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MDIM Journal of Management Review and Practice is published by Management Development Institute Murshidabad. The journal started publishing in 2023 in English Language. The journal aims to create and advance knowledge in the field of management sciences and its allied disciplines. High quality research papers, case studies, opinion pieces and book reviews are published in *MDIM Journal of Management Review and Practice*.

Through thought leadership, the journal fosters a knowledge ecosystem that enriches the existing body of knowledge.

MDIM Journal of Management Review and Practice is published twice a year, in March and September. The journal publishes research works that are thought provoking. The most recent developments in the following fields have been covered in recent years. Thought leaders, researchers, academicians as well as corporate professionals publish their scholarly work through this outlet.

The indicative list of areas on which research work is published in this journal are as follows:

- General Management
- Finance & Accounting
- Economics
- Information Technology
- Marketing
- Human Resource Management
- Ethics
- Organization Behaviour
- Operation and Strategic Management
- Public Policies and Governance

The journal has provided a forum for debate and a platform for exchange of ideas from a diverse range of scholarly perspectives in order to promote research with quantitative, qualitative as well theoretical underpinnings on issues confronting the world as a whole in general and business world in particular.

The main features (paper types) of the journal are as follows:

- Applied and Normative Research
- Review Articles
- Case Studies
- Book Reviews

Aims and Scope

MDIM Journal of Management Review and Practice, a humble initiative of Management Development Institute Murshidabad, strives and fosters to propel research in the arena of business and management sciences by providing evidence-based research papers of highest quality for academicians, researchers, managers and policy makers. The journal endeavors to create influence on corporate and academia think tanks. It aspires to provide a platform for discussions and cross-pollinations of ideas across wide spectrum of scholarly perspectives to garner theoretical, empirical and comparative research on ongoing and probable problems in the business world.

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Editorial

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The field of management is facing previously unheard-of opportunities and problems in today's quickly changing global corporate world. In the field of management, our journal is an outlet for cutting-edge research, novel concepts, and stimulating discussions. We are glad to observe a plethora of topics being investigated through research papers in this journal.

We have an unwavering commitment to foster diversity and inclusivity within the management researcher community. To reflect the multifaceted nature of the field, we continue to encourage submissions from scholars with a variety of backgrounds and points of view.

We remain committed to providing a platform for rigorous research and informed dialogue that empowers practitioners, scholars and students alike as we navigate the complexities of contemporary management. We are grateful to our readers, reviewers, editorial board members, and contributors for their ongoing engagement and support.

Souvik Banerjee

Editor

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Work–Family Symbiosis in Nurses: Work–Family Positive Spillover in Female Nurses in North India

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Fatima Riyaz Khateeb¹ 

Abstract

This study determines the nature and extent of positive spillover between work and family in case of female nurses in Jammu & Kashmir, India. The relationship is construed along three dimensions, namely, affective positive spillover, behavior-based instrumental positive spillover, and value-based instrumental positive spillover in both the directions of work to family and family to work. The work-life positive spillover (WFPS) is examined with respect to life satisfaction and psychological well-being (PWB) of female nurses. A survey was conducted using a questionnaire among female nurses in seven government-run hospitals in Jammu & Kashmir in North India. A total of 311 data points were gathered through random sampling. SPSS is used for analyzing data. Hypotheses were tested through SEM using AMOS 24 and in addition to Pearson correlation, Cronbach's alpha test, and descriptive statistics were used to draw out the inferences. The findings show that WFPS has a considerable impact on the PWB and life satisfaction of female nurses. This impact varied according to the aspects of spillover, with value-based instrumental positive spillover being most important in the case of psychological well-being and affective positive spillover being most significant in the case of life satisfaction. Thus far the relationship between work and life has been construed as being in conflict which thus has influenced the labor policy formulation in case of nurses and healthcare. A more holistic policy framework must also consider the positive relationship between work and life that this work has posited.

Keywords

Nursing work life, positive spillover, nurses wellbeing, life satisfaction, psychological wellbeing

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Introduction

The relationship between work and family life is a topic that continues to pique researcher's interest across the world. Economic development, globalization, and equitable job opportunities are all modernizing trends that have led to a greater focus on the impact of work-life issues on one's well-being. These issues have been dealt with and researched under the rubric of work-life balance (WLB).

WLB is defined as a person's impression of how well his or her life responsibilities are balanced. This definition is based on the person-centered approach, which considers WLB to be a holistic concept encompassing all areas of an individual's life, which is unique for each person and can vary throughout the course of people's lives depending on their career or life stage, and which is dependent on an individual's life values, goals, and aspirations (Greenhaus & Allen, 2011). It is crucial to stress that WLB is a notion that applies to all working individuals, independent of their family circumstances (i.e., single, childless employees with no extra caregiving duties) because it captures the individual's ability to accomplish effectively the things that are important to them (Kossek et al., 2014). WLB is based on two fundamental dimensions, namely, role engagement in work and family life and alleviation of conflict between work and family roles.

At its inception, the research on WLB of individuals was primarily focused on the negative consequences that domains of work and life have on each other. However, in due course of time, the researchers started to focus on how the interaction between work and personal life can have constructive effects on each other.

The enhancement hypothesis, an alternative to the older scarcity hypothesis, which forms the basis of the paradigm of work-family conflict, asserts that playing many roles can be advantageous. The advantages of one role influencing another have been operationalized in a number of ways, such as gaining knowledge or skills that can be applied in another role (Edwards & Rothbard, 2000; Sieber, 1974), creating a safety net against failure in another role (Barnett & Hyde, 2001; Sieber, 1974) and giving people a wider frame of reference from which to relate to other domains (Barnett & Hyde, 2001; Sieber, 1974). It is assumed that the combined effect of these advantages makes it easier to integrate and manage the roles, which produces fewer unfavorable results and more favorable ones (Thoits, 1983; Voydanoff, 2002).

The recognition of the fact that work and family responsibilities need not necessarily be incompatible and such a relationship can have positive results as well, resulted in conception theories like positive spillover (Grzywacz & Marks, 2000), work-life facilitation (Grzywacz, 2002) and work-life enrichment (Greenhaus & Powell, 2006). These theories basically focus on how positive encounters in one domain of life (e.g., work) can lead to productive experiences in the other domain (e.g., personal life) (Baltes et al., 2009). These theories have been receiving great attention from various researchers for several years now (Masuda et al., 2012). Among the theories that have been proposed in addressing this positive relationship between the two domains include work-life facilitation, work-life enrichment, and work-family positive spillover (WFPS).

The concept of spillover originally propounded by Wilensky (1960) explicates that the experiences in one domain of life (e.g., work) transmit into the other domain of life (e.g., family) thereby directly affecting the kind of experience you will have in the other domain (Edwards & Rothbard, 2000). This phenomenon has been addressed using other terms including generalization, similarity, isomorphism, continuation, familiarity, and extension (Edwards & Rothbard, 2000).

The evidencing of positive spillover has been shown to have effect on all domains which contribute to positive work, non-work, and stress-related outcomes (Lee et al., 2021). This is made possible through three pathways. First, there is an increase life satisfaction due to positive affect spillover (Heller & Watson, 2005). Second, positive spillover acts as a defense mechanism against unpleasant life experiences (Barnett & Hyde, 2001). Third, good performance in one function might provide psychological availability and therefore lead to psychological wellbeing.

In a significant study, Hanson et al. (2006) studied the positive spillover under three categorizations; value-based instrumental positive spillover, behavior-based instrumental positive spillover, and affective positive spillover. In their conceptualization, affective positive spillover (work-to-family and/or family-to-work) occurs when positive effects (e.g., appreciation) in one domain ease the process of fulfilling responsibilities in the other domain. Behavior-based instrumental positive spillover (work-to-family and/or family-to-work) occurs when the behavior (e.g., multitasking) required in one domain makes it easier to fulfill the commitments in the other domain. Lastly, value-based instrumental positive spillover (work-to-family and/or family-to-work) comes to pass when the values, for instance, autonomy, in one domain, improve the functioning in the other domain. All these dimensions have been analyzed in the present study. Experiencing positive spillover is said to have beneficial results at both individual as well as organizational level. Individuals experiencing positive spillover are less likely to develop problematic drinking behaviors and are more likely to develop a better sleeping pattern and such individuals in all probability are going to experience job satisfaction as well (Poelmans et al., 2008).

WFPS has been used interchangeably with other positive constructs like work–family facilitation and work-life enrichment. While there are similarities between these constructs, they are some polarities as well. While positive spillover includes transfer of personal gains (skills, affect, and behavior) from one domain to other, facilitation includes capital gains (employment benefits, money) along with the personal gains (Hanson et al., 2006). Similarly, work-life enrichment includes not only the transfer of resource gains from one domain to other (positive spillover) but the individual being able to recognize the positive effects of this transfer on the other domain (enrichment) (Masuda et al., 2012; Wayne, 2009).

The severity of the COVID-19 pandemic, with over 172 million confirmed cases and 3.7 million fatalities globally (World Health Organization, 2021), as a public health concern has put health care professionals including nurses at the center of attention. Nursing, an especially challenging profession, involves both mental and physical stress and with changes in shift timings, female nurses, who

also partake in caregiving roles, find it challenging to attain WLB. This becomes more acute in Indian context where the drastic changes in the gender roles at work have not translated into any major changes at the domestic front leading to greater imbalances between work and life (Shastri et al., 2021), which has further been exacerbated by a chronic shortage of nurses in government hospitals (Gill, 2016).

WLB policies formulated for nurses in India must not only consider the negative relationship between work and personal life but also the positive interactions. As a result, effective impact in one domain enhances performance in the other (Edwards & Rothbard, 2000).

Work-life interventions and policies in India with regards to nurses have been limited to providing maternal leaves/benefits, on-site childcare, personal leave, one month leave a year among others. These benefits have been put forward within the paradigm of work and life conflict. With the intention that these benefits may alleviate the conflict between work and life. In a changing conceptual landscape of the field of WLB these interventions need to be re-investigated such that the positive interactions between work and life are also addressed at the policy level. To bring this, about the need for an empirical study seeking to investigate the nature of work and life through the lens of positive work life spillover is called for.

Evidence from such a study would be useful in creating organizational interventions, and public policies focusing on various kinds of social support at work that promote WLB. Furthermore, determining which types of support at home are more beneficial to family life satisfaction may be valuable for implementing appropriate family therapies. The locale of the study is justified by total absence of any instance of such in North India which is the locale of the present study. Therefore, the research objectives of this study are enumerated as under:

1. To analyze the constituents of work–family positive spillover with respect to PWB of female nurses.
2. To analyze the constituents of work–family positive spillover with respect to the life satisfaction of female nurses.

Literature Review

Recognizing the need for understanding the nature of WLB in nurses in India one comes across substantial research that has been published through the years. The research can be categorized along three major dimensions.

Firstly, those studies that relate to the psychological effects of work on the nurses. Some of the significant studies in this group include effects of low esteem and high stress (Johnson et al., 2020), prevalence of depression/anxiety in wake of covid-19 pandemic (Wilson et al., 2020), prevalence of burnout (Kesarwani et al., 2020), effect of psychological capital on perception of burnout (Gupta et al., 2019), personality traits and burnout among female nurses (Divinakumar et al., 2019) among others.

Second category of studies includes themes where job perception of nurses has been considered. Some of themes include quality of work-life (Bhende et al., 2020), organizational commitment (Shabir & Gani, 2020), job satisfaction (Singh et al., 2019; Dhamija et al., 2019), fear of litigation (Saqib et al., 2020) among others. Third category includes studies undertaken with an organizational view into account. Some of the examples include workplace empowerment (Nayak et al., 2018), shift work effects (Verma et al., 2018) and organizational culture (Madhiwalla et al., 2018). Given context of these studies is Indian some of the studies reflect cultural aspects of the effects of/on work including workplace spirituality (Iyer & Deshmukh, 2018) and positive religious coping (Pandey & Singh, 2019).

