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### Factors affecting leaders working style in the era of digitalization

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#### Abstract

Digitalization is a major trend which is affecting society and institutions. Leaders are working in continuously evolving digital environment wherein initiatives and ideas transform in a manner which cannot be imagined. Adoption of new digital technologies triggers changes in the working of leaders. The paper focuses on identifying factors affecting the working style of leaders in the era of digitalization. The study uses questionnaire as a primary method for data collection. Data was collected by administering questionnaire to 104 senior faculties of twelve engineering colleges of Himachal Pradesh and factor analysis was done. Four factors were identified out of the total 19 items. These factors are digital integration and work culture transformation; engagement enhancement; technology driven information dynamics and skill evolution; and digital impact on work dynamics and decision urgency.

**Keywords**-Digitalization, institutional culture, flexible working, digital innovation, digital collaboration.

#### Introduction

Globalization along with rapid progress of information technology has influenced education domain and had exerted pressure for using digital technology to improve performance. Its use in educational institutes is an ancient happening, but its explosive effect on working of academic institutes is realized recently. (Howard, C., & Plummer, D. C., 2013). Technology has influenced all the activities of institutions by customised and devoted applications (Holger Arians, 2017). It has radically changed the nature and form of working (Chew, E., et al., 2013). Due to fast technological innovations, on one side where new opportunities are created new threats are also created. Powerful processing power of semiconductors accompanied with quick connectivity are shaping the digital age. Technology has become strategic differentiator in organizations. Role of leaders is substantially altered by these developments (Haffke, I., et al., 2016). These comprehensive technological advances are not restricted to a particular domain, due to which role and responsibilities of leaders is changing significantly therefore leaders need

to align themselves for these changes (DeRosa, D., 2019). Technology has got enormous and varied impact on leaders creating diverse opportunities (Kohnke, O., 2017). Human behaviour is modulated by fast changing environment, and thus the leaders working is also affected. Leaders has important role in shaping institutions. They influence outside environment and get influenced by it. Fast technological innovations influence leader's insight, decisions behaviour, and lifestyle (Kapucu, H., 2020). Technology effects working of leaders and leaders also are affected by the technology. Spirit of leaders and nature of advance technology may decide the success of implementation of technology in an organization (Borowska, G., 2019). Leaders' digital quotient must be high as it is essential for maintaining competitiveness. Digital technology helps leaders grow faster, enhance profits, find new opportunities, and remain competent (Sainger, G., 2018). Technology is critically affecting leaders' behavior. Interaction of technology and leaders demands leaders to adapt and adopt themselves with this dynamically changing technological environment (Kapucu, H., 2020). It is a well-accepted fact that digital technology affects leadership practices (Bughin, J., Holley, A., & Mellbye, A., 2015). It has substantially changed the practices of leaders (Khan, S., 2016). Good decision making and vision of leaders enables organizations to address its needs effectively (Sainger, G., 2018). Incorporation of technology in education has altered conventional responsibilities and roles of academic leaders as well. Academic leadership is more than management and resource acquisition. They have many dimensions due to complexity of learning institutions. Institutional culture is shared values, norms, philosophies, practices, and beliefs that dictate behaviour of its members. Culture creation is a continuous process shaped by interactions and behaviour of its members. Literature indicates that for better performance strong institutional culture is required. Leaders are important for creation and manipulation of culture and leaders also gets influenced by the culture. Adoption and use of new digital technologies leads to many varied experiences to people and institutions (Morakanyane, R., et al., 2017). Technology acts as stimulator for fast changes at workplaces, these radial changes travel deep by affecting beliefs, norms, and culture of institutions (Korhonen, J. J., 2015). Technology is affecting every aspect of our life including our way of working. Adoption of technology affects way of decision making, collaboration, and communication. Organizations undergo substantial changes in culture due to adoption of new technologies. Leaders must sense cultural change due to technological change and position the organization accordingly (Bozkus, K., 2023). It is basically the role of leaders to promote and facilitate adaptation to culture of transformation in technological settings to survive successfully (Sainger, G., 2018). They must take the lead to promote and propagate cultural shift in a positive direction (Day, D. V., et al., 2014). Digitalisation has given birth to new methods and tools at workplace. Leaders can apply these tools to work virtually when away from the office. Physical presence can now be substituted by digital means (Khan, S., 2016) which has enabled leaders to monitor and work from far locations (Tarafdar, M., 2016). Technology has made possible working of people virtually from anywhere and at any time (Holger Arians, 2017). People can share and interact in digital channels providing flexibility in their work (Klus, M. F., & Müller, J., 2021). Relationships between leader and people gets affected due to virtual working as compared to past (Hesse, A., 2018). Hence, technological disruptions have resulted in change of working style of leaders (DeRosa, D., 2019).

