A Study on the Plant Design Software on the Digital Transformation and MSME Entrepreneurs Emotions Towards Business Sustainability and Autonomy in the Energy Service Industry

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Abstract. The energy industry mainly covers Oil & Gas, Renewable energy, and Power, and the energy industry plays a vital role in society globally. Among this industry, as per McKinsey's Global Energy Perspective 2022 [12] and global energy statistics and facts, more than 50% of primary energy consumption is through Oil & gas, and our society consumes Oil & gas energy for our daily basic needs. Oil & Gas industry requires plant design software to catalyze its optimization and growth. Plant design software builds the plant in 2D and 3D complete design (Design, Construct and Operate) from the process, Health Safety and Environment (HSE), piping, pipeline, Mechanical, Electrical, Instrument, and Civil & Structural. Plant design software utilizes innovative technologies, including Artificial intelligence (AI), Machine learning, the Internet of Things (IoT), Virtual reality (VR), and augmented reality (AR). To maintain business sustainability and autonomy, MSME Entrepreneur implements new technologies through digital transformation to have digital reality and optimization with high accuracy and precision. MSME Entrepreneur's emotions play a crucial role in this plant design software implementation in the energy industry. This research reveals the plant design software utilized in the energy industry and MSME Entrepreneur's emotions to maintain business sustainability and autonomy. Furthermore, suggest that the government could alter the current policies to support the PAN India program in developing plant design software to promote MSME Entrepreneurs in small and medium service business.

Keywords: Plant Design Software · MSME Entrepreneur · Emotions · Sustainability · Autonomy · Energy industry

1 Introduction

Energy industry utilizes plant design software globally to build the plant to have databases in digital and provide high precision delivery with good quality deliverables. Plant deliverables from project management, process, Health Safety and Environment (HSE),

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Material & Corrosion, piping, pipeline, Mechanical, HVAC, Electrical, Instrument, and Civil & Structural and majorly most of the deliverables delivers through plant design software's. Plant design software's utilizes latest technologies including Artificial intelligence, Machine learning, the Internet of Things (IoT), Virtual reality (VR), and augmented reality (AR) to make robust databases for right delivery. MSME Entrepreneur's emotions to understand the present requirements from clients, client's expectations and intentions, competency, latest technologies based on the innovation and digital transformation happens around the world. Based on the digital transformation in the plant design software, MSME entrepreneurs maintain business sustainability and autonomy in their business. Plant design software's continuously upgrades its database based on the current updates in the software industry. Based on the extensive literature review and study through Scopus journals, concept studies, case studies of plant design software's available in the market, this paper focuses on projecting the current scenario of plant design software's and further research requirements to promote locally made plant design software's by MSME Entrepreneurs.

2 Definition, Literature Review & Methodology

2.1 Energy Service Industry

Energy service industry mainly covers Oil & gas (upstream, mid stream and downstream), Renewable and power. Now a days, energy industry implements in their plants to have complete digital technology and to have all data in digital and deliver database without manual interventions from the beginning to end. And energy industry utilizes current developments from the software industry to have all plant data in digital twin. There are two categories of plants, one is green field plant (New) and another type is brown field plant (either revamping or modification from existing plants). Energy industry implements plant design software's completely when it newly installed and when modification and upgrades comes into picture, energy industry implements case to case basis based on the client's requirements, economy and its plant projection. In a petrochemical plant, different software tools and its collaborative environment provides the benefits of reduced risk to individuals and plant environment, comply health, environment and safety, less economic loss [7]. Small service businesses are struggling with increasing operating costs and market competition forces them to increase operating costs to stay competitive in the market. Small services businesses implements digital transformation with its agile approaches to meet the client requirement as well as dynamic nature of the market [9].