As may be discerned from the aforementioned research, almost all the research that has been conducted has focused on negative aspects of the relationship between the two roles. Although, studies have consistently pointed to conflict between work and life of the nurses but nonetheless the turnover intention among the nurses across the board remains invariably low. Studies indicate how turnover intention can be significantly related to the positive work–family interface in form of work–family enrichment (McNall et al., 2009; Yang & Lee, 2009) work–family facilitation (Karatepe & Azar, 2013) and more importantly work–family positive spillover (Sok et al., 2018).

Consequently, a possibility of positive relationship between work and life is to be surmised which is sought for through the paradigm of positive spillover in this study.

Hypothesis Development

Psychological well-being (PWB) signifies individuals' positive self-perception, being fully aware of oneself including one's strengths and weaknesses, being able to successfully face difficult times, and discovering the life's purpose (Yayla & Eskici İlgin, 2021). The task of successfully managing the work responsibilities along with taking care of the non-work responsibilities can negatively affect the psychological health. This is especially true for women, who along with managing the work responsibilities also are generally primary caregivers at home (Wilkinson, 2013). PWB has been proven to have various characteristics that cannot be covered by a single domain.

Published literature indicates that when the experiences of one domain have a positive impact on the experiences of the other domain, it would have a positive impact on the PWB of the individuals. For instance, Farradinna et al. (2019) in their study of female academicians found that PWB was influenced by work-to-family positive spillover. Similarly, Kim et al. (2020) in their study found that those individuals who experienced positive work–family spillover reported having higher well-being.

Research shows that PWB has been shown to be crucial in boosting mental health among healthcare personnel, resulting in the preservation of a

happy nurse practice environment and improved patient care (Andrews & Wan, 2009; Coetzee et al., 2012; Murray et al., 2016). A 2015 systematic review of literature found that satisfaction with life, job and family was significantly and positively connected with psychological well-being of nurses (Hall et al., 2016). Following which the PWB of nurses and WFPS are hypothesized to have a positive relationship. The hypotheses along the three dimensions runs as:

- H_{1a} : There is a positive relationship between affective work-life positive spillover (WFPS) and psychological wellbeing of female nurses.
- H_{1b} : There is a positive relationship between behavior-based instrumental WFPS and psychological wellbeing of female nurses.
- H_{1c} : There is a positive relationship between value-based instrumental WFPS and psychological wellbeing of female nurses.

When individuals believe that they are able to balance their work and non-work responsibilities, it leads to decrease in role strain, thereby increasing their life satisfaction (Perrone & Civileto, 2004). Life satisfaction is defined by Sousa and Lyubomirsky (2001) as “contentment with or acceptance of one’s life circumstances, or the fulfillment of one’s wants and needs for one’s life as a whole.” Imbalance between work and non-work domain leads to decrease in life satisfaction (Yucel, 2017; Zhao et al., 2011). Contrarily, research has shown that being able to strike a balance between work and non-work responsibilities helps individuals to achieve better life satisfaction (Best & Chinta, 2021; Yusuf & Khan, 2018). Wolfram and Gratton (2014) in their study found that positive spillover from home was positively related to life satisfaction. Similarly, Stevanovic and Rupert (2009), found that, positive spillover leads to greater life satisfaction. In cases of the nurses, the studies regarding alternative theories positing the positive relationship between life and work of the nurses like enrichment and facilitation are more in number than those studying positive spillover. A study conducted in South Korea posits that family-to-work enrichment had a greater effect on life satisfaction (Rhee & Zheng, 2019). Another study in Malaysia concludes that there is a causal link between work–family enrichment and life satisfaction in nurses as mediated by the social support (Wan Rashid et al., 2011). Following the lead of these studies a positive relationship between spillover and life satisfaction of nurses is surmised which along the three dimensions of spillover as:

- H_{2a} : There is a positive relationship between affective WFPS and life satisfaction of female nurses.
- H_{2b} : There is a positive relationship between behavior-based instrumental WFPS and life satisfaction of female nurses.
- H_{2c} : There is a positive relationship between value-based instrumental WFPS and life satisfaction of female nurses.

Sample and Data Collection

Sample and Sampling Technique

This study was conducted at seven hospitals connected with the Government Medical College (GMC) in Srinagar between November and December 2022. The GMC gave the researcher a list of the nurses who worked at these facilities, as well as their marital statuses. The sample size was determined using the method for sample sizes inside a known universe. All nurses employed in these hospitals ($N = 623$) were included in the research group. Using the computation of sample size inside a given universe, the sample size was calculated to be 238 nurses with a 95% confidence interval and a 5% error range.

Given the possibility of data loss, the data collecting procedure was completed when data from 328 nurses were obtained using simple random selection from this group. The data of 17 nurses who were suffering from chronic illnesses at the time of data collection were eliminated. Thus, **311** nurses participated in the study.

Measures

Demographics: Four personal and family demographical questions were asked. These included questions related to the age, years of work experience, marital status and education qualification of the nurses.

Independent Variables

Work–Family Positive Spillover

WFPS scale by Hanson et al. (2006) was used to study the status of positive spillover among the nurses. The positive spillover from work to family as well as family to work was analyzed. The scale is significant in so far as it distinguishes and sets apart the concept of positive spillover from facilitation and enrichment although any presence of spillover may not exclude the presence of work and life conflict. It is an 18-item scale and the questions were related to affective, behavioral, and value-based instrumental WFPS. It is a seven-point Likert scale with “1” indicating total disagreement and “7” indicating total agreement.

Dependent Variables

PWB: Participants' PWB was assessed using the positive affective well-being scale (Hess et al., 2005). Other studies have successfully used this measure to assess PWB among employees (e.g., Arnold et al., 2007). Using a seven-point Likert-type scale (1 = not at all to 7 = all the time), participants indicated the extent to which they have felt positive emotional states (e.g., lively, motivated) over the previous four months.

Life Satisfaction: The study is employing satisfaction with life scale (SWLS) formulated by Diener et al. (1985). It is a five-item scale that assesses an individual's global cognitive assessments of life satisfaction. Participants use a seven-point scale ranging from 7 "strongly agree" to 1 "strongly disagree" to indicate how much they agree or disagree with each of the five statements. The scale runs from 5 to 35 points, with higher scores indicating a better level of life satisfaction.

Data Analysis

Data analysis was carried out with SPSS 23 software. Reliability analysis was done for the questionnaire using Cronbach's alpha parameter. The correlation was computed to assess the research variables' internal relationships and descriptive statistics for the five variables, namely, Affective WFPS, Behavior-based Instrumental WFPS, Value-based instrumental WFPS, PWB and Life Satisfaction. Before SEM was deployed, the confirmatory factor analysis (CFA), common method bias (CMB), and multicollinearity were calculated. The structural model is constructed with independent variables as Affective WFPS, Behavior-based Instrumental WFPS, Value-based instrumental WFPS and PWB and Life Satisfaction as dependent variables. The use of self-report questionnaires has been contested in the HRM literature (Bryman, 1988; Spector, 1986), with some arguing that they may lead to unnaturally high correlations across measures of behavioral components. The use of a self-report methodology may have raised the magnitude of the observed correlations, but this impact would have no influence on the statistical significance of the observed associations between the research variables (Carmines & McIver, 1981; Kent, 2001). In reality, because work-life spillover is subjective, the constructs included in this study were tested by asking employees to express their attitudes and views (Fisher, 2001). As a result, self-report questionnaires are an appropriate and easy tool for gathering study data.

Results

Table 1 indicates the sample demographic characteristics, including age, marital status, years of work experience, and education qualification. More than half of the female nurses in the current study are aged between 31 and 40 years (53.7%), followed by those aged between 25 and 30 (24.4%), and lastly, the nurses aged 41 and above (21.9%). The sample constitutes 68.2% of the married female nurses and the rest 31.8% are either unmarried, divorced, or widowed. 55.9% of the sample have 6–15 years of work experience, 25.1% have work experience of above 16 years. 62.1% of the sample nurses have a bachelor's degree, 21.8% of the nurses have master's degree and the rest 16.1% have lower education.

The results of the mean, standard deviation and correlation coefficient among the constructs are presented in Table 2. The correlation analysis shows that all predictor

Table 1. Demographic Characteristics of the Sample.

Characteristics	Range	Frequency	%
Age	25–30	76	24.4
	31–40	167	53.7
	41 and above	68	21.9
Marital status	Unmarried/divorced/widow	99	31.8
	Married	212	68.2
Years of work experience	1–5	59	19
	6–15	174	55.9
	Above 15	78	25.1
Education qualification	Masters	68	21.8
	Bachelor's degree	193	62.1
	Lower education	50	16.1

Table 2. Mean, Standard Deviation, and Correlation Coefficient of Study Variables.

	Constructs	Mean	SD	1	2	3	4	5
1	Affective WFPS	5.24	0.87	–	0.55*	0.45*	0.32*	0.58*
2	Behavior-based instrumental WFPS	5.23	0.76	0.55*	–	0.60*	0.40*	0.55*
3	Value-based instrumental WFPS	5.27	0.79	0.45*	0.60*	–	0.40*	0.59*
4	Psychological well-being	4.62	0.84	0.32*	0.40*	0.40*	–	0.43*
5	Life satisfaction	4.38	0.77	0.58*	0.55*	0.59*	0.43*	–

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

constructs, that is, affective WFPS, behavior-based instrumental WFPS and value-based instrumental WFPS were positively and significantly correlated with psychological wellbeing. Similarly, all the predictor constructs also showed a significant positive correlation with life satisfaction. These correlation results act as preliminary evidence to support the hypothesized relationships of the current study.

Confirmatory Factor Analysis

CFA was conducted to calculate the standardized factor loadings of all the items and the items below the threshold value of 0.6 were removed. Based on the results, one item from each construct except for affective WFPS were removed. After removing the items, CFA produced a good model fit: $\chi^2 = 705.79$, $df = 395$, $\chi^2 = 1.78$,

CFI = 0.94, RMSEA = 0.05, and TLI = 0.94. To measure the internal consistency of the constructs, Cronbach's Alpha test was conducted. The alpha reliability of all study constructs were above the acceptable limit of 0.70 (Taber, 2018). The values of average variance extracted (AVE) (Table 3) of the variables ranged from 0.57 to 0.63, all above the minimum acceptable value of 0.5. This indicates all the latent constructs have an acceptable convergent validity. Discriminant validity ($\sqrt{\text{AVE}}$) of

Table 3. Factor Loadings, Validity Reliability and VIF.

Constructs/Items	Factor Loading	α	AVE	$\sqrt{\text{AVE}}$	CR	VIF
Affective WFPS		0.92	0.63	0.79	0.93	1.45
WFPS1	0.78					
WFPS2	0.82					
WFPS3	0.78					
WFPS4	0.76					
WFPS12	0.85					
WFPS13	0.87					
WFPS14	0.84					
WFPS15	0.66					
Behavior-based instrumental WFPS		0.91	0.59	0.77	0.91	1.79
WFPS5	0.78					
WFPS6	0.79					
WFPS7	0.83					
WFPS8	Dropped					
WFPS16	0.72					
WFPS17	0.76					
WFPS18	0.77					
WFPS19	0.74					
Value-based instrumental WFPS		0.88	0.59	0.77	0.88	1.57
WFPS9	0.75					
WFPS10	0.89					
WFPS11	0.79					
WFPS20	0.66					
WFPS21	Dropped					
WFPS22	0.74					
Psychological well-being		0.89	0.57	0.76	0.89	—
PWBI	0.76					

(Table 3 continued)

(Table 3 continued)

Constructs/Items	Factor Loading	α	AVE	$\sqrt{\text{AVE}}$	CR	VIF
PWB2	0.82					
PWB3	0.79					
PW4	Dropped					
PWB5	0.73					
PWB6	0.65					
PWB7	0.8					
Life satisfaction		0.86	0.61	0.78	0.86	–
LS1	0.71					
LS2	0.79					
LS3	0.78					
LS4	Dropped					
LS5	0.84					

each construct (ranged from 0.76 and 0.79) was higher than its standardized correlation value with other constructs, therefore meeting the condition of discriminant validity (Fornell & Larcker, 1981). Construct reliability of all constructs were above the acceptable value of 0.8 (Fornell & Larcker, 1981). This indicates that requirements for the validity and reliability of the measurement model are met. All the results are presented in Table 3.