Digitalization has become the biggest story nowadays. It has removed restraints and created new possibilities affecting workplaces and lives. Every future digital innovation cannot be predicted but digital elements like software, hardware, networks, and data will pervade in organizations quickly, broadly, and deeply. Regardless of type of business or location, workplaces are becoming more digitalized (Westerman, G., et al., 2014). Disruptive innovations caused by digital technology has created new processes, relationships, experiences, and organizational forms. It brings innovations by combining earlier experiences, by

incorporating advanced features like storage, sensors, processing power, display, and internet. These features are being embedded progressively to make devices smart which when used in institutes produces dynamic changes in institute working. Reprogrammable feature of devices allows to use advanced capabilities. Different digital portals, platforms, and tools are being used in institutions to support dedicated function. Tools and technologies such as cloud computing, artificial intelligence, social networking, performance management and learning platforms are examples of its proliferation in all the activities of workplaces (McGowan, M., 2018). In this uncertain and ambiguous environment, technological innovation is not a phenomenon but a factor. Technology creates more open and flexible affordances which leads to innovative disruptions (Chew, E. K., 2015), it is becoming bigger very rapidly every moment (Bolden, R., & O'Regan, N., 2016). Organizations need to align itself with new technologies to realize its full potential. Leaders' role is important to create value in organizations in current competitive environment (Li, W., et al., 2016). Leadership practices are being reshaped in digital age (Kluz, A., & Firlej, M., 2016). Leaders must capitalize the opportunity generated by the new technologies (Borowska, G., 2019). Diffusion of fast technological innovations will require leaders to assimilate and understand them wisely (Mihai, R. L., & CREȚU, A., 2019) as technology flow is continuous and never-ending process, leaders need to track it and keep updated with changing technological settings (McPolin, N., 2018). Leader's function is critical for implementation of technological innovations (Hunt, C. S., 2015). Leaders need to ensure that people inculcate digital mindset and respond adequately to the disruptions of digitalization (Benlian, A., & Haffke, I., 2016).

Digitalization brought forth tools for capturing and storing data, visualizing and analysing data on real-time basis which requires leaders to develop more trust with people (Khan, S., 2016). Availability of sophisticated tools and technologies along with internet connectivity has served as prime mover for automation. Workplaces are undergoing major changes with technologies offering new opportunities to pick up data in real-time, analyse it and find trends and behaviours (Klus, M. F., & Müller, J., 2021). Technology has provided opportunity to people for collaborative working in real time from different locations on secure platforms (Holger Arians, 2017). Real-time data has enhanced the agility of organizations (McAfee, A., et al., 2012) and has made close monitoring possible while ensuring tight compliances to prevent and anticipate unpleasant circumstances of the future (George, G., et al., 2016).

Technology brings forward challenges to leaders as they now have to master data-driven decision making (Hesse, A., 2018). Digital age leaders must possess good technological understanding and must have learning attitude (Bock, V., & Lange, M., 2018). Data is a critical component, leaders must have capability to deal with decision making based on data, which is the role of a leader as a mentor of data and information (Kapucu, H., 2020). Education leaders need to have digital capabilities, they must understand digital tools and new technologies (Antonopoulou, H., et al., 2020). Digitalisation has enabled data-analysis which is helpful in taking decisions (Khan, S., 2016) therefore digital leaders must take informed decisions based on data for strategic issues (Borowska, G., 2019) as decisions driven by data are better decisions and data permits leaders to make their decisions based on the evidences instead of intuition.

In digitalized world the role of leaders is important. Leaders now need to be more flexible holistic and fast. They have to exhibit stronger integrity and more transparency in their working in the current environment of interconnectedness. Technology ultimately creates demand to be transparent in working (Mäenpää, R., & Korhonen, J. J., 2015). Digital tools enhance transparency. Various social networking tools creates accountability, driving leaders to be transparent. Technology have made leaders to become more transparent and honest (Westerman, G., et al., 2014). Transparency will be an important factor in digitalized world in the future (Kapucu, H., 2020). Digitization enhances amount of data availability and hence the transparency, which often creates fear in employees as well as in leaders. Conscious data

handling is required especially for enhancing efficiency, improving processes and facilitating tasks (Gilli, K., et. Al., 2024). Digitalisation serves as an integrity enhancer, exerting pressure on the leaders to work in transparent way (Khan, S., 2016), it drives leaders to function in a transparent manner (Hesse, A., 2018). Digital leaders have to embrace transparency in their working (Ready, D. A., et al., 2020).