2.2 Plant Design Software

Plant design software's are basically builds the industry in a such a way that all databases and deliverables delivers from the respective software's in a collaborative environment includes planning and cost control development software's, Process & Instrument Diagram (P&ID) from P&ID development software's, simulation software's, sizing and

calculations software's, mechanical applications includes thermal design software, vessel sizing calculation software's, piping applications includes 2D/3D development software's, stress application software's, sizing and calculation software's, electrical application includes 2D/3D development software's, study software's, instrumentation application includes instrumentation database development software's, sizing and calculation software's, 2D/3D development software's, civil & structural application includes 2D/3D development software's, sizing and calculation software's. Industry builds onshore and offshore facilities including above ground and below ground areas by using plant design software's. The use of computer tools are very much necessary during the various stages of plant design and production system to comply fourth industrial revolution where three types of software tools are used to support layout design includes Computed Aided Design (CAD), the information systems linked to collaborative computer tools in cloud environment and the application of simulation and optimization of production processes [1]. Aging management schema manages the safety digital control system to improve the reliability of safety digital control system [22]. As per changing market scenario, layout optimization is to be done for existing manufacturing units by using simulation and heuristic methods [24]. Plant design software's utilizes latest technology such as Artificial intelligence (AI), Machine learning, the Internet of Things (IoT), Virtual reality (VR), and augmented reality (AR). Only few original equipment manufacturers (OEM's) started implementing new technologies and this new technology introduces plant design, operation and maintenance with increased productivity and good profit in terms of company growth point of view. Based on the literature study, the conceptual model is given below (See Fig. 1).

2.3 Research Methodology

This study collected multiple case studies and empirical papers to explore and scrutinize the subject and its areas more comprehensively. Research method is basically literature research and focuses mainly energy industries across the world from America, Europe, Asia, Middle East, China, Russia and Australia. The aim of this paper is to provide with a categorization of the different contributions to the plant design software on digital transformation in the form of digital twin and MSME entrepreneurs emotions towards sustainability and autonomy in energy service industry.

2.4 Digital Transformation

Digital transformation happens across industry to make all data in digital to minimize hardcopies in the plant. Innovative technologies and business digital transformation provides opportunities to upgrade plant design software's. Plant design software provider keeps on upgrading their software's to fulfill client requirements. Digital model, digital shadow and digital twin [8] are the categories differentiate manual and automated system in plant design software's. Digital twin technology provides minimum manual intervention from process inputs, mechanical input, instrumentation inputs, electrical inputs and civil & structural inputs to make the database, model and deliverables ready for delivery. Extracted deliverables from the 2D/3D database will be delivered to client as per the plant design and capacity requirements. Industry 4.0 factors covers intelligent

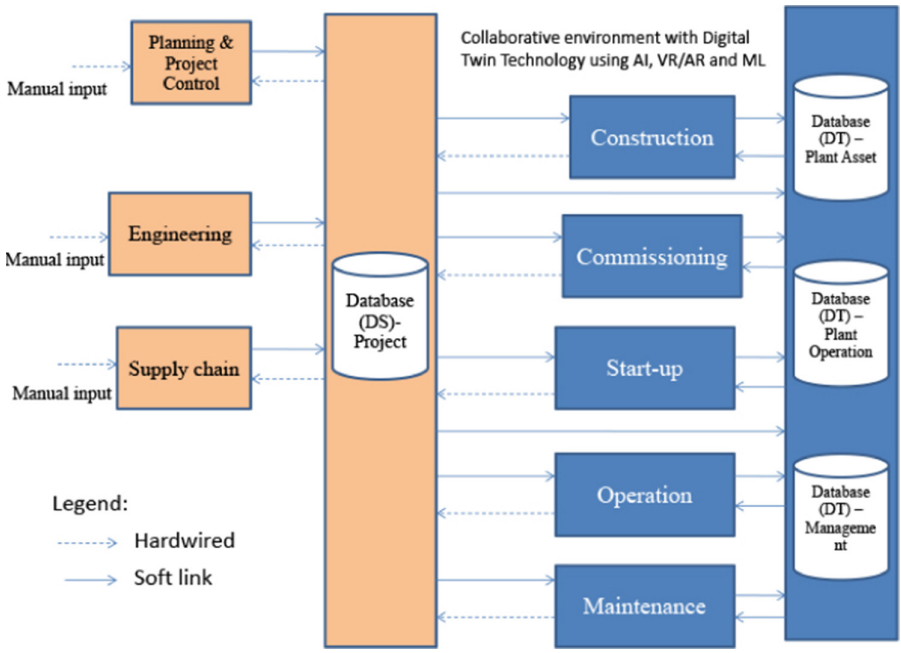

Fig. 1. Model for plant design software's in a collaborative environment in digital twin platform