Common Method Bias

Considering that all the data is collected through a single questionnaire, at same time it is necessary to check the potential of CMB problem. Harman’s one-factor analysis using the principal component analysis are employed to assess the potential CMB problem. The unrotated solution found no indication of one apparent factor. Results show five factors with eigenvalues above 1, with the first factor explaining only 19.48% of the total variance. In addition to this, CFA of single factor analysis result in a poor model fit: $\chi^2 = 2861.70$, $df = 405$, $\chi^2 = 7.06$, CFI = 0.58, RMSEA = 0.14, and TLI = 0.48; thereby additionally confirming no indication CMB.

Multicollinearity

The problem of multicollinearity occurs when there is high correlation between two or more predictors (independent variables) that can adversely impact regression interpretation by limiting the size of the R^2 and confounding the contribution of independent variables. The variance inflation factor (VIF) helps to determine the severity of multicollinearity among the independent variables. There is no issue of multicollinearity, when the values of VIF are below 3 (Neter

Table 4. Hypothesis Testing.

Hypothesized Path			Estimate			t-Value	Results
			B	Beta (β)	SE		
Affective WFPS	→	Psychological well-being	0.15	0.16	0.06	2.22*	Accepted
Behavior-based instrumental WFPS	→	Psychological well-being	0.2	0.18	0.09	2.07*	Accepted
Value-based instrumental WFPS	→	Psychological well-being	0.29	0.26	0.08	3.24***	Accepted
Affective WFPS	→	Life satisfaction	0.31	0.37	0.05	6.00***	Accepted
Behavior-based instrumental WFPS	→	Life satisfaction	0.18	0.18	0.07	2.51*	Accepted
Value-based instrumental WFPS	→	Life satisfaction	0.33	0.34	0.06	4.93***	Accepted

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

et al., 1983). In the present study, VIF of the independent constructs range from 1.45 to 1.79, thus indicating absence of multicollinearity.

Structural Model

For testing the hypothesis, structural model was performed in AMOS. The model fit of the hypothesized five-factor model indicated a good fit: $\chi^2 = 710.98.70$, $df = 396$, $\chi^2 = 1.79$, CFI = 0.94, RMSEA = 0.05, and TLI = 0.94. The results indicate that all three dimensions of spillover have a positive impact on the psychological well-being of the nurses (Table 4 and Figure 1). In case of the affective WFPS a significant positive influence on PWB ($\beta = 0.16$, $p < .05$) is seen which therefore supports H_{1a} . Similarly, behavior-based instrumental WFPS shows a significant positive influence on the PWB of the respondents ($\beta = 0.18$, $p < .05$) and thus supporting H_{1b} . H_{1c} was also supported as value-based instrumental WFPS shows a significant positive influence on PWB ($\beta = 0.26$, $p < 0.01$).

In similar vein, all three dimensions of WFPS show a positive impact on the life satisfaction of the nurses (Table 4 and Figure 1). Affective WFPS has a significant positive influence on the degree of life satisfaction of the respondents ($\beta = 0.31$, $p < .001$) supporting H_{2a} . Behavior-based instrumental WFPS also has a significant positive influence on life satisfaction ($\beta = 0.18$, $p < .05$), supporting H_{2b} .

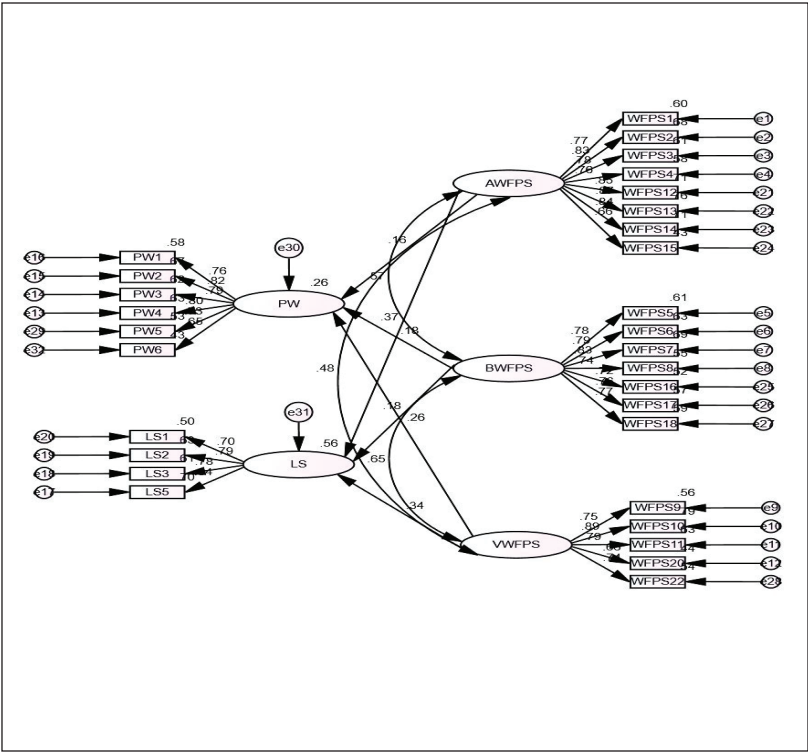


Figure 1. Structural Model.

Table 5. Regression Analysis.

Model 1	β	t
Affective WFPS	0.14	2.37*
Behavior-based instrumental WFPS	0.18	2.75**
Value-based instrumental WFPS	0.22	3.6***
Note: Dependent variable: Psychological well-being		
Model 2	β	t
Affective WFPS	0.33	6.48***
Behavior-based instrumental WFPS	0.19	3.37**
Value-based instrumental WFPS	0.27	5.2***

Note: Dependent variable: Life satisfaction.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Finally, value-based instrumental WFPS also has a significant positive influence on life satisfaction ($\beta = 0.34, p < .001$), thus supporting the hypothesis H_{2c} .

Finally, regression analysis has been carried out in SPSS to validate whether results are in line with those calculated through SEM (Table 5). The findings

showed a strong link between the outcomes of the SEM and the SPSS regression-based analysis.

Discussion

The present study focused on testing the influence of work and family positive spillover on psychological well-being and life satisfaction, using SEM. This approach is superior to regression analysis in that all predictor and outcome effects can be tested at the same time. The measurement model provides strong support for the separation of the three dimensions of WFPS. Similarly, both the measurement and structural yielded an acceptable degree of fit to the data providing strong support for the effects tested. Overall, the findings were largely in line with the literature, suggesting commonalities on the benefits of positive spillover with respect to life satisfaction and PWB.

WFPS, along all three dimensions, showed significance in predicting psychological well-being. This supports findings in the literature (Grzywacz & Marks, 2000; Hammer et al., 2005; Hanson et al., 2006). While WFPS was also significantly related to life satisfaction along all three dimensions. It should be noted that skills and behaviors show up same factor because skills are characteristically evidenced as behaviors.

In case of psychological well-being, value-based spillover scores higher in determining the increase in the psychological well-being followed by behavioral-based instrumental spillover and affective spillover. This fundamentally translates to the fact that the more values and behaviors employees reported transferring from work to family, the better their mental health and the higher their satisfaction.

These results suggest that allowing and encouraging employees to apply the skills, abilities, and values they have acquired at home—such as diligence, patience, and honesty—at work will enhance mental health. Given that values and behaviors learned in one role, for example, have a socializing influence on one's general life values and thus vicariously affect what is valued in other roles. For instance, (Vondracek & Schulenberg, 1986) assert that youngsters who playfully copy adults and help out around the house are the first to engage in job socialization. According to Kanter (1989), family culture may have an impact on the workplace by influencing family members' job-related morals, such as their work ethic. Learning research suggests that the transfer of knowledge, skills, and behaviors is more likely when they are generalized into abstract psychological and emotional schemas, facilitating skill transfer despite situational dissimilarities (Bandura, 1977), which thus justifies the preponderance of value and behavioral spillover in case of PWB.

Similar to the PWB, life satisfaction is significantly contingent on work–family positive spillover. But unlike, PWB the affective and value-based instrumental spillover have higher beta values than behavioral spillover.

Positive spillover has been linked to more satisfied families in other job contexts such as education, remote work, and caregivers. It is only appropriate that employing work-related skills and behaviors in domestic settings strengthens

family ties. Although it might be challenging to point out, on the grounds of published research as to what kinds of skills and behaviors developed at work are most effective for enhancing circumstances in life or vice versa. Differentiating between skills and behaviors acquired at work that are beneficial and/or harmful in non-work roles (life roles) more critical as it may better help in distinguishing between positive and negative spillover. As a consequence, family therapists and employee trainers could advise staff members to apply these practical work behaviors and abilities at home.

Given that the affective positive spillover among the three most closely aligns with the enrichment and facilitation models (Hanson et al., 2006) wherein the studies have implied that members who experience work–family enrichment not only have higher levels of satisfaction with their jobs but also have a higher level of satisfaction with their overall lives.

Exploring the correlations using SEM has been one of the main contributions of the current work. To our knowledge, no research have used this strategy for both measurement and prediction models as the positive spillover literature in research on nursing is still in its infancy. Our study offers a significant addition since the measurement model assessed the overall strength and reliability of the outcomes measures as well as reaffirmed the three characteristics of positive spillover. Furthermore, as all results are examined concurrently, the researcher's findings may be seen as more comprehensive and offer a more thorough understanding of the impact of positive spillover on results.

Practical Implications

Among the nurses sampled for this study, more than 75% were aged above 30 years and 68% of them were married. Such a demographic of women in the given context (North India) entails that they engender many roles in the home, such as providing childcare, eldercare and caregiving. The acquisition of various resources should therefore make it easier to perform these duties. As a result, it is incumbent on companies to create training programs that highlight and amplify facilitative and enriching impacts. Employers can reduce the expense of poor employee mental health by encouraging work-to-family positive spillover and work-to-family value-based instrumental positive spillover. Given that WFPS has been proven to be contingent on how engaging occupations are, it is critical that both employment resources be enhanced and interventions to improve job engagement be implemented.

These interventions can come in the form of programs like “Civility, Respect, and Engagement in the Workplace” and job crafting intervention programs. It must be borne in mind that evidencing of facilitation, enrichment and positive spillover in organizations does not rule out work and family conflict. A sufficient amount of assistance for balancing work and family life is still required for a robust yet empathetic organization.

Limitations and Future Direction

There are a few limitations to consider when examining the links observed between the various aspects of positive spillover and other variables offered in this study. First, because all the data was acquired using self-report questionnaires, it is probable that the relationships could have been exaggerated due to CMB. However, on Harman's one-factor analysis using the principal component analysis is employed to assess the potential CMB problem. The un-rotated solution found no indication of one apparent factor

Positive spillover has been used relatively interchangeably with other phrases in recent studies to indicate the benefits of participating in both work and family, such as facilitation, enhancement, and enrichment. The MIDUS scale, for example, has been described as a measure of both positive spillover (Grzywacz, 2000; Grzywacz et al., 2002; Grzywacz & Marks, 2000) and facilitation (Grzywacz, 2002; Grzywacz & Butler, 2003; Grzywacz & Marks, 2000). Positive spillover, according to the researcher, is one way via which both facilitation and enrichment may occur. Positive spillover, on the other hand, does not capture all of the positive impacts described as part of these novel constructs (e.g., physical resources, social capital, and material resources).