The leadership age now is not about creating the things in isolation but in collaboration (Anak Agung Sagung, M. A., & Sri Darma, G., 2020). Technology has infused the culture of collaboration at workplaces (Klus, M. F., & Müller, J., 2021). Digital technology enables development of relationships in networks making collaboration to emerge at a greater level (Borowska, G., 2019). Hyper connectivity enabled by technology facilitates collaboration (Berman, S., & Marshall, A., 2014). Availability of wide variety of technological tools facilitate collaboration for project management or cocreation (Gilson, L. L., et al., 2015). Leaders in the digital age must embrace new means of leading and working by intensifying collaboration (Ready, D. A., et al., 2020). They must create a culture supportive to collaboration and innovation (Ghamrawi, N., & M Tamim, R., 2022), they must facilitate people and make them customise with software tools to encourage effective collaboration (Klus, M., & Müller, J., 2020). Education leaders can strengthen communication and cooperation between faculty and learners to build collaborative environment (Karakose, T., et al., 2021). Therefore, leaders need to perform their tasks through collaborations and partnerships (Larjovuori, R. L., et al., 2018).

In digitally connected environment workplaces has grown in virtual context characterised by higher number of digital interactions including training, feedback, follow-up, leadership and work instructions all these often occurs in the digital format (Savolainen, T., 2013). Interactions across people has enhanced in digitalized environment (Bounfour, A., 2016). Leaders in information and communication era need to deal with greater frequency of interactions. They frequently communicate with people and such interactions is facilitated by communication technology. Advances in technologies has enhanced frequency of the interactions with members spread at different locations or at different time zones redefining role of the leaders (Lilian, S. C., 2014).

Interconnectedness has facilitated exchange of knowledge, information and practices while ensuring participation over dynamic networking. Digitalized world is marked by ambiguity, chaos, transitions, and disruptions hence, leaders are required to play critical role by building participative culture (Apoorve Dubey, 2019). Complexity along with different ideas required in making decisions compels leaders to shift towards teams for participative decision-making and achieve higher success (Eberl, J. K., & Drews, P., 2021). Leaders of digitalized era have to support decision-making in a participative way to increase effectiveness at workplaces (Anderson, H. J., et al., 2017). Therefore, leaders of digital age need to modulate themselves by being more participative (Kapucu, H., 2020).

Future organizations have to co-create value in exceedingly competitive and complex environment. They are required to be innovative by way of dynamically collaborating for co-creation of value as per the requirements of turbulent and disruptive settings (Chew, E. K., 2015). Advancements in technologies has furthered remarkable connectivity enabling co-creation (Berman, S., & Marshall, A., 2014). Technology facilitates collaboration and co-creation enhancing effectiveness, agility and competitiveness in organizations. In digitally connected settings, initiatives must be taken by leaders so that employees can contribute new ideas and co-create. Interconnectedness and organizations without rigid hierarchy are more conducive for co-creation (Khan, S., 2016). Leaders in digitally connected era have to face more aware and educated employees demanding co-creation and collaboration (Hesse, A., 2018), they must be competent enough to understand and apply all technologies to support its use in institutions (Ghamrawi, N., & M Tamim, R., 2022). Co-creation have stronger effect

than command and control (Kapucu, H., 2020). Therefore, leaders need to co-create value in organizations functioning in dynamic and complex settings by exploiting disruptive innovations.

Digitalized world is characterized by hyper-connectivity (Berman, S., & Marshall, A., 2014). Communication technology is the backbone of all digital settings. Future organizations will be interwoven in networks, coupled tightly and expanded over globe (Chew, E. K., 2015). "We are living in a time where technology is impacting everything we do and touch like never before, where being connected is becoming a basic human right" (Osman Sultan, CEO, Du, UAE). Digital era is characterized by information and knowledge sharing between people and organizations to produce collective intelligence (Bounfour, A., 2016). In this networked era fundamentally everyone and everything is mutually interdependent and digital tools will further blur the gap between physical and virtual (Berman, S., & Marshall, A., 2014). In digitalized environment of interconnectedness, leaders must establish networks and tune themselves with the changing reality (Ritz, A. A., 2021). So, working of the leaders of networked age is considerably different from leaders of the past.