sensors and actuators, control and monitoring system, management system and information system in the cloud [1]. Digital transformation provides higher sustainability for small business units [9]. Regional innovative digital transformation system enhances its technological cognitive base, resource skills, effectively utilize opportunities to support business competitiveness [17]. Digital twin and new technological developments such as artificial intelligence applies in plant design software and simulation software to make it complete digital and digital twin. To make digital twin completely, energy industry to maintain the data management system has to be planned and developed in advance [13]. Covid-19 pandemic accelerated digital transformation and innovation of MSMEs and created landscape that encourages entrepreneurs to adopt technological innovations to stay in the business [14, 18]. Internal and external motivation drives MSME's digital innovation [18]. Digital Twins should contain an automated data acquisition, multiple data sources, the appliance of data governance rules, a data processing and repository, and raw data input [31]. Digital twin in manufacturing from planning and project control, plant design, production system, operation and maintenance that links everything together through collaborative environment [32].

2.5 MSME Entrepreneur's Emotions Towards Business Sustainability and Autonomy

Micro, Small and Medium Enterprises facilitates entrepreneurs to consistently maintain, sustain and to make autonomy their plant design software enterprises. Plant design software enterprises mostly exist in US, Europe and other locations in abroad. In India, plant design software providers are less and less competitive in the global plant design software providers. MSME entrepreneur's emotions towards business sustainability in India to understand clients requirements for the plant design and capacity to have better optimization for green and brown based plants. Family business operates in wide ranging industries and these have many positive emotions includes avoidance and compromise and emotional display of negative emotions between family members [25]. MSME entrepreneurs have positive emotions such as Passion, Empathy, motivation, avoidance, compromise, Trust, excitement, enthusiasm, happiness, pride, boldness and negative emotions such as fear, anger, which might plan an important role in opportunity recognition and exploitation [15, 25]. Personal motivation to start-up business, changes in market conditions, digital innovation and health guidelines are the drivers for business sustainability to overcome business disruptions [14]. Autonomy mediates the relationship between entrepreneurship and well being partially through its effect on competence and relatedness [23]. MSME entrepreneurs should develop positive awareness towards entrepreneurial intention and contribute construction sector more than other sectors [29]. Business sustainability criteria shows that relate to behavior and business factors. Within these behavioral criteria, ethics, competitive intelligence, intrinsic motivation, and self efficacy are particularly important to maintain sustainable entrepreneurship [30]. In the process of entrepreneurship, cognitive bias and entrepreneurial emotion plays vital role. Positive entrepreneurial emotion plays a mediating role in the relationship between optimism and entrepreneurial intention. Negative entrepreneurial emotion plays a mediating role in the relationship between overconfidence and entrepreneurial intention [34].

3 Discussion

The results of the study highlight that plant design software on digital transformation enables to update digital innovative technologies, digital twin and digital skills within in energy industry. The first point summarizes as categorical literature review results and highlights the novelty of the findings. Second point describes the plant design software current developments in energy industry. The third point proposes update in the government policies to improve further digital transformations and MSME entrepreneurs emotions towards sustainability and autonomy. This section discusses the theoretical definition of plant design software through the plant enterprises lifecycle on digital transformation in digital twin and MSME emotions towards sustainability and autonomy through interviews and industry experiences.

3.1 MSME Entrepreneur's Emotions Towards Business Sustainability and Autonomy

A comprehensive analysis of type, level of integration, focused area and technology gives more imminent. Level of integration DM (Digital model), DS (Digital Shadow) and DT (Digital Twin) [32] reflects the focused area from planning & project control up to supply chain process in the energy industry (Tables 1, 2, and 3).

Table 1. Shows categorical literature review of plant design software (from planning & project control up to supply chain) on digital transformation in energy service industry.