When assessing the generalizability of the findings, it is critical to note a few key constraints. A randomly selected sample would have provided the most rigorous test of generalizability. Because we lacked the necessary resources, the sample is made up of nurses from public hospitals and not the private ones.

As previously stated above, the mechanisms through which WFPS can be aided must be researched. One possibility is to try to include examples from other life domains into staff training sessions. According to learning studies, information transfer is more likely when it is generalized into abstract schemas, allowing skill transmission despite situational dissimilarities.

Conclusion

This research examined the impact of WFPS on PWB and life satisfaction of female nurses. Data were collected through structured questionnaires using a sample size of 311 female nurses across seven hospitals in Jammu & Kashmir, India. Hypotheses were tested through SEM. The results indicate that WFPS has a significant influence on PWB and life satisfaction of female nurses. This influence differed with respect to the dimensions of spillover with value-based instrumental WFPS most significant in case of psychological well-being and affective spillover in case of life satisfaction.

Declaration of Conflicting Interests

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Being Agile: Transcendent Solutions to Enduring Problems in the Age of COVID-19

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Abstract

To stay ahead of market movements and constantly changing stakeholder's priorities, it is critical for industry moguls and employees to constantly scan for real-time insights into a highly volatile market. A profound shift towards digital transformation during the ongoing pandemic opened a new era of agility in the business sector and acted as an indispensable ingredient for redrafting plans and strategies in a new normal due to that the term "Agile" became a most popular buzzword in the corporate world. The turbulent market impacted every corner of the industry irrespective of size and type of business and compelled them to shift their focus from scale to pace. The pandemic forces us to expedite strategic plans according to the market change to be sustained and not being thrown out by subversive competitors. Therefore, it is recommended to develop tools and models to invigorate the organization from a volatile market through four steps from scratch continuous scanning, orienting the situation faced and finalizing strategy, and working on the action plan. Companies who are aligned with the time and their strategy will lead the market and get competitive advantages over the acute disruption and also be positioned at the top of the K-shaped recovery of the economy. This article is an attempt to provide an insight into agile practices and their managerial implications at the organizational level.

Keywords

Agile business practice, COVID-19, K shaped recovery, digital transformation, agile strategy

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Introduction

“In this new world, it is not the big fish which eats the small fish;
It’s the fast fish which eats the slow fish.”

—Klaus Schwab, Founder and Executive Chairman,
World Economic Forum.

The word “Agile” is not a new phenomenon in the business world but it became more popularized during a pandemic due to its basic characteristics which describe continuous improvement and adaptation of new technologies or plans according to changes in customer needs and feedback (Arshad et al., 2022; Wang et al., 2022). Stalk and Stewart (2019) stated that the traditional strategic planning process will not help to fast execution and building an agile organization. He also argued that the Pandemic induced a change in the process of annual strategic planning with the current and strategic planning which is based on fresh market insights and focuses on the tools and models to stimulate agile behavior across the business landscape. In the new era of agile practices, large-size companies threaten to disrupt new, small and fast-moving companies. Stalk & Stewart argued that in the current cut-throat competition landscape, time to deliver to market is more important than size and scale. A few studies revealed that organizations that preferably opted for agile methods are more empowered in the context of employees and asset management which stimulates creativity and innovation in the decision-making process (Alzoubi et al., 2022; Rigby et al., 2018). Agile is manifested with great communication and collaboration among team members with gradual planning and high flexibility in the ongoing changes in the marketplace and customer needs (Dutton, 2018). Moreover, COVID-19 pandemic persuaded many businesses to undergo digital transformation with a prophetic warning to the laggards for a new normal life as only an agile framework can provide better assistance in the era of chronic disruption as it has ripple effects that trajectory segmenting the economy into two parts are widely known as K shaped recovery of an economy. A study (Deloitte, 2020) report identified that organizations that are digitally sound tend to focus on multiple iterations and constant affirmation to adopt agile methods over the less digitally matured organization. Therefore, those organizations which are not digitally mature face more ambiguity and vagueness to channelize agile frameworks within the organization which leads to falling under the bottom of K such as hospitality companies, travel, and tourism, restaurants while others are vice-versa. They are more equipped with techno parts and quickly administer value-based outcomes such as Zoom, Netflix, TikTok, and PayPal (Weichbroth, 2022). In a (State of Agile, 2021) report findings show that there is a significant outrageous growth in the adoption of the agile strategy in software/IT companies which increased from 37% in 2020 to 86% in 2021 while non-IT companies also have significantly doubled in adopting agile framework within the organization comparing to the last year.

How Agile Benefited to Build an Invigorating Strategy?

“We placed a focus on the business and transforming how we work first and foremost. We used that as a catalyst to begin to drive agility through the organization—speed of decision making, clarity of focus on purpose, showing that we can deliver incremental value—without forgoing the larger picture.”

—David Paine, Domain Information Office Toyota Financial Services

The global epidemic spread out in early 2020 opens a new challenge and threat to the companies to sustain and perform in a complete lockdown condition which instigates the organization to move for digital transformation and create a new opportunity for many young and small companies to adopt agile practices in building business strategy as well as operational execution (Benlian, 2022). The agile framework instigates collaboration and communication between team members and stakeholders and provides a dynamic outlook of business practices due to its systematic approach and consistent development (Mueller & Benlian, 2022; Oladinrin et al., 2022; Reich & Peppard, 2022; Röglinger et al., 2022). The agile methodology ensures fixing any issues immediately at the particular instance and deliberates the process smoothly from its foundational stages. Figure 1 depicts the flow chart of agile methodology for a better understanding of agile processes to pursue by an organization.

Continuous Planning

In response to the COVID-19 epidemic, most companies accelerating their approach to adopting new business practices, processes, and technologies based on the ongoing changes that occurred in market conditions and customer feedback (Figure 1). The “new normal” posed an imperative requirement for continual planning to quickly identify the changing demand of customers and



Figure 1. Agile Methodology Pipeline.

provide active solutions for the same (Aragonés-Jericó & Canales-Ronda, 2022; Flores-Cerna et al., 2022).

Analysis: Prioritizing Business Tasks

Prioritization of tasks provides subliminal assistance to focus on a gray area for immediate intervention and better outcomes. This process channelizes the task on a need basis and helps to completion of a project at a particular time. Another important role of prioritization is to review a list of tasks on a daily basis and align with the user's feedback constantly.

Design: Actionable Insights

“Using data and analytics to continuously source promising opportunities or solutions to problems in real-time, deploying tests quickly, evaluating the results, and rapidly iterating.”

—McKinsey, 2016

Agile companies use the database for proactive decisions which provide a significant level of insights not for creating a baseline only but also to provide a comprehensive outlook of the condition that prevailed in that project.

Maintenance: Real-time Outcome

The most difficult task is to maintain and retain performance irrespective of the market condition, and competitors' strategies applied by your rivalries. Being an agile company helps you to lift and optimize priorities according to the needs of the project and provide better assistance to be sustained even in times of turmoil.

Testing and Integration: Process of Learning

The process of learning is initiated with internal testing and integration which help to know the needs of potential customers and revenue opportunities in a particular market condition and also channel the growth opportunities within the process of learning.

Implementation: Focused Team

Planning is the first and foremost task needed either to test or learn as it replaces the chance of not knowing, learning but without execution your planning will

not be in action. Therefore, it is necessary for every individual within the organization either operation manager, strategic decision-maker, or individual contributor, all be equally responsible for the execution and implementation of tasks/projects in real-time with value-based outcomes.

Being Agile Is Not Easy

Composition of Agile Approach “5 Ps.”

In response to the COVID disruption, many organizations set a trend to work from remote areas on behalf of the companies. A report by the State of Agile, July 2021, found that only 3% of employees of a software company were planning to go back to the office full time whereas, 25% of the respondents prefer to work remotely even post-COVID period. The study also revealed that 56% of respondents are in favor of a hybrid approach, they can return to the office on a need basis but not daily. Companies working with an agile framework address the issue on an immediate basis and are not allowed COVID-19 to hamper the performance of an organization and the revenue itself. The aforementioned building blocks are the keys to being a sustainable organization in a period of chronic disruption. However, these 5Ps provide better assistance to drive the organization on the said path. These 5Ps are well known as People, plan, process, platform, and performance.

People

Traditionally, leaders believe in sharing tasks with their employees and constantly monitoring the same to achieve the desired outcomes but now a paradigm shift has come into this approach and today's organizational leaders delegate full responsibility and accountability for the task to empower the employees and provide complete access to perform their best with the freedom of decision-making process towards the fulfilment of organizational goals and objectives (Saarikallio & Tyrväinen, 2022). Putting the people at the center of the organization leads to innovative, quick, and effective outcomes. The fundamental objective of agile is to make clarity of the role and goal. If the employee well understands and is clear about the vision and mission of an organization along with their responsibility and accountability then an organization reaches the first milestone of an agile framework. In most organizations that follow Agile practices, employees take ownership of goals set by the team and their higher management, decisions to achieve those goals, and performance of individuals for achieving these targets by exhibiting entrepreneurial skills. In this technological era, employees have to proactively upgrade their soft and hard skills and continuously pursue new challenges and opportunities to get jobs ready in the market. New-age companies seek self-motivated talent, invest in the growth of their carrier upgrade skills, and aim for excellence. The agile model also inspires companies to upgrade the skills of their workforce by way of the talent development department (Marnewick & Marnewick, 2022). Nowadays companies instead of hiring talent

from outside prefer to encourage and skill up their existing resources and provide the option to choose internal mobility so that their prior experience can add value on top of a new skill that was acquired over a while. Internal mobility is something that facilitates the existing workforce to move internally across different projects both vertically and horizontally. There is software that is being used in organizations to keep track of open positions, and roles and track the talent pipeline. This way individuals can target to achieve and set their career goals and aspirations while organizations are getting benefitted by saving their costs on hiring, induction, cultural fit, and professional fit for new resources from an outside organization.

Plan

The agile organization encourages their employees to share strategic input for delivering the task at hand and also instigates to keep sight on any external changes in the environment or customer preference to shape and iterate to new initiatives or build business models for unforeseen changes in the market.

In an Agile environment, there are nimble and smart teams that are self-sufficient to drive the customer target and expectations. These teams are called Agile Squads where the Squads run to achieve a specific goal that keeps on changing as per customer preference and external environment. Agile Squads have various roles like Scrum Master, Product Owner, Development Lead, Lead Analyst, Quality and Assurance folks, Business Analyst. Squads seek stakeholder feedback on regular intervals by way of product demos, sprint demos, sprint retrospection, crowdsourcing, and hackathons. These squads use a variety of tools to capture customer journey maps to identify new opportunities and provide ultimate satisfaction. These Squads also keep track of the progress and check the pulse of their commitments sprint over sprint. These companies majorly set up the Centre of Excellence for new initiatives, and pilot launches and allocate these resources for innovations and most demanding areas to ripen the profits (Ndlela & Tanner, 2022). Product-based organizations like Netflix, Uber, Google, Microsoft, Amazon, Facebook, and so on, either try to grow organically by developing in-house tools and continuously improving those or in-organically by way of acquisitions to strengthen their market presence. This helps them to reduce their cost and capture market space with their competitors. Most of the decisions taken for acquisitions are taken by top management keeping in mind their vision and mission that will keep those organizations sustainable in a highly competitive global market. The Agile best practices also ensure that every individual feels that they are a key contributor and are directly impacting the delivery and making contributions to achieve customer expectations.