Multitasking is parallel execution of many tasks. Access to huge data and digital connectedness provoke multitasking. (Hefner, D., & Vorderer, P., 2016). Electronic multitasking is the result of growth of internet, availability of portable digital devices such as laptops and smartphones, and increased usage of ICT at workplaces (Hasenberg, J., & Machovsky, K. 2016). People create, access, share and communicate lot of information seamlessly which requires to switch the attention among diverse forms of information amidst performing different tasks which is known as multitasking. Many interruptions including digital tools, mails, internet, messages, and mobile technologies are responsible for continuous switching of the activity or multitasking all day (Mark, G., 2022). Leaders are gradually facing the challenges connected to digitalization, particularly the parallel handling of tasks due to data flushing through electronic channels, which requires different leadership skills (Klus, M. F., & Müller, J., 2021). Today's Leaders are feeling the pressure of multitasking which sometimes lead to stressful situation, but they need to acclimatize to this reality

Digital technology has raised the expectation from leaders. To creating efficient and effective leaders in this new digitalized age, leaders need to have good technological skills and they must adopt, understand, and advance the technology well (Kapucu, H., 2020). Leaders in the digital age should have eagerness for learning and re-learning. These leaders use digital technology to grow, to maintain and gain competitive advantage (Borowska, G., 2019). Consequently, rapidly changing technological environment has sparked changes in leaders working in an unprecedented way compelling leaders to gain new skills continuously (Kapucu, H., 2020).

Digitalization has led to globalization and dynamically increased the flow of information (Kluz, A., & Firlej, M., 2016). It has impacted everything in current setting and has made our dependence on information. Organizations are now progressively dependent upon digital technology to raise their competitive value (Hiekkanen, K., 2015). Huge data is constantly being generated (Collin, J., et al., 2015) and leaders are required to acknowledge and unleash the value of data (Li, W., et al., 2016). Leaders must have analytical software tools with them to interpret huge data and identify the valuable information to organization (Verma, R., et al., 2022) and they should be able to understand and harness this huge information.

Rapid innovations in technology, huge bandwidth, growing storage capacities, tremendous processing powers has enabled digitalization of everything which has made new setting increasingly complex (Hiekkanen, K., 2015). The information age is marked by growing technological complexity, which has redefined the role of leaders. As these disruptions are created leaders has to tune their response accordingly (Vial, G., 2021). New technology and disruptive innovations have significant impact on organizations, processes, and people. Leaders have to adjust themselves for this change (Apoorve Dubey, 2019). Digitalized era

demands leaders who must be able to understand complexity of the technology (Li, W., et al., 2016). In education institute's role of leaders is significant to deal with uncertain and complex environment (Sheninger, E., 2019). Therefore, new generation leaders must learn to lead in environment filled with complex changes (Bock, V., & Lange, M., 2018).

New technology influences power structure and relationships at workplaces which creates altogether different context for leaders. Digitalization democratizes the access to information affecting negotiating power, and consequently interdependencies and power structure also gets affected. The result is reduction in hierarchical barriers in organizations (Hesse, A., 2018). It frequently brings structural changes to align new operations with technology. Mainly product, processes, and skillsets are affected by these changes (Matt, C., et al., 2015). Leaders cannot lead effectively today with rigid hierarchical mindset. Omnipotent leaders are not appropriate now. Controlling with authority is outdated. Leaders have to break down the hierarchal barriers and collaborate with employees (Rodríguez, M., et al., 2019). Hierarchical mode to lead people is not appropriate in new complex and digitalized setting, rather constant encouragement from leaders makes people achieve targets (Kapucu, H., 2020). Therefore, elimination of personal and hierarchal barriers is necessary to lead in digital era and leaders must acknowledge it (Khan, S., 2016).