			Focused area				
					Supply chain		
Reference	Type	Level of integration	Planning& project control	Engineering	Procurement	Logistics	Technology
Alpala, Luis Omar et al. (2018) [1]	Review	DT	No	Yes	Yes	Yes	Plant Design and Optimization
Ansys Accelerating the Digital Transformation of Industry with Simulation (2020) [3]	Concept	DS	No	Yes	No	No	Simulation, Optimization
Asea Brown Boveri (2022) [2]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Aspentech The Digital Twin and the Smart Enterprise (2022) [4]	Study	DT	No	Yes	Yes	No	Simulation, Plant design and Optimization
Autodesk digital transformation (2022). [5]	Study	DS	No	Yes	No	No	Plant Design and Optimization
Aveva A sustainable future (2021) [6]	Case Study	DT	No	Yes	Yes	Yes	Simulation, Plant Design and Optimization

(*continued*)

Table 1. (*continued*)

			Focused area				
					Supply chain		
Reference	Type	Level of integration	Planning& project control	Engineering	Procurement	Logistics	Technology
Bentley overcome digital transformation challenges (2022) [8]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Bing, Wang & Ma, Feicheng. (2010) [7]	Review	DS	No	Yes	No	No	Plant Design and Optimization
CADmatic digital twin: driving digital transformation (2019) [10]	Review	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
CADworx Solution to Digitalize Project Delivery (2021) [11]	Study	DT	Yes	Yes	Yes	Yes	Simulation, Plant Design and Optimization
Chen, C.-L.; Lin, Y.-C.; Chen,W.-H.; Chao, C.-F. Pandia, H (2021) [9]	Review	DS	No	Yes	No	Yes	Automation, Plant design and management system
Csaba Ruzsa (2021) [13]	Review	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Cueto, Lavinia Javier, et al., 2022 [14]	Concept	DS	No	No	Yes	No	Optimization
Dean A. Shepherd and Holger Patzelt. (2018) [15]	Concept	DM	No	No	No	No	Digital technology
Emerson makes digital transformation a reality (2022) [16]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization

(*continued*)

Table 1. (*continued*)

			Focused area				
					Supply chain		
Reference	Type	Level of integration	Planning& project control	Engineering	Procurement	Logistics	Technology
Federico Brunetti, et al., (2020) [17]	Concept	DS	No	Yes	No	No	Digital technology for infrastructure services
Fridayani, H. D., Chiang, L. (2022) [18]	Review	DM	No	No	No	No	Online business
GE the digital energy transformation (2018) [19]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Hexagon Digital transformation solutions (2019) [20]	Case Study	DT	Yes	Yes	Yes	Yes	Simulation, Plant Design and Optimization
Honeywell digital transformation revealing new business possibilities (2022) [21]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Liang, H., Gu, P., Tang, J. et al., (2016) [22]	Review	DS	No	Yes	Yes	Yes	Plant Design and Optimization
Naik, Sanjeev & Kallurkar, Shrikant. (2016) [24]	Review	DS	No	Yes	No	No	Plant Design and Optimization
Radu-Lefebvre, M., & Randerson, K. (2020) [25]	Concept	DM	No	No	No	No	Control and monitor

(*continued*)

Table 1. (*continued*)

			Focused area				
					Supply chain		
Reference	Type	Level of integration	Planning& project control	Engineering	Procurement	Logistics	Technology
Rockwell Automation digital transformation simplified (2022) [26]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Siemens transforming to digital enterprise (2020) [27]	Study	DT	No	Yes	No	No	Simulation, Plant Design and Optimization
Solidworks 4th industrial revolution and beyond (2021) [28]	Review	DS	Yes	Yes	No	No	Simulation, Plant Design and Optimization
Van der Valk, H., Haße, H., Möller, F. et al. (2022) [31]	Review	DT	No	Yes	No	Yes	Simulation, Plant Design and Optimization
Werner Kritzinger, Matthias Karner, Georg Traar, Jan Henjes, Wilfried Sihn, (2018) [32]	Review	DT	No	Yes	No	Yes	Simulation, Plant Design and Optimization
Yokogawa A Journey Towards Autonomous Operations and Operational Excellence (2022) [33]	Study	DT	No	Yes	Yes	No	Simulation, Plant Design and Optimization

Table 2. Shows categorical literature review of plant design software (from Construction up to maintenance) on digital transformation in energy service industry.