Process and Performance

In the traditional approach where the most experienced individual was responsible for the right outcome and responsible for providing a detailed plan to achieve the outcome keeping in mind to minimize the risk along the way, Agile embraces certain basic assumptions like its onerous prognostication of change in customer demand/need and

which will be intact, followed by analysis, design, and testing that are not projected prior on the planning phase (Figure 1). Agile philosophies advocate that processes should be adopted incrementally to manage unpredictability and incorporate changes at a swift pace. It supports quickly trying out things to embrace changing requirements so that risk can be reduced (Saarikallio & Tyrväinen, 2022). Agile processes encourage incremental adaptation that inherently works on the philosophy of getting customer feedback at regular intervals based on incremental delivered working software in small chunks (Figure 2). Unlike traditional models where organizations were delivering in a year or two span's time, most companies, nowadays follow seven days to 15 days of production deployment for their regular updates targeting customer requirements. This helps to drive the change swiftly and get regular feedback every two weeks, thereby reducing the turnaround time. Major global banks like Morgan Stanley, JP Morgan, Goldman Sachs, and so on, have scrapped their project-management office and ventured into product management organizations by changing the thread in this culture from a traditional approach to a minimum viable product-based process that acts as a primary measure of progress. Instead of a single release a year, they have ventured to several thousand releases on monthly basis to gear up product development, continuous integration, and deployment. Even at a later stage of development, agile principles emphasize customer satisfaction via prompt, sustained distribution of working software products keeping in mind the customers' ever-changing requirements (Figure 2). This is perceived as expanding the client's competitive advantage. For this to succeed, agile squad members need to have collaboration and coordination and be available when someone asks for help. All the squad members need to be in sync and focus to get things done in a specified time. Pre-COVID-19, face-to-face communication was the de facto standard for conveying information got replaced with online meeting apps (like Zoom, Google Meet, Skype, Microsoft Teams, etc.) after COVID-19 within the squad. While being self-organizing, the primary objective of these squads is to deliver a quality product by utilizing state-of-the-art architecture, design, and showcase and incorporating the feedback received at regular intervals through retrospections (Sharma et al., 2022). There exist various agile models named Agile Modeling, Adaptive Software Development, Scrum, Kanban, Feature Driven Development Extreme Programming, and so on, but mostly Scrum is prevalent in the Indian marketplace. For value delivery, a high-performing squad should have certain attributes like value-driven development, mutual trust, unified outlook, respect, collaboration, competencies, and timely acceptance and improvement based on continuous feedback. Several squad ceremonies act as a pulse check for the overall health of the sprint right from backlog refinement, sprint planning, daily scrum, review, and sprint retrospection to name a few.

In a typical agile squad, there are different roles and corresponding responsibilities tied to such roles as Product Owner, Agile Coach, Scrum Master, Vertical Lead, Lead, CoE Lead, and so on. The agile process requires a minimum of four roles to be effective as per below (Figure 3).

The Product Owner is at the core of the squad that defines the overall strategy and direction of the product and ensures organizational alignment with stakeholders. They communicate stakeholders' needs in the form of user stories and

product backlogs. The Scrum Master facilitates the process to ensure the squad delivers outcomes. They foster a collaborative culture and ensure the squad regularly celebrates success. The Agile Coach ensures that Squads are following agile processes in each sprint by observing, consulting, and providing feedback for improvement. They are responsible for regularly assessing team maturity and providing action plans for improvement. The Agile Squad works on building product features to deliver outcomes in line with the customer's needs. This comprises a cross-functional group of people who get stuff done. They escalate issues early and often so that the scrum master and product owner can remove any hindrances or roadblocks. An Agile Squad interacts with several internal & external stakeholders. Agile squad encourages creating an environment where everyone raises their concern and discusses an open platform with complete transparency (Figure 4).

Platform

Technology has gotten its feet in whatever we do in the present time. Organizations are trying hard to integrate all facets flawlessly to unlatch the value that can cater to the changing priorities and demands of the stakeholders. As the agile organization has to provide products and services that can embrace change and act rapidly on those, therefore, it is crucial to have everything digitalized or digitally enabled and proper monitoring and alert mechanisms for such systems should be in place. New advancements like Big Data, IoT, Data Science, Artificial Intelligence, Machine Learning, Cloud-Based architecture, Micro-Services,

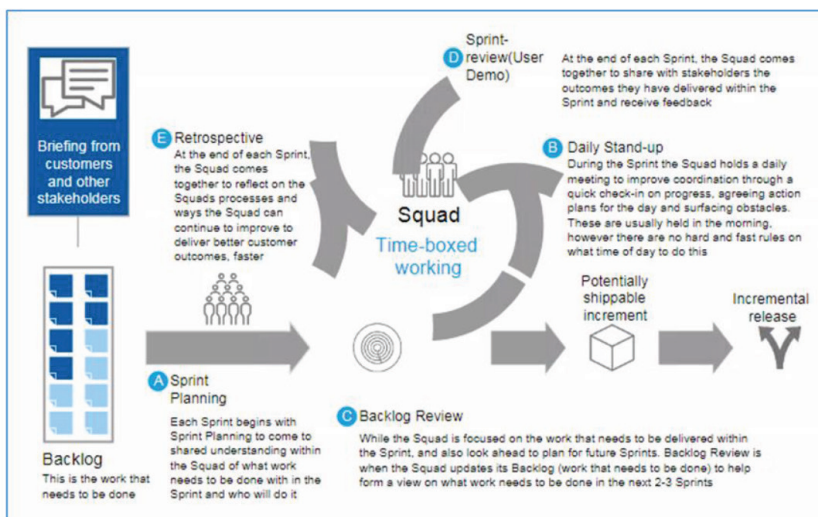


Figure 2. The Sprint Cycle Explained.

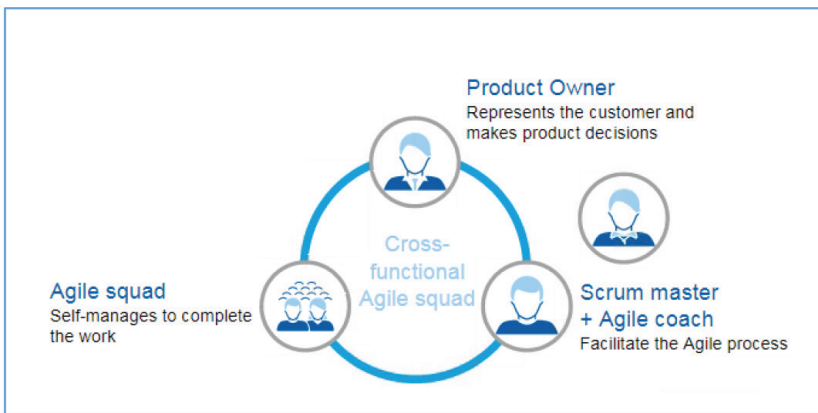


Figure 3. Typical Squad Core Roles.

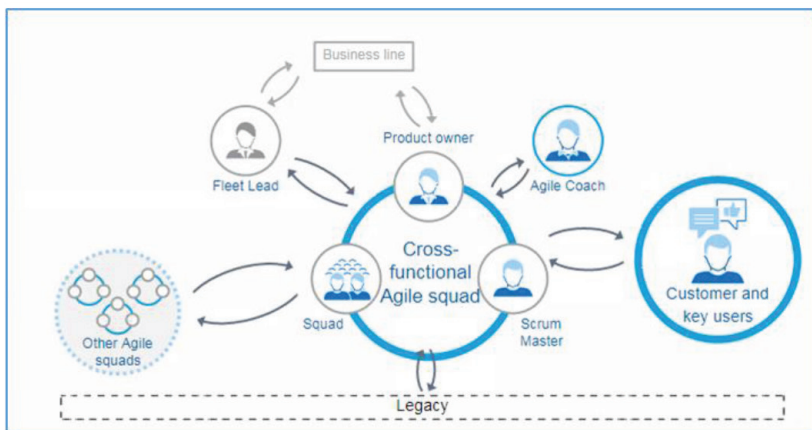


Figure 4. Spotify Squad Framework.

Source: <https://www.thescrummaster.co.uk/agile-scrum-the-spotify-model/>

Kafka based systems should be used in the development and delivery practices into the business to cater growing demands of the users (Sharma et al., 2022).

Conclusion

Agile is the new default way of working in the current dynamic and rapidly evolving business environment that enables organizations to stay competitive and market-ready for survival. It can be coined as a new mindset for companies based on common values and principles to achieve the best possible outcomes for the

customers. As modern markets face unprecedented uncertainty, therefore, it is very much necessary for companies to be agile in developing an immune system that can help them to adjust, adapt and respond to any unexpected changes while remaining competitive within the marketplace. This also helps in fostering a culture of collaboration in agile teams. This is the prime reason why Organizations are rushing to adopt agile development methodologies across the world.

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Incorporating Technological Progress and Competitive Disruption in India's Educational System

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Abstract

The global economy and trade had been halted by the COVID-19 outbreak, and in this new era of independence and home-made goods, consumer demand for social and economic services had plummeted. The world has shifted to a more disruptive technology as a result of COVID-19. Technology that causes a dramatic shift in either the price or availability of an existing good or service is considered disruptive. Such technologies include the blockchain, robotics, decentralized energy systems, digital services, and many more. While the future of the world is uncertain, research to date indicates that disruptive technology holds extraordinary promise for the social and economic sectors. Covid's effect is fading, and as a result, businesses are picking up speed again, and with that come a spate of innovations with the potential to cause major disruptions. Disruptive technologies serve many purposes and affect various industries. Online healthcare, blockchain-based monitoring systems, robots that transport food and medications, remote working solutions, 3D printing technology to maintain a social distance in manufacturing plants, and online education platforms are all affected. People are also using artificial intelligence and mobile money as digital services to uphold societal norms. Even though investors are wary, tech firms are seeing large inflows of capital. In Covid-impacted countries, the role of technology differs across industries due to differences in digital maturity and responsiveness. For instance, we breezed through the transition because only those industries that had already begun using disruptive technologies in their

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operations prior to the Covid era had a foundation upon which to build. Before the Covid era, people were aware of these technologies but did not widely adopt them. The e-commerce, e-learning, and e-payment industries are only a few examples. Emerging economies that have not yet adopted the disruptive technology are forecast to do so in an accelerated way, and a proliferation of online business models and platforms is predicted despite the strong impact in this Covid age. However, it is anticipated that high-middle-income countries will advance at a quicker rate than low-income ones. Healthcare, education, commerce, e-logistics, fintech, and software as a service are just a few of the sectors where demand is predicted to rise. The travel, transportation, and lodging industries all anticipate weak demand. As disruptive technologies become more widely adopted, the importance of having access to the Internet and possessing the necessary digital skills will increase. To hasten their digital transformation, private businesses may eventually outsource the management of their relationships with vendors, customers, and employees to technology firms. In reaction to uncertainty, this article aims to contribute to the ongoing discussion about the integration of technology into education. This will be done by demonstrating the importance of technology in modern education through the use of blended learning and online education. Technology, it is said, should be seen not just as a tool but also as a medium that moulds society. In light of this, it is essential that the incorporation of technology into education be accompanied by ongoing reflection on the discernible qualities of technology as a medium that is neither value-neutral nor a disembedded force. However, technology is inherently related to and influenced by social contexts and dynamics. The purpose of this article is to draw attention to the social embeddedness of technology by highlighting its interdependence on advances in other spheres of society like economics. It is important to consider the nature of technology as a medium in order to use it more effectively and ethically in the classroom. Given the prior examination of technology's social embeddedness, the potential difficulties and advantages of using technology as a medium for instruction are highlighted and examined. Technology-enhanced learning is discussed, with a focus on its potential usefulness in higher education.