Speed of data and information has accelerated due to shift towards technology (Westerman, G., et al., 2014). Moreover, disruptive change induced by technology has reduced the duration of change to happen compared to past as development and maturity of new technologies has become faster (Berman, S., & Marshall, A., 2014). These rapid technological developments in current information embracing setting had created pressure for taking timely and appropriate decisions (Halén, M., 2015) as the speed of doing things in digitalized era can decide success and failure of an organization. Therefore, leaders must adapt and respond to these changes and take effective and quick decisions (Apoorve Dubey, 2019). Leaders in technological age are forced to take their decisions in a shorter timeframe (Rogers, D. L., 2016), cutting the time lag of decision making (Collin, J., et al., 2015). New digitalized era demands speed and agility for remaining effective. Leaders have to be quick (Maedche, A., 2016) and organizations must enhance their agility in response to fast varying requirements and expectations (Chew, E., et al., 2013).

## **Methodology**

Questionnaire was used as an instrument to identify factors which are affecting leaders working style in the era of digitalization in twelve engineering colleges of Himachal Pradesh. Research literature was reviewed on the topic by the researcher and questionnaire was developed which was used for data collection. Nineteen questions were administered to a total of 104 different respondents. The responses were rated on seven-point Likert scale. The respondents were head of the departments and senior faculties having at least five years of teaching experiences. Responses were collected and factor analyzed.

## **Factor analysis**

Factor Analytics was used to club large number of items into few factors. It extracted the maximum common variance from all the variables and placed them into a common score. Since all the items identified for the specific topic under study were having equal status and the idea was to identify the benefits associated with digitization, so the tool for interdependence analysis i.e. exploratory factor analysis has been applied.

Cronbach's alpha coefficient is used to measure reliability or internal consistency of data. This statistic indicates if the data is consistently measuring same characteristic or not. It evaluates it on a scale of 0 to 1. Closer this value to one, higher is the agreement between the items. Here the value is 0.938, indicating internal consistency to be excellent for the data in hand.

Table 1: Reliability statistics

Cronbach's Alpha	Number of Items
.938	19

### KMO and Bartlett's test

Kaiser Meyer Olkin (KMO) test is used to assess suitability of the data for carrying out factor analysis. It measures degree of the coherence between different variables. Values of this test falls between 1 and 0. If this score is higher than 0.5, then it is found suitable for carrying out factor analysis. Table 2 depicts that KMO score is 0.882, which is considered very good for carrying factor analysis. Bartlett's test of sphericity tests null hypothesis which asserts correlation matrix to be an identity matrix which implies that the variables are unrelated and hence not suitable to carry out factor analysis. If this test is significant i.e. less than 0.05, then it implies that correlation matrix is not an identity matrix, rejecting null hypothesis. Table 2 shows that the test to be significant at  $<.001$ . Therefore, null hypothesis is rejected and factor analysis can be carried out.

Table 2: KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy.		.882
Bartlett's test of sphericity	Approx. Chi-square	1459.324
	Df	171
	Sig.	$<.001$

### Communalities

Communalities indicate volume of the original information which is present in the variable and can be extracted from a common factor. Closer the score of communalities to 1, higher the volume of information which can be extracted. Communality score should be at least above 0.04. By default, the Initial score of communalities for every variable by default is set to 1.00 or say 100% as at the start of factor analysis, no information is extracted.

Result in table 3 shows that minimum volume of information extraction is 48.9% by communality 3, implying 51.1% loss of the information. In consonance with Kaiser's criterion, the number of variables is less than 30 and average communality score to be higher than 0.7, so factor analysis can be carried out.

Table 3: Communalities

Sr. No.	Communalities	Initial	Extraction
1	Technology has changed the way I gather, connect, communicate, and interact with others in my institute.	1.000	.880
2	Ease of interconnectedness with people due to digital technology has changed the way I work.	1.000	.764
3	Access to required information and digital connectedness often require me to multitask.	1.000	.489
4	I use communication technology to reach out to anyone for official task, both during workhours and afterhours.	1.000	.691
5	My decision is getting positively affected based on the use of technology.	1.000	.628
6	Use of new technologies has changed old work practices of my institute.	1.000	.618

7	Digitalization has enhanced interaction between people at different levels of my institute.	1.000	.764
8	Digitalization has enhanced the employee influence in my institute.	1.000	.795
9	Use of digital technology has affected power and influence structure in my institute.	1.000	.778
10	Use of digital tools and technologies has brought transparency in my institutes work.	1.000	.814
11	Digitized environment in my institute has led to shorter decision timeframes.	1.000	.692
12	Use of technology has led to efficient access of respective need-based information to different stakeholders in my institution.	1.000	.686
13	Access to real-time information in my institute has changed my way of working.	1.000	.766
14	Digitalization has developed participative culture in my institute.	1.000	.786
15	I feel increased complexity in my work due to use of wide range of digital tools and technologies.	1.000	.706
16	Use of online interactive platforms has made my working more collaborative.	1.000	.804
17	Use of digital technologies has changed dominant values and beliefs of people in my institute changing the way I work	1.000	.728
18	I feel constant need to upgrade my IT knowledge and skill to work effectively in my institute.	1.000	.632
19	People in my institute find digital platforms to be an easy and convenient way to discuss issues and solve problems.	1.000	.656

Extraction method: Principal component analysis.