			Focused area					
Reference	Type	Level of integration	Construction	Commissioning	Start-up	Operation	Maintenance	Technology
Alpala, Luis Omar et al. (2018) [1]	Review	DT	Yes	Yes	No	No	No	Plant Design and Optimization
Ansys Accelerating the Digital Transformation of Industry with Simulation (2020) [3]	Concept	DS	No	No	No	No	No	Simulation, Optimization
Asea Brown Boveri (2022) [2]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Aspentech The Digital Twin and the Smart Enterprise (2022) [4]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant design and Optimization
Autodesk digital transformation (2022) [5]	Study	DS	No	No	No	No	No	Plant Design and Optimization
Aveva A sustainable future (2021) [6]	Case Study	DT	Yes	Yes	Yes	Yes	Yes	Simulation, Plant Design and Optimization
Bentley overcome digital transformation challenges (2022) [8]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Bing, Wang & Ma, Feicheng. (2010) [7]	Review	DS	No	No	No	No	No	Plant Design and Optimization
CADmatic digital twin: driving digital transformation (2019) [10]	Review	DT	Yes	No	No	Yes	Yes	Simulation, Plant Design and Optimization
CADworx Solution to Digitalize Project Delivery (2021) [11]	Study	DT	Yes	Yes	Yes	Yes	No	Simulation, Plant Design and Optimization

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Table 2. (*continued*)

			Focused area					
Reference	Type	Level of integration	Construction	Commissioning	Start-up	Operation	Maintenance	Technology
Chen, C.-L.; Lin, Y.-C.; Chen,W.-H.; Chao, C.-F. Pandia, H (2021) [9]	Review	DS	No	No	No	No	No	Automation, Plant design and management system
Csaba Ruzsa (2021) [13]	Review	DT	No	No	No	No	No	Simulation, Plant Design and Optimization
Cueto, Lavinia Javier, et al., 2022 [14]	Concept	DS	No	No	No	Yes	Yes	Optimization
Dean A. Shepherd and Holger Patzelt. (2018) [15]	Concept	DM	No	No	No	Yes	Yes	Digital technology
Emerson makes digital transformation a reality (2022) [16]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Federico Brunetti, et al., (2020) [17]	Concept	DS	No	No	No	No	No	Digital technology for infrastructure services
Fridayani, H. D., Chiang, L. (2022) [18]	Review	DM	No	No	No	No	No	Online business
GE the digital energy transformation (2018) [19]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Hexagon Digital transformation solutions (2019) [20]	Case Study	DT	Yes	Yes	Yes	Yes	Yes	Simulation, Plant Design and Optimization
Honeywell digital transformation revealing new business possibilities (2022) [21]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization

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Table 2. (*continued*)

			Focused area					
Reference	Type	Level of integration	Construction	Commissioning	Start-up	Operation	Maintenance	Technology
Liang, H., Gu, P., Tang, J. et al. (2016) [22]	Review	DS	Yes	Yes	Yes	Yes	Yes	Plant Design and Optimization
Naik, Sanjeev & Kallurkar, Shrikant. (2016) [24]	Review	DS	No	No	No	No	No	Plant Design and Optimization
Radu-Lefebvre, M., & Randerson, K. (2020) [25]	Concept	DM	No	No	No	Yes	Yes	Control and monitor
Rockwell Automation digital transformation simplified (2022) [26]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Siemens transforming to digital enterprise (2020) [27]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Solidworks 4th industrial revolution and beyond (2021) [28]	Review	DS	No	No	Yes	Yes	Yes	Simulation, Plant Design and Optimization
Van der Valk, H., Haße, H., Möller, F. et al. (2022) [31]	Review	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Werner Kritzinger, Matthias Karner, Georg Traar, Jan Henjes, Wilfried Sihn, (2018) [32]	Review	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization
Yokogawa A Journey Towards Autonomous Operations and Operational Excellence (2022) [33]	Study	DT	No	No	No	Yes	Yes	Simulation, Plant Design and Optimization

Table 3. Shows categorical literature review of MSME entrepreneurs emotions towards business sustainability and autonomy in energy service industry.