Keywords

Disruptive technology, COVID-19 outbreak, higher education

Introduction

Varied effects of technology on education are highlighted by the ongoing discussion of these two topics. Therefore, this essay will discuss the benefits and drawbacks of using technology in the classroom. We can avoid either overestimating or underestimating the usefulness of technology in education if we take the time to consider the benefits and drawbacks of using it in the classroom. The major objective of this piece is to demonstrate how intricate technology is as

a medium. In order to successfully and ethically incorporate technology into high-quality education, it is crucial to have a firm grasp on the complexities of the technology in question.

In the first part, we address the social embeddedness of technology as one of its defining features, expanding on the idea that technology is more of a medium than a tool in moulding contemporary culture. The commodification of information and education, with technology as its primary driver, will be addressed in light of this conversation. The following section introduces the layered complexity of technology in order to unpack its potential effects on classroom instruction. Since the effects of incorporating technology into classrooms are context dependent, this section first discusses the ramifications of doing so in an Indian setting before moving on to the possibilities that such an implementation presents for higher education.

Inherent Sociality of Technological Media

“Effective education requires knowledge of the opportunities and constraints of the modality of education,” writes Ascough (2002). That is to say, before creating a learning environment, it is necessary to comprehend the medium itself. In keeping with this line of thinking, Hess (2002) argues that studies involving education and technology should not just ask how to utilize a simple tool. Instead, it should involve a series of culturally based queries. The use of technology in the media arts as a generator of meaning is well acknowledged (Hess, 2002). Drees (2002) cautions that technology is more than that and specifies several dimensions of technology, despite our tendency to think of it as things (gadgets) like a phone, car, or computer that represent tangible realities. Infrastructure, which includes things such as receivers and transmitters, is considered fundamental to technology since no technological system could function without it. The delivery of services by institutions is another aspect of technology as a social system. Competencies are a crucial factor that should not be overlooked in comparison to hardware. A technological mindset is one that actively analyzes issues in search of workable solutions.

In addition to all of these features, technology is also a culture (Drees, 2002). The most all-encompassing perspective is one that sees technology as a reflection of our identities, motivations, and ideals (that include our hopes and dreams). It is for this reason that Drees’s (2002) difference between technology as design (which emphasizes the work of technological specialists) and technology as culture (which includes technology’s connections with wider culture) is so instructive.

The rapid advancement of technology is neither independent of nor unrelated to other social changes. For this reason, it is important to consider how technological progress affects the economy. Allenby and Sarewitz (2011) state that technological progress depends on more than simply new ideas; it also requires widespread user buy-in and evolves in tandem with other fields such as economics, politics, and culture.

Thus, technology is more than just a set of systems or a collection of objects that can be used in whatever way one sees fit. It needs a new moral vision and social contract that tells people how to live and how to treat each other (Saravanamuthu, 2002). There is a high level of desirability in the use of technology as a mediator of information and communication, and there is a near complete lack of acceptable alternatives.

Within the context of transhumanism, Allenby and Sarewitz (2011) plan cutting-edge technical advancements. For them, transhuman discourse is only another flavor of technical optimism, with the added claim that “the objectives of transhumanism are broad, reaching beyond health and longevity to substantially increased intelligence, creativity, and emotional skills” (Allenby & Sarewitz, 2011).

They also express concern that we are becoming increasingly oblivious to the technologically dominated future we are bringing into existence. According to their statement, “people don’t understand technology or the complexity that it engenders,” this is the core problem.

Allenby and Sarewitz (2011) try to categorize the interplay between technology’s complexity and its social embeddedness on at least three tiers. The first stage is the technology’s immediate usefulness and efficiency. A reliable technological solution is one that uses technology to carry out a specific duty, such as a plane that can take you far away from where you are.

The price structure, inefficiencies of the boarding and security process, and delays are all examples of level-2 system complexity, which also encompasses irrationality and dysfunction. In spite of the high cost of airline tickets, many airlines go bankrupt. Thus, there are a great deal of unpredictable unintended outcomes at the level-2 setting.

On the third level, however, there is a phenomenon known as “technology lock in,” which occurs when an economy, culture, and technological system all converge on a single mode of operation. While it is not claimed that these tiers are infallible, they are an attempt to visualize the various layers at which technology functions, as well as their interconnectedness with one another and with social and economic policies, etc. Therefore, it is evident that technological systems do not function independently of other social and cultural systems, but rather, they are intricately interwoven with those systems.

The following discussion will emphasize distinct traits and views with regard to technology in light of the importance of understanding technology as medium specifically in the context of education. Keeping up with the times, or at least appearing to be so in a culture and a world that are always evolving at a dizzying rate, is often associated with the use of technology.

The most frequently acknowledged rationale for universities’ involvement in e-learning or online learning is to increase access, flexibility, and cost-effectiveness (Söderström et al., 2012).

Since educational technologies play such a central role in the creation and spread of online, blended, and other forms of remote learning, technological progress is singled out as the most crucial component in the evolution of these modes of instruction. Because everything we wish to achieve can be done better with technology, Verene (2013) emphasizes that technology does not reflect on

the past but rather promises a better future. He calls this “technological bluff,” the false belief that technological advancements can solve any problem. A little more time will tell.

This upbeat perspective on technology is grounded in the idea that it is beneficial and useful, which in turn sustains the desire for its continued use. Chau (2010) drew inspiration from Postman’s seminal work to develop her own ideas and critique of the optimistic view of technology (Postman, 1992). Postman coined the term “Technopoly” to characterize this idealized perspective of technology.

People who think that technological growth is humanity’s pinnacle achievement and the means by which our deepest problems can be overcome tend to feel at home in Technopoly. They also consider knowledge to be a wholly positive phenomenon, the unrestricted creation and transmission of which can only lead to more individual autonomy, inventiveness, and tranquility (Postman, 1992, p. 71).

For this conversation to adequately portray the rapid growth of technology and the increasing need to apply it explicitly in education, it is necessary to challenge several long-held views and assumptions. Students are assumed to have sufficient intrinsic motivation to study on their own time and in their own space, and that traditional classroom instruction can be successfully adapted to the online environment. “The underlying assumption is that anything that can be accomplished in the traditional classroom can be done electronically,” writes Verene (2013). Information, he says, may be recreated digitally, but knowledge, and especially a lecture, can’t be recreated in the digital realm. According to him, a lecture is a live performance in which a person thinks aloud and in which the audience participates by taking notes and asking questions (Verene, 2013). The online lecture format lacks the rhetorical presentation of a traditional classroom setting. Instead, students are reduced to consumers of information that is available internationally through online education, and the contents are decontextualized so that they can be applied to any situation (Verene, 2013). The technical operation is what he separates from the technical phenomena. The term “technical operation” is used to describe technology as a tool, whereas the term “technical phenomenon” describes the ways in which technology modifies our personalities and worldviews. Technology trends suggest that it includes our hopes and expectations for the future. This means that we are placing all of our goals and dreams in the hands of technology (Verene, 2013). In general, it appears that the gains connected with online learning are overstated, while the losses are given little to no consideration (Sinclair, 1998).

The Privatization of Knowledge and Education

Knowledge commodification is a multifaceted phenomenon that can be explained in several ways. That’s why I am not going to pretend like I have the one true explanation for it. In this regard, I found the viewpoint of Radder (2010) instructive; he defines commodification as “the pursuit of profit by academic institutions through selling the knowledge of the researchers and the findings of their inquiries.” In addition, the commercialization of education is not an

independent phenomenon but rather an integral aspect of broader societal shifts. Another implication of academic commodification is that economic criteria are increasingly used to analyze and evaluate academic activities and their outcomes.

According to Radder (2010), patents as a form of commodification of research became acceptable in fields like biomedical science as a result of decreased government financing. The commodityization of research will manifest itself as contract research, for example, in the social sciences. Since these procedures have become standard operating procedures in colleges, they will be subject to less and less scrutiny as time goes on. Consequently, the market, rather than the citizen, will become the focus of education (Radder, 2010).

“Many education methods support the neo-liberal dream of power, commercialization, and profit-making,” Amory (2012) argues. He says that this means that market principles and practices are incorporated into the educational system. Amory (2012) argues that the contemporary educational system, in which technology plays a crucial role, promotes neoliberal agendas that are instructional in nature. Despite the speed at which technology is advancing, little has changed in the way that classes are taught or students are evaluated. In this essay, we will discuss two ways that universities use technology to enhance their curriculum: online education and the blended learning model.

For higher education institutions to thrive in today’s uncertain future and competitive market, online education that is primarily assisted by technology becomes a long-term plan for instruction (Chau, 2010). It’s important to remember that not everyone places the same value on online courses as they would do on in-person instruction, despite the fact that they are frequently seen as the solution to problems of accessibility and flexibility in education (Chau, 2010). As an example of this trend, Chau (2010) cites a poll conducted by Adams and DeFleur (2006), who concluded that businesses would rather hire someone with a traditional education than one earned online. Perhaps even more unexpected was the discovery that traditional universities are less likely to admit students who have earned degrees entirely online.

Residential colleges increasingly adopt the blended learning paradigm. Blended learning consists of “a combination of traditional classroom instruction and the use of electronic media and other forms of distance learning” (Zhonggen, 2015). Blending online and offline learning is not as easy as it may seem for teachers and students. To improve traditional classroom instruction and student outcomes, this mix presupposes that learning and teaching can be integrated successfully. The learning environment, student demographic characteristics, institutional mission, faculty response, resource availability, and so on all have a part to play in the decision whether or not blended learning is successful as an educational approach.

Institutional resistance to change is a major barrier to the successful adoption of blended learning as an instructional methodology (Zhonggen, 2015). Despite its widespread use, blended learning still faces a number of significant obstacles. Chief among these is the reluctance of certain institutions to make significant changes in order to accommodate it. Moreover, there appears to be a weak association between this educational approach and student performance or

perseverance, which could signal a loss of financial and time resources associated with blended learning. Yet another difficulty is the students' tendency to sit back and observe rather than actively participate (Zhonggen, 2015). Amory (2012) is more critical, arguing that "blended learning" is a word used to redeem money unwisely spent on a compromise position and an attempt to save face. "The strategy involves continuing current procedures into the foreseeable future while claiming to welcome novelty" (Amory 2012). Technology does not play a role in the process of building knowledge in this technique; rather, building knowledge is the focus of the education.

The Role of Technology in the Commercialization of the Educational System

We now have terms in our lexicon like "knowledge economy" and "information economy" that highlight the interplay between the modern economy and formal schooling. The ideology of capitalism can help shed light on the relationship between technological progress and its application. The World Bank describes a knowledge-based economy as one that "depends primarily on the use of ideas rather than physical ability and on the application of technology" (World Bank, 2003, p. 1). This research argues for lifelong learning because of the knowledge-based economy's dependence on a flexible and adaptable workforce. Therefore, in order to take part in the global knowledge-based economy, it is necessary to engage in continuous training and education. In a knowledge-based economy, the adoption of new technologies is closely correlated with the level of education among the labor force. As a result, modern society is dependent on the knowledge economy, which depends on the production and dissemination of information.

India, like many other developing nations, faces the "dual challenge of resolving the ongoing concerns of access, quality, and equity while evolving towards a lifelong learning system" (World Bank, 2003, p. 8). In a developing nation like India, issues of access to technology and technological literacy are among the many obstacles people must overcome. The term "digital divide" is commonly used to characterize the gap between people who have access to technology and those who do not (Cloete, 2015, p. 147). However, as Chau (2010, p. 186) points out, not everyone has access to technology or the skills to utilize it, so not everyone can profit from it. This is especially true with initiatives like online education, where the use of technology forms the basis.

However, Lelliot et al. (2001, p. 2) warn that this societal embeddedness of technology leads to an inevitable problem in India.