### Total variance explained

As shown in table 4, number of components having initial eigenvalue score higher than 1 are four, therefore, four factors are extracted. Eigenvalues of first four components are 9.550, 1.734, 1.277 and 1.116 respectively which are greater than 1 therefore, 19 components represent 4 factors.

The % variance column in table 4 depicts that 50.265% of variance features are explained by first factor, 9.126% by second factor, 6.719% by third factor and 5.873% by fourth factor. In table 4 the score of cumulative % of extracted sum of squared loadings for fourth component shows extraction of four different factors and total variance explained by these four factors is 71.983% which being effective enough for representation of characteristics of 19 variables.

Table 4: Total variance explained

Component	Total	Initial eigenvalues		Extraction sums of squared loadings		
		% of variance	Cumulative %	Total	% of variance	Cumulative %
1	9.550	50.265	50.265	9.550	50.265	50.265
2	1.734	9.126	59.391	1.734	9.126	59.391
3	1.277	6.719	66.110	1.277	6.719	66.110
4	1.116	5.873	71.983	1.116	5.873	71.983
5	.897	4.723	76.706			



6	.692	3.640	80.347			
7	.506	2.661	83.008			
8	.487	2.564	85.572			
9	.432	2.275	87.847			
10	.378	1.990	89.837			
11	.329	1.730	91.567			
12	.319	1.678	93.246			
13	.299	1.574	94.820			
14	.236	1.241	96.060			
15	.225	1.184	97.244			
16	.192	1.009	98.253			
17	.136	.717	98.970			
18	.105	.554	99.524			
19	.090	.476	100.000			

### Scree plot

Scree plot is used to plot eigenvalues of the factors which are arranged in decreasing order from left to right in the plot. It is used to decide number of factors which must be retained. Factors to the left of the point where the curve gets flatten, known as point of inflexion, are extracted and factors to the right of the inflection point are removed. In our case four factors are extracted. Factors with eigenvalue more than 1 are extracted and factors having eigenvalues less than 1 are removed (Field, A., 2013).