Reference	Type	Level of integration	Technology	MSME entrepreneurs emotion	Sustainability	Autonomy
Alpala, Luis Omar et al. (2018) [1]	Review	DT	Plant Design and Optimization	Compromise, Empathy, positive emotions	Modular, Flexible and adaptable way to changes accordingly to custom and demand	To be competitive in the market
Ansys Accelerating the Digital Transformation of Industry with Simulation (2020) [3]	Concept	DS	Simulation, Optimization	Empathy, Trust	Business factors	Simulation and Automation product life cycle
Asea Brown Boveri (2022) [2]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm, Cognitive	Business factors, Digital twin	Set the future, Fulfil product life cycle
Aspentech The Digital Twin and the Smart Enterprise (2022) [4]	Study	DT	Simulation, Plant design and Optimization	Empathy, Trust	Business factors	Simulation and Automation product life cycle
Autodesk digital transformation (2022) [5]	Study	DS	Empathy, Trust	Business factors	Set the future, Fulfil product life cycle	Fulfil product life cycle
Aveva A sustainable future (2021) [6]	Case Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm, Cognitive	Business factors, Digital twin	Set the future, Fulfil product life cycle
Bentley overcome digital transformation challenges (2022) [8]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust	Business factors	Set the future, Fulfil product life cycle

(*continued*)

Table 3. (*continued*)

Reference	Type	Level of integration	Technology	MSME entrepreneurs emotion	Sustainability	Autonomy
Bing, Wang & Ma, Feicheng. (2010) [7]	Review	DS	Plant Design and Optimization	Compromise, Empathy, positive emotions	To meet different client requirements	To reduce risk of plant and maintain the health, safety and environment
CADmatic digital twin: driving digital transformation (2019) [10]	Review	DT	Simulation, Plant Design and Optimization	Empathy, Trust	Business factors	Fulfil product life cycle
CADworx Solution to Digitalize Project Delivery (2021) [11]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust	Business factors	Set the future, Fulfil product life cycle
Chen, C.-L.; Lin, Y.-C.; Chen,W.-H.; Chao, C.-F. Pandia, H (2021) [9]	Review	DS	Automation, Plant design and management system	Motivation, compromise, positive emotions	Higher business	Achieve business growth and gain competitive advantages
Csaba Ruzsa (2021) [13]	Review	DT	Simulation, Plant Design and Optimization	Empathy, Self regulations, Trust	Business factors	Set the future, Fulfil product life cycle
Cueto, Lavinia Javier, et al., (2022) [14]	Concept	DS	Optimization	Motivation, Empathy, Self regulations, Trust	Overcome business disruptions	Business innovations and Productivity
Dean A. Shepherd and Holger Patzelt. (2018) [15]	Concept	DM	Digital technology	Positive emotions	Opportunity recognition and communal environment	Knowledge types and sustainable development opportunities
Emerson makes digital transformation a reality (2022) [16]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm, Cognitive	Business factors, Digital twin	Automation product life cycle

(*continued*)

Table 3. (*continued*)

Reference	Type	Level of integration	Technology	MSME entrepreneurs emotion	Sustainability	Autonomy
Federico Brunetti, et al., (2020) [17]	Concept	DS	Digital technology for infrastructure services	Motivation, positive emotions	Higher priority	To make digitalization between culture & skills, technology & infrastructure and ecosystem
Fridayani, H. D., Chiang, L. (2022) [18]	Review	DM	Online business	Motivation, compromise, positive emotions	Sustain in the business through digital transformation	Cause and effect, adaptability, entrepreneurial orientation relate to innovation
GE the digital energy transformation (2018) [19]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust	Business factors	Automation product life cycle
Hexagon Digital transformation solutions (2019) [20]	Case Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm, Cognitive	Business factors, Digital twin	Set the future, Fulfil product life cycle
Honeywell digital transformation revealing new business possibilities (2022) [21]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm, Cognitive	Business factors	Automation product life cycle
Liang, H., Gu, P., Tang, J. et al. (2016) [22]	Review	DS	Plant Design and Optimization	Positive emotions	Aging of the control system	Aging management schema
Nadav Shir, Boris N. Nikolaev, Joakim Wincent (2019) [23]	Review	DM	–	Greater feelings of relatedness and higher levels of well-being	Opportunity and Well being gains	Interest in well-being

(*continued*)

Table 3. (*continued*)

