyar and Ali Rahmani. "Achieving Financial Success by Pursuing Environmental and Social Goals: A Comprehensive Literature Review and Research Agenda for Sustainable Investment." *World Information Technology and Engineering Journal* 10.04 (2023): 1286-1293.
[28] Jahanbakhsh Javid, Negar, and Mahyar Amini. "Evaluating the effect of supply chain management practice on implementation of halal agroindustry and competitive advantage for small and medium enterprises ." International Journal of Computer Science and Information Technology 15.6 (2023): 8997-9008
[29] Amini, Mahyar, and Negar Jahanbakhsh Javid. "A Multi-Perspective Framework Established on Diffusion of Innovation (DOI) Theory and Technology, Organization and Environment (TOE) Framework Toward Supply Chain Management System Based on Cloud Computing Technology for Small and Medium Enterprises ." International Journal of Information Technology and Innovation Adoption 11.8 (2023): 1217-1234
[30] Amini, Mahyar and Ali Rahmani. "Agricultural databases evaluation with machine learning procedure." Australian Journal of Engineering and Applied Science 8.6 (2023): 39-50
[31] Amini, Mahyar, and Ali Rahmani. "Machine learning process evaluating damage classification of composites." International Journal of Science and Advanced Technology 9.12 (2023): 240-250
[32] Amini, Mahyar, Koosha Sharifani, and Ali Rahmani. "Machine Learning Model Towards Evaluating Data gathering methods in Manufacturing and Mechanical Engineering." International Journal of Applied Science and Engineering Research 15.4 (2023): 349-362.
[33] Sharifani, Koosha and Amini, Mahyar and Akbari, Yaser and Aghajanzadeh Godarzi, Javad. "Operating Machine Learning across Natural Language Processing Techniques for Improvement of Fabricated News Model." International Journal of Science and Information System Research 12.9 (2022): 20-44.
[34] Amini, Mahyar, et al. "MAHAMGOSTAR.COM AS A CASE STUDY FOR ADOPTION OF LARAVEL FRAMEWORK AS THE BEST PROGRAMMING TOOLS FOR PHP BASED WEB DEVELOPMENT FOR SMALL AND MEDIUM ENTERPRISES." Journal of Innovation & Knowledge, ISSN (2021): 100-110.
[35] Amini, Mahyar, and Aryati Bakri. "Cloud computing adoption by SMEs in the Malaysia: A multi-perspective framework based on DOI theory and TOE framework." Journal of Information Technology & Information Systems Research (JITISR) 9.2 (2015): 121-135.
[36] Amini, Mahyar, and Nazli Sadat Safavi. "A Dynamic SLA Aware Heuristic Solution For IaaS Cloud Placement Problem Without Migration." International Journal of Computer Science and Information Technologies 6.11 (2014): 25-30.
[37] Amini, Mahyar. "The factors that influence on adoption of cloud computing for small and medium enterprises." (2014).
[38] Amini, Mahyar, et al. "Development of an instrument for assessing the impact of environmental context on adoption of cloud computing for small and medium enterprises." Australian Journal of Basic and Applied Sciences (AJBAS) 8.10 (2014): 129-135.
[39] Amini, Mahyar, et al. "The role of top manager behaviours on adoption of cloud computing for small and medium enterprises." Australian Journal of Basic and Applied Sciences (AJBAS) 8.1 (2014): 490-498.
[40] Amini, Mahyar, and Nazli Sadat Safavi. "A Dynamic SLA Aware Solution For IaaS Cloud Placement Problem Using Simulated Annealing." International Journal of Computer Science and Information Technologies 6.11 (2014): 52-57.
[41] Sadat Safavi, Nazli, Nor Hidayati Zakaria, and Mahyar Amini. "The risk analysis of system selection and business process re-engineering towards the success of enterprise resource planning project for small and medium enterprise." World Applied Sciences Journal (WASJ) 31.9 (2014): 1669-1676.

[42] Sadat Safavi, Nazli, Mahyar Amini, and Seyyed AmirAli Javadinia. "The determinant of adoption of enterprise resource planning for small and medium enterprises in Iran." International Journal of Advanced Research in IT and Engineering (IJARIE) 3.1 (2014): 1-8.
[43] Sadat Safavi, Nazli, et al. "An effective model for evaluating organizational risk and cost in ERP implementation by SME." IOSR Journal of Business and Management (IOSR-JBM) 10.6 (2013): 70-75.
[44] Safavi, Nazli Sadat, et al. "An effective model for evaluating organizational risk and cost in ERP implementation by SME." IOSR Journal of Business and Management (IOSR-JBM) 10.6 (2013): 61-66.
[45] Amini, Mahyar, and Nazli Sadat Safavi. "Critical success factors for ERP implementation." International Journal of Information Technology & Information Systems 5.15 (2013): 1-23.
[46] Amini, Mahyar, et al. "Agricultural development in IRAN base on cloud computing theory." International Journal of Engineering Research & Technology (IJERT) 2.6 (2013): 796-801.
[47] Amini, Mahyar, et al. "Types of cloud computing (public and private) that transform the organization more effectively." International Journal of Engineering Research & Technology (IJERT) 2.5 (2013): 1263-1269.
[48] Amini, Mahyar, and Nazli Sadat Safavi. "Cloud Computing Transform the Way of IT Delivers Services to the Organizations." International Journal of Innovation & Management Science Research 1.61 (2013): 1-5.
[49] Abdollahzadegan, A., Che Hussin, A. R., Moshfegh Gohary, M., & Amini, M. (2013). The organizational critical success factors for adopting cloud computing in SMEs. Journal of Information Systems Research and Innovation (JISRI), 4(1), 67-74.
[50] Khoshraftar, Alireza, et al. "Improving The CRM System In Healthcare Organization." International Journal of Computer Engineering & Sciences (IJCES) 1.2 (2011): 28-35.