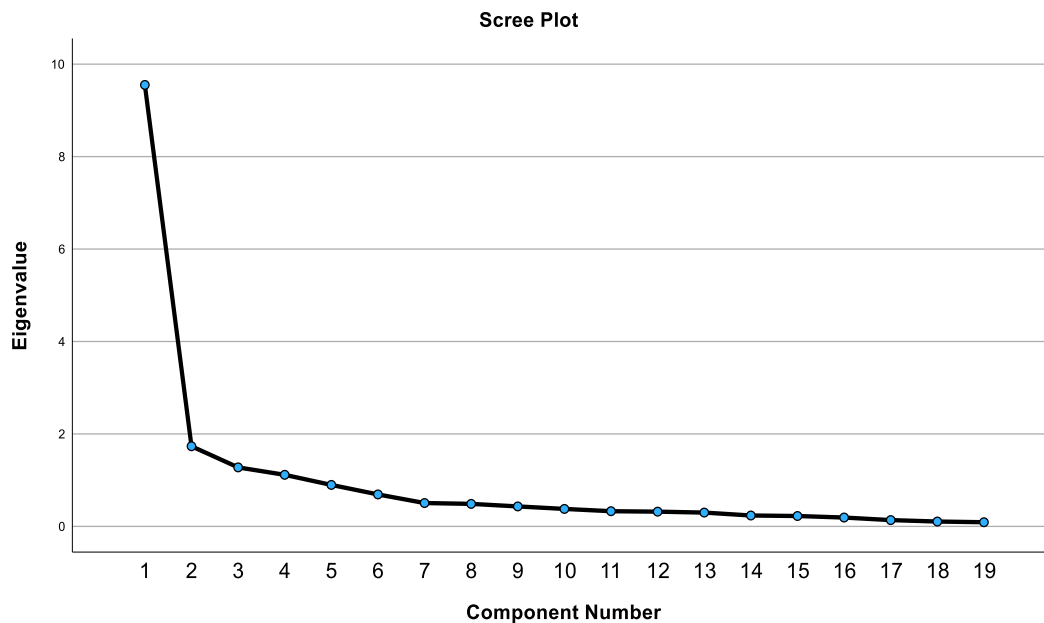


Figure 1: Scree plot

### Rotated component matrix

Rotation reduces number of the factors where variables have got high loadings. If loading score is more than 0.5 for any variable, then that variable is included for analysis. In table 5, highest component score is 4, which indicates presence of four factors. First factor includes six items, second factor has four items, third factor consists of five items and in the fourth factor there are four items. Rotated component matrix gives estimate of correlations between variables and estimated components.

Table 5: Rotated component matrix

List of items	Components			
	1	2	3	4
Use of digital technologies has changed dominant values and beliefs of people in my institute changing the way I work	.737			
I use communication technology to reach out to anyone for official task, both during workhours and afterhours.	.734			
Use of new technologies has changed old work practices of my institute.	.669			
Access to real-time information in my institute has changed my way of working.	.653			
My decision is getting positively affected based on the use of technology.	.635			
Use of digital tools and technologies has brought transparency in my institutes work.	.634	.573		
Use of online interactive platforms has made my working more collaborative.		.805		
Digitalization has enhanced interaction between people at different levels of my institute.		.798		
Digitalization has developed participative culture in my institute.		.758		
People in my institute find digital platforms to be an easy and convenient way to discuss issues and solve problems.		.613		
Technology has changed the way I gather, connect, communicate, and interact with others in my institute.			.872	
Ease of interconnectedness with people due to digital technology has changed the way I work.			.816	
I feel constant need to upgrade my IT knowledge and skill to work effectively in my institute.			.681	
Use of technology has led to efficient access of respective need-based information to different stakeholders in my institution.			.626	
Access to required information and digital connectedness often require me to multitask.			.511	
I feel increased complexity in my work due to use of wide range of digital tools and technologies.				.805
Digitalization has enhanced the employee influence in my institute.	.500			.724
Use of digital technology has affected power and influence structure in my institute.				.680

Digitized environment in my institute has led to shorter decision timeframes.				.631
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Extraction method: Principal component analysis.

Rotation Method: Varimax with Kaiser normalization.

a. Rotation converged in 3 iterations.

The first factor comprises of items related to change in institutional culture, flexible working, changing work practices, access to real-time information, technology-based decision making, and enhanced transparency, which is clubbed under the name digital integration and work culture transformation. Second factor includes items related to digital collaboration, enhanced interactions, increased participation, co-creation, which is clubbed under the name engagement enhancement. Third factor incorporates items related to ease of interconnectedness, information sharing, multitasking, continuous reskilling requirements, and abundance of information, which is clubbed under the name technology driven information dynamics and skill evolution. Fourth factor contains items related to increased complexity, increased employee influence, changed power and influence structure, and shorter timeframes for decision making, which is clubbed under the name digital impact on work dynamics and decision urgency. Summary of factors for factors affecting leaders working style in the era of digitalization in engineering colleges of HPTU is depicted in table 6.

Table 6: Factor groups

Factor	Name of factor	List of Items
Factor 1	Digital integration and work culture transformation	<ul style="list-style-type: none"> <li>• Use of digital technologies has changed dominant values and beliefs of people in my institute changing the way I work</li> <li>• I use communication technology to reach out to anyone for official task, both during workhours and afterhours.</li> <li>• Use of new technologies has changed old work practices of my institute.</li> <li>• Access to real-time information in my institute has changed my way of working.</li> <li>• My decision is getting positively affected based on the use of technology.</li> <li>• Use of digital tools and technologies has brought transparency in my institutes work.</li> </ul>
Factor 2	Engagement enhancement	<ul style="list-style-type: none"> <li>• Use of online interactive platforms has made my working more collaborative.</li> <li>• Digitalization has enhanced interaction between people at different levels of my institute.</li> <li>• Digitalization has developed participative culture in my institute.</li> <li>• People in my institute find digital platforms to be an easy and convenient way to discuss issues and solve problems.</li> </ul>
Factor 3	Technology driven information dynamics and skill evolution	<ul style="list-style-type: none"> <li>• Technology has changed the way I gather, connect, communicate, and interact with others in my institute.</li> </ul>