Reference	Type	Level of integration	Technology	MSME entrepreneurs emotion	Sustainability	Autonomy
Naik, Sanjeev & Kallurkar, Shrikant. (2016) [24]	Review	DS	Plant Design and Optimization	Compromise, Empathy, positive emotions	As per chaning market scenario, opportunity to be utilised	Combination of simulation and heuristic technique
Radu-Lefebvre, M., & Randerson, K. (2020) [25]	Concept	DM	Control and monitor	Positive and negative emotions	Emotion management strategies	Manage the paradox of control and autonomy
Rockwell Automation digital transformation simplified (2022) [26]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust	Business factors	Automation product life cycle
Siemens transforming to digital enterprise (2020) [27]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm	Business factors, Digital twin	Set the future, Fulfil product life cycle
Solidworks 4th industrial revolution and beyond (2021) [28]	Review	DS	Simulation, Plant Design and Optimization	Empathy, Trust	Business factors	Fulfil product life cycle
Tesfaye Leta Tufa1, Ashwinkumar A. Patel. (2022) [29]	Review	DM	–	Passion, compromise and positive emotions	Diversified sector intentions	Autonomy, human capital development and entrepreneurial intention
Tur-Porcar, Ana, Norat Roig-Tierno, and Anna Llorca Mestre. (2018) [30]	Review	DM	–	Motivation, Empathy, Cognitive, enthusiasm, happiness, anger and fear	Entrepreneurial ventures	To manage business dynamics
Van der Valk, H., Haße, H., Möller, F. et al. (2022) [31]	Review	DT	Simulation, Plant Design and Optimization	Motivation, Empathy and positive emotions	Development of digital twin	Exhaustive twin

(*continued*)

Table 3. (*continued*)

Reference	Type	Level of integration	Technology	MSME entrepreneurs emotion	Sustainability	Autonomy
Werner Kritzinger, Matthias Karner, Georg Traar, Jan Henjes, Wilfried Sihn, (2018) [32]	Review	DT	Simulation, Plant Design and Optimization	Enthusiasm, Motivation, Empathy	Planning to maintenance to fulfil the digital twin	Product life cycle management
Yokogawa A Journey Towards Autonomous Operations and Operational Excellence (2022) [33]	Study	DT	Simulation, Plant Design and Optimization	Empathy, Trust, Enthusiasm, Cognitive	Business factors	Automation product life cycle
Zhao Y and Xie B, (2020) [34]	Review	DM	–	Positive and negative emotions	Entrepreneurial intentions	Entrepreneurial emotion and cognitive bias

4 Outlook & Conclusions

The comprehensive literature review shows that the plant design software on digital transformation is still in conceptual stage for many OEM's and not fulfilled in digital platform in a asset life cycle environment without manual interventions. This paper proposed a model to review and implement in India to fulfill the plant design software requirements in energy industry and this must be developed. As shown, a main focus of recent research concerning the digital transformation in manufacturing and service sectors are dealing with planning and cost control, process design, piping design, mechanical design, instrumentation design, electrical design and civil & structural design. The above focused areas have not focused before and analysed in a asset life cycle digital twin collaborative environment. However, digital transformation can be developed and implemented in plant design softwares and improve plant design softwares locally to meet local clients requirements. MSME entrepreneur's emotions towards clients intentions and their requirements to be fulfilled by providing plant design softwares in digital twin platform. By implementing complete digital transformation in plant design softwares which will enable MSME entrepreneur to have good business sustainability with local clients and of course, business autonomy in energy service industry.

5 Recommendations, Limitations and Future Research

Plant design software's have to be developed, integrated and upgraded in India as part of PAN india program and government has to alter and amend the policies in government

tenders and instruct government Public Sector Units and private companies to update their terms and conditions in Tender bid by clients to the bidders. Bidders have to follow the terms and conditions and use Indian made plant design softwares for the plant design and optimization.

First limitation is, government has to alter and amend the policies and instruct government Public Sector Units and private sector units to utilize locally and indigenously made plant design sofwares. Second limitation is, plant design software have to be built in a such a way that plant design software service providers to compete with pioneers in their software's in the world. Third limitation is, Plant design softwares in digital twin platform is to be developed indigenously to overcome the gaps in the plant design softwares from the world.

Future research to analyse plant design softwares in digital twin platform and find the gaps as input to newcomers in India to comply local client requirements and also to analyse further on the Indian clients expectations and intentions to convince them to use Indian made plant design softwares.

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