Access to technology "will bring new forms of exclusion and new threats," but developing countries like India won't be able to benefit from it until they have access to cutting-edge technology. Furthermore, it has issues for distributive justice because, in cases where funds are spent on infrastructure to secure technology use, those funds cannot be used to provide people with fundamental needs such as shelter, food, healthcare, and education. Though it is commonly

expected that technological advancements will improve the globe and people's lives, there is insufficient confirmation of this in India and the rest of India. Therefore, it is difficult to understand or accept, especially when the optimistic perspective of technology is the prevailing one, that the push for the growth of technology in these situations could lead to even more poverty and isolation. "Where people lack the capacities to execute an opportunity, the opportunity is hollow," write Lelliot et al. (2001).

Some people believe that the technologically enabled promise of a "learning society" is nothing but a myth since "the whole notion of learning is under-theocratized" (Lelliot et al., 2001). It's undeniable that the learning societies, and those in India in particular, will have to deal with some difficult questions regarding Information and communication technology (ICT). This is because the use of technology may introduce new forms of exclusion and risks for those who do not have access to it or the solid framework necessary to use it.

ICT use in the classroom also presupposes that the quality of primary and secondary education is high, which is not the situation in many developing nations, including many in India (Lelliot et al., 2001). Wilkinson et al. (2001) agree: "Despite the resources being pushed into the provision of new online education programs by Indian institutions of higher education, this sort of education is not likely to meet the aspirations of this country" (p. 135).

Not only does a sizable portion of the population lack access, but even those who may potentially use it do not have enough network and infrastructure. Students and teachers alike need not only have physical access but also epistemic access, meaning they must be comfortable with and proficient in the use of computers.

Martin (2007) questions whether or not the pedagogy of online education is sound and whether or not it serves the interests of governments. While he does not quite answer the question, his attempt to do so adds significantly to the expanding critical conversation on ICT in higher education. To the contrary of conventional wisdom, he claims that the use of technology in schools can raise prices, restrict enrollment, and turn education into a commodity driven primarily by the pursuit of financial gain by multinational, for-profit organizations (Martin, 2007). He concludes that the eagerness to use it comes rather from those who will benefit from selling the technology to universities and other organizations, as there is no substantive proof that the use of ICT in education adds to excellent teaching. Furthermore, although colleges are spending more money on technology, their budgets are getting smaller, making it harder to hire new faculty.

This could lead to a situation where colleges invest more in the hardware and software needed to run their many ICT programs than they do in the training of their faculty and students. Therefore, universities need to find new means to fund teaching and research, and one option is to raise tuition.

As a result, students need to take on more financial responsibility for their education by taking out loans to cover rising costs, investing in their own computers and other technology to gain access to educational information and

communication technologies, and taking more control over their own learning (Martin, 2007).

Millennials are the generation now enrolled in higher education, and Keengwe and Georguna (2013) claim that their requirements can be met through the incorporation of technology into education.

They say that this generation is distinguished by its desire to design its own learning material and methods, its preference for teamwork, and its advanced knowledge and competence in the use of digital technology. They are, however, wary of an instrumentalist interpretation and use of technology, in which technology is seen as an end in itself. Instead of letting technology dictate lessons, it should be woven into what is already being taught. Good teaching cannot be replaced by technology. According to research (Keengwe & Georguna, 2013), I would like to draw attention to how technological innovation may ultimately transform the university experience for both students and faculty. Technology integration in the classroom requires a rethinking of the pedagogical logic behind teaching and learning (Söderström et al., 2012).

In a society where education and information are increasingly treated as commodities, Nel (2008) explains how students are increasingly viewed as customers and clients. He goes on to say that this process involves watering down education and training to better suit the demands of the marketplace. The quest for knowledge, while related to and possibly the most important of these lofty goals, takes a back seat to the chase for riches. The titles of administrative roles in universities, such as “program manager” and “school director,” are derived from the business sector, as Nel (2008) explains.

According to Chau (2010), the deterministic perspective on technology allows for the appropriation of education and society by corporations. There has been a shift in the role of universities; they are now primarily in the education business, where critical thinking may not be a top priority. Furthermore, this shift in educational priorities and institutional dynamics will produce professionals with a commercial orientation rather than a public-interest one.

Consequently, a growing number of “experts” will behave more like corporate executives than educators, and the focus of education will shift from learning to achieving economic goals (Chau, 2010).

As universities and corporations work together more closely, the boundaries between the two are beginning to blur.

Although schools have never been out of reach of corporations, their job is considerably broader than simply producing knowledgeable citizens. Education’s ability to mold the beliefs and sense of self in its students is crucial as well. Briefly put, education ought to significantly contribute to students’ being functions not just their doing functions.

Next, we will look at the potential that technology presents, with a focus on higher education, in light of the issues we have already discussed. Possibilities afforded by the rise of technology in the classroom, especially as it relates to religious instruction.

One of the benefits of technology in the classroom is that it has forced educators to reevaluate their approaches to teaching and sparked much-needed in-depth

conversations (Ascough, 2004). The first part of the article focused on the difficulties that technology, as a socially integrated medium, presents to society at large and to education in particular. My own interest in higher education is one reason for this emphasis, but the reality that the majority of Indians are religious means that society and the government rely significantly on ordained ministers to lead churches in constructively engaging society, which is another (Naidoo, 2015). As a result, having a solid higher education is crucial for those who want to serve in both the church and the wider community.

Institutions of higher learning cannot disregard the potential benefits that educational technologies may offer; hence, it is important to invest in training faculty to use these tools pedagogically.

Unisa is where Olivier conducted his study on the use of technology in theology education (2014). She frames technological advancement within the context of a revolution and provides a succinct description of revolution as a process marked by anxiety, unease, and the need to adjust. Thus, a dedication to adjusting and being adaptable is crucial to achieving new ways of teaching in the classroom. The commitment to adapting to a shifting educational landscape necessitates ongoing technology training for faculty and student body members as well as pedagogically sound research into the most effective uses of technology in the classroom.

Olivier (2014) argues that theology accepted the challenge of utilizing the printing press and that it should do the same with the new technology. The significance of theology has grown or waned depending on the media employed at any given time. Therefore, there is an urgent need for higher education to fully embrace technology. Despite the fact that her ideas appear to primarily operate within an instrumentalist conception of technology, it is nonetheless notable to bring specifically theology at the center of society and education today. Higher education that spans denominational, cultural, international, and disciplinary boundaries stands to benefit from technological advancements in education, which may also increase the field's overall audience (Olivier, 2014). As an added bonus, the reflective activities may be made possible by the interactivity of instructional technology.

Learning relies heavily on introspection. If students are to become agents of change in the world, they must engage in reflective thinking, which involves making connections to prior learning and engaging in open discourse with those who hold opposing opinions (Baporikar, 2016). Someone who challenges the status quo by suggesting new approaches to old problems is a change agent.

It has been noted by both Delmater (2004) and Ascough (2002) that online learning encourages greater student engagement. It can be challenging to assign grades based on classroom involvement when extrovert students thrive in an environment that encourages group work and discussion while introverted students struggle to find a comfortable place to contribute.

However, thanks to the nature of online learning, students' voices, including those who are typically silenced in the classroom, are amplified, leading to increased involvement and collaborative learning. Because of the dynamic nature of technology in online education, where students can connect with one another

regardless of time or location, students are expected to take on a greater level of responsibility for their own education and to be actively engaged in the learning process at all times. Olivier's (2013) findings corroborate the possibility of enhancing student engagement in online learning through strategic conceptualization and design. The course helps students better integrate their beliefs into their daily lives and raises their awareness of their societal obligations as citizens, according to student responses.

Students may learn valuable skills such as self-monitoring and group dynamics with the use of interactive technology. Furthermore, their involvement in the educational process has the potential to make both teaching and learning more enjoyable, which is a trait not typically connected with the educational process (Olivier, 2014).

One of the most difficult aspects of online theology education is the disembodiment that comes with it (Cloete, 2015; Delmater, 2004). However, a more complex interpretation of embodiment is provided by Delmater et al. (2007), which challenges the view that bodily presence is the sole genuine form of embodiment. They back up their claim by saying, first, that online learning has the potential to foster relationships beyond the traditional classroom setting, both between teachers and students and among students themselves. Second, they contend that cultural distance, gender, and class historical distance are all more pervasive and challenging than other forms of distance between students and teacher. Even in traditional, face-to-face classroom settings, educators frequently fail to account for and address these types of separation. Ascough (2002) contends that the rise of online education has the potential to reduce prejudice and discrimination based on social class, race, and gender.

Finally, Delmater et al. (2004) suggest a higher anthropology of a spirit-soul unification that precludes a dualism between the physical and the spiritual. As a result, one may argue that the questions raised by educational technologies have the potential to test our higher assumptions about people and their place in the world. A larger definition of social presence is advocated for, specifically in the context of online education, by Kim et al. (2016). In brief, social presence refers to paying attention to the other person when interacting with them. In a technologically enhanced and mediated setting, "social presence" refers to the perception of another person's presence, even though that person is not actually there. According to Kim et al. (2016), the concept of social presence is complex since it includes not only presence as psychological engagement but also co-presence. Technology, with its potential for constant connectedness, could also help reconcile the gap that so often exists between theory and practice. The gap between formal education and the church community is a common source of this tension. To broaden students' horizons and help close the gap between theory and practice, religious leaders from local churches should be invited to participate in online discussions with students (Litchfield, 1999).

According to Bauman et al. (2014), online education enables the kind of in-depth participation, self-representation, and expression that may be considered spirituality in a global setting. Students' goals generally involve shaping their own set of views and values, whereas the aim of education is often to foster the growth

of critical thinking. Education in theology is ideally situated to harness the technological skills of its students to foster meaningful interaction with their peers of different faiths. Religious leaders in the modern world must be adept at communicating in a diverse range of religious settings. Students may be forced to learn how to critically evaluate what they read online and come up with original perspectives as a result of the overwhelming amount of information and divergent points of view they encounter. Students are faced with the problem of making informed choices from an ever-increasing volume of complex, contradictory information (Bauman et al., 2014; Kerr, 2005).

Impact of Information and Communications Technologies on Education

Information and communication technology has the potential to broaden participation in and enhance the quality of education. According to Tinio (2002), the use of ICTs has a significant effect on the classroom by facilitating the following:

1. To facilitate active learning, ICT tools are being digitized and made accessible to students, teachers, and administrators alike. Instead of being forced to memorize information, students can choose what they want to study and move at their own pace while solving problems that arise in authentic contexts with the use of ICT, which significantly increases student engagement.
2. Technology-enabled learning environments foster collaboration and cooperation between students and instructors, regardless of physical proximity. It helps students develop their communication and teamwork skills while expanding their cultural understanding and worldview through exposure to people from a variety of backgrounds. The usage of ICT has been linked to increased collaboration among students both within and outside of the classroom, as well as a more two-way relationship between students and teachers (Grégoire et al., 1996). Collaboration, as defined by the author, is “a philosophy of interaction and personal lifestyle in which individuals are responsible for their activities, including learning about and respecting the abilities and contributions of their peers.” (Panitz, 1996).
3. In order to produce a tangible product or achieve a specific pedagogical goal, ICT encourages learners to manipulate existing information and develop their own knowledge.
When compared to the traditional classroom, where focus is placed on a single topic, ICT encourages an integrative approach to teaching and learning by removing the synthetic boundary between theory and practice.
4. Formative assessment: Interactive learning tools put students at the center of the learning process and provide them with immediate, actionable feedback on how they are doing. Rather than relying on memory and drill, students can instead engage in active learning that is supported by constructivist theories of learning, thanks to ICT.

Positive Effects

Increased effectiveness in the classroom technology such as digital cameras, projectors, mind-training software, laptops, PowerPoint presentations, and 3D visualization tools have become wonderful resources for teachers to help pupils readily grasp a concept.

It is important to realize that pupils have a far better time learning when concepts are explained visually. They have a greater opportunity for classroom participation, and teachers have an opportunity to provide more engaging lessons.