		<ul style="list-style-type: none"> <li>• Ease of interconnectedness with people due to digital technology has changed the way I work.</li> <li>• I feel constant need to upgrade my IT knowledge and skill to work effectively in my institute.</li> <li>• Use of technology has led to efficient access of respective need-based information to different stakeholders in my institution.</li> <li>• Access to required information and digital connectedness often require me to multitask.</li> </ul>
Factor 4	Digital impact on work dynamics and decision urgency	<ul style="list-style-type: none"> <li>• I feel increased complexity in my work due to use of wide range of digital tools and technologies.</li> <li>• Digitalization has enhanced the employee influence in my institute.</li> <li>• Use of digital technology has affected power and influence structure in my institute.</li> <li>• Digitized environment in my institute has led to shorter decision timeframes.</li> </ul>

### Discussion and conclusion

Our dependance on technology and pace of change has necessitated adjustments in leaders working style. Digitalization has forced leaders to redefine their vision to stay competitive in new settings. Today institutions need leaders who can ensure successful use of digital technologies as fast digital innovations has generated a different context for leaders. Therefore, leaders are required to ensure that they handle huge information effectively, take quick decisions, maintain transparency, involve people in decision making, remain well informed with technology, interact with people, handle complexity and remain agile. The findings indicate that the factors affecting leaders working style in the era of digitalization is built upon four factors: digital integration and work culture transformation; engagement enhancement; technology driven information dynamics and skill evolution; and digital impact on work dynamics and decision urgency.

When examining these factors, it is found that technology has been integrated deep in every aspect of our work. Wide range of available data analysis tools has facilitated leaders to take well informed decisions. Technology has enabled real time working of leaders by providing access to real time CCTV video during examinations, for monitoring people or for security purpose. People can now work in real time collaborative way from far locations on secure platforms. Spread of the technology has enabled easy access of information and provided many tools and platforms for incorporating transparency, exerting pressure on leaders to be transparent in their working. Flexible working has given more control over the work of leaders when they are away from the institute. It helps to overcome negative impact of environmental uncertainty as happened during Corona pandemic and adverse weather conditions, by providing flexibility on how work is performed. Flexible working is not restricted to work from remote only but it is more extensive phenomenon. Leaders now use cloud storage for sharing documents and information irrespective of any location and they remain informed with the activities going on in the institute by checking and responding to important correspondence from remote. Adoption of new technology brings about many varied experiences to people and institutions. Technology has significant influence on communication modes, work processes,

roles and responsibilities of people and decision making which impacts common beliefs, values behaviors and customs in the institute leading to the change in the way leaders work in the institute.

The capability to interact and collaborate on digital platforms beyond the limits of time and space has resulted in the reconfiguration of institutes and new form of working, facilitating collaboration beyond disciplinary and national boundaries. Collaboration using technology needs new skills and leaders need to embrace this change to ensure success of their institutes. In the digitalized environment in which interconnectedness is certain and speed of information is very high, leaders need to connect with people, share information, interact and communicate with people. In digitally intertwined world, need for agile, adaptable, and innovative leadership is greater than ever. Therefore, continuous learning has surfaced as an important pillar for success of any institute.

The current time which is characterized by unpredictability and ambiguity, presents many challenges to the leaders. They need to handle this uncertainty and complexity of internal and external environment. Moreover, agility and speed are the most valued traits in any institute today so, leaders need to think dynamically and take quick decisions to ensure timely compliances and stay relevant.

### **Future research implications**

Digitalization has strongly influenced businesses and institutions. Mushrooming growth of new technologies and their use presents many questions for leaders to rethink about their working style as impact of digital technologies can be experienced on different aspects of institutions. Institutions are now realizing importance of leaders, who play critical role in success and identity creation of an institute. The paper contributes to the growing literature on leaders working style in digitalized environment and offers invaluable insights to leaders. These findings can serve as groundwork for the future research on leaders working in digitalized environment. The effectiveness of the academic leaders will improve effectiveness of institutions and help learners improve their future preparedness, which can improve their career opportunities and solve situation of youth unemployment.

Discussion in the study shows the existence of knowledge gap which awaits to be narrow down in the future. In future research can be carried out to find the impact of institutional culture on the working style of leaders, impact of technology mediated decision making on leaders working style, and impact of digitalization on organizational structure or skillset of people.

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