Video conferencing allows students in different sections of the state to “meet” one another without having to go to each other’s schools. Websites like www.glovico.com facilitate online language learning by matching groups of students with native-speaking teachers from around the world. No need to relocate for school: distance learning has virtually eliminated the requirement for students to attend traditional classes. Several international schools now offer online degree programs that students can enrol in. Online and distance education have rapidly grown in importance in today’s educational landscape results in harm one, a decline in writing proficiency.

Young people today have terrible writing abilities because they spend so much time on texting and other forms of online shorthand. Teens and preteens nowadays are so reliant on electronic means of communication that they have abandoned efforts to hone their written expression skills.

They have trouble spelling words, writing correctly, and using cursive.

Second, there are more instances of cheating because of the prevalence of technological aids such as graphical calculators, high-tech watches, and small cameras.

Graphing calculators make it less risky for kids to copy and paste calculations and take notes.

Third, a failure to concentrate: texting and sending SMS messages have become popular habits among today’s youth. It is not uncommon to spot a student fiddling with their iPhone when they are in class, in the car, or anywhere else they might have some free time.

Students’ inability to concentrate on schoolwork, as well as their performance in sports and other extracurricular activities, has been linked to their constant online connectivity.

Advantages

- The result is a boost in motivation in the classroom. Assists students juggling several commitments and allows them to complete assignments at their own pace and at their own time.
- Instructs pupils in cutting-edge technological abilities that will serve them well in the workplace. Helps spread the “green revolution” idea by cutting down on paper and copying expenses.

Disadvantages

- Many knowledgeable people believe that the use of this kind of technology in the classroom has a negative impact on pupils' capacity to think creatively and critically. It might be a drain on the time of the instructor as well. The expense of implementing such technology is high. When used excessively, there are risks to health as well.
- Unfortunately, not many students can afford the latest computers.

Conclusion

The advent of modern technology in the twentieth century has been called the "fourth revolution," and it has brought with it both advantages and disadvantages. The article's overarching goal is to show how technological complexity is intertwined in broader societal processes. In the same way as technology may both include and exclude based on its structural nature, it can also foster exclusions.

Thus, technology is viewed as more than just useful tools; it also represents a worldview. The article made an effort to show that the effects of technology on schools are multifaceted, with advantages and disadvantages. These difficulties and potentials can be traced back to the combination of technology and a socially grounded media. Implications for higher education in India and for the incorporation of technology into education were discussed in the essay.

The use of technology in the classroom has both beneficial and potentially detrimental implications. Teachers and students should look at this from a positive perspective and work together to get rid of the obstacles that are preventing many students and schools from succeeding. Therefore, in the future, it is time for all nations to implement a more technologically equipped educational system.

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Abstract

This article explores the concept of Industry 5.0 and its implications for the manufacturing industry. Industry 5.0 represents a paradigm shift that emphasizes the collaboration between humans and advanced technologies to revolutionize manufacturing processes. The article aims to investigate the potential benefits, challenges, and future impact of Industry 5.0. Through primary data collection, including surveys among industry professionals and experts, the study provides insights into the potential benefits of Industry 5.0. The data analysis reveals that improved quality control, faster time to market, and increased productivity are perceived as significant potential benefits. However, respondents rated ‘improved customer experience’ as a relatively less prominent benefit. Other important benefits include enhanced innovation, customization and personalization, and sustainability and resource efficiency. The study also highlights challenges hindering the widespread adoption of Industry 5.0. These challenges include the need for upskilling and reskilling the workforce, ensuring data privacy and security, and managing the transition from existing manufacturing systems. Based on the findings, the article emphasizes the transformative nature of Industry 5.0, enabling greater customization, flexibility, and sustainability in manufacturing processes. It highlights the importance of human–machine collaboration and the empowerment of workers to leverage their creativity and problem-solving skills alongside advanced technologies. To successfully implement Industry 5.0, organizations need to address challenges and consider recommendations provided in the article. This includes investing in workforce upskilling, ensuring data privacy and security measures, and managing the transition process.

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effectively. In conclusion, Industry 5.0 has the potential to redefine manufacturing processes, driving innovation and sustainability across various industries. By embracing the principles of customization, sustainability, and human ingenuity, the manufacturing sector can adapt and thrive in the future.

Keywords

Industry 5.0, manufacturing, customization, sustainability, human-machine collaboration, innovation

Introduction

In the ever-evolving landscape of industrial development, the concept of Industry 5.0 has emerged as the next frontier of manufacturing. Building upon the advancements of Industry 4.0, this paradigm shift represents a fusion of human ingenuity with cutting-edge technologies to revolutionize the way we design, produce, and distribute goods. This article aims to explore the concept of Industry 5.0, its significance in the context of the manufacturing sector, and present primary data insights to shed light on its potential impact on various industries.

The landscape of industrial development is in a state of perpetual transformation. The journey from Industry 1.0, characterized by mechanization, to Industry 4.0, defined by digitalization and automation, has led us to the cusp of a new era in manufacturing known as Industry 5.0. In this era, the synthesis of human ingenuity and cutting-edge technologies is poised to reshape the manufacturing sector. It represents a collaborative revolution where humans and technology work hand in hand, transforming the way we conceptualize, create, and disseminate products.

This article delves into the exciting concept of Industry 5.0 and explores its profound implications for the manufacturing sector and beyond. As Industry 4.0 laid the groundwork for the digitalization of factories and processes, Industry 5.0 goes a step further, emphasizing the synergy between human intelligence and advanced technologies. The synergy, as described by Chrysosolouris (2020), leads to what can be termed a “Human–Technology Collaboration Revolution.” It’s a concept that beckons us to reimagine manufacturing processes and engage in a new era of human-technology collaboration.

The advent of Industry 5.0 couldn’t be timelier. In today’s fast-paced world, as highlighted by the World Economic Forum (2020), the need to shape the future of advanced manufacturing and production has become increasingly pressing. Recommendations from experts like Kagermann et al. (2013) stress the strategic importance of initiatives like INDUSTRIE 4.0, which laid the foundation for what Industry 4.0 has become.

As we move forward into Industry 5.0, an understanding of its implications extends beyond the factory floor. It influences business operations, management, and even society. The research by Laakso and Vuori (2020) is pivotal in unraveling the implications of Industry 4.0 and Society 5.0 on various aspects of business.

Schumacher and Sauter (2021) shed light on the specifics of Industry 5.0’s “Human-Machine Collaboration.” Exploring the needs and opportunities in this domain becomes crucial as we usher in this new era.

Furthermore, in a world increasingly concerned about sustainability, Tschirky and Dach (2019) have reviewed the sustainable aspects of manufacturing in the context of Industry 4.0. The question naturally arises: how will Industry 5.0 contribute to sustainable manufacturing? The study by Ganz and Schüßler (2021) explores this very relationship.

Additionally, the transition to Industry 5.0 has profound implications for manufacturing processes and value networks. Westkämper et al. (2021) provide valuable insights into the transformation of factories into “Smart Factories” and the evolution of value networks.

The journey from Industry 4.0 to Industry 5.0 is not just a leap in terminology, but a leap in possibilities and potentials. It is about enabling smart human-technology collaboration, transforming manufacturing, and influencing sustainability. It opens doors to innovative value networks and redefines the future of manufacturing.

In this exploration of Industry 5.0, we embark on a quest to understand the essence of this revolution and its potential impact on the manufacturing and industrial landscape.

Statement of the Problem

Traditional manufacturing processes have often focused on automation and efficiency, resulting in a decrease in the importance of human involvement. However, this approach has presented challenges in terms of flexibility, customization, and the integration of emerging technologies. Industry 5.0 seeks to address these concerns by emphasizing the collaboration between humans and advanced technologies, enabling a new era of intelligent, sustainable, and human-centric manufacturing.

Table 1. Mean Difference Between Potential Benefits of Industry 5.0.

Variable	Mean Rank
	Mean Score
Increased productivity	5.62
Enhanced innovation	5.55
Customization and personalization	5.47
Improved quality control	5.82
Faster time to market	5.75
Enhanced supply chain management	5.42
Improved customer experience	5.16
Sustainability and resource efficiency	5.41
Work force empowerment	5.58
Cost reduction	5.22

Scope

This article focuses on Industry 5.0 and its implications for the manufacturing industry. It aims to highlight the core principles and characteristics of Industry 5.0 and examine its potential benefits, challenges, and future impact.

Objectives

The objectives of this article are as follows:

- Investigate the potential benefits of Industry 5.0 in terms of productivity, innovation, enhanced customer experiences, and the adaptation level.
- Identify the challenges and obstacles hindering the widespread adoption of Industry 5.0 in the manufacturing sector.
- Provide suggestions and recommendations for organizations to embrace and implement Industry 5.0 principles successfully.

Methodology

To gather primary data for this article, a combination of qualitative and quantitative research methods was employed. Surveys were conducted among industry professionals, manufacturing organizations, and technology experts to gather insights on the adoption, challenges, and benefits of Industry 5.0. 350 experts in the manufacturing field were selected based on simple random sampling.

Data Analysis

Interpretation of Table 1

Table 1 presents the mean scores and ranks for different potential benefits of Industry 5.0. The variables listed include increased productivity, enhanced innovation, customization and personalization, improved quality control, faster time to market, enhanced supply chain management, improved customer experience, sustainability and resource efficiency, workforce empowerment, and cost reduction.

The mean scores represent the average rating given by the respondents for each variable on a scale of 1 to 7, with higher scores indicating a stronger agreement with the potential benefits.

Based on the mean scores, the variable with the highest mean score is 'improved quality control' (mean score = 5.82), indicating that respondents perceived it as the most significant potential benefit of Industry 5.0. This is followed by 'faster time to market' (mean score = 5.75) and 'increased productivity' (mean score = 5.62), which also received high mean scores.

On the other hand, the variable with the lowest mean score is 'improved customer experience' (mean score = 5.16), suggesting that respondents rated it as a relatively less prominent potential benefit of Industry 5.0. Other variables such

Table 2 Chi-square.

N	255
Chi-square	14.837
Df	9
Asymp. sig.	0.096
a. Friedman test	

Table 3 Confirmatory Test.

Model Fit Summary: Effect of E-banking Service Model	Result
No. test factor value criteria*	
1 Chi-square 144.23, $p > 0.05$	1% level
2 Chi-square / df (33) 4.37, 2.0–5.0	Good fit
3 GFI (goodness-of-fit index) 0.97 > 0.95	Good fit
4 AGFI (adjusted goodness-of-fit index) 0.96 > 0.95	Good fit
5 CFI (comparative fit index) 0.98 > 0.95	Good fit
6 NFI (normed fit index) 0.95 > 0.95	Good fit
7 TLI (Tucker–Lewis index) 0.94 > 0.95	Good fit
RMSEA (root mean square error of approximation) 0.064 < 0.07	Good fit

Source: Primary data.

as sustainability and resource efficiency (mean score = 5.41), enhanced supply chain management (mean score = 5.42), and cost reduction (mean score = 5.22) received moderate mean scores.

The mean ranks provide an additional perspective on the variables. However, without the full distribution of rankings, it is difficult to draw specific conclusions based solely on the mean ranks.

Interpretation of Table 2

Table 2 presents the results of a chi-square test conducted with a sample size of 255 respondents. The chi-square value obtained is 14.837, with 9 degrees of freedom. The p -value (asympt. sig.) associated with this test is 0.096.

The chi-square test is a statistical test used to determine if there is a significant association between variables. In this case, the chi-square test was likely conducted to examine the relationship between different variables and categories.

The obtained p -value of 0.096 suggests that there may not be a statistically significant association between the variables tested at the conventional significance level (e.g., $\alpha = 0.05$). However, further investigation or a larger sample size may be needed to make definitive conclusions.

It is important to note that the interpretation of the chi-square test results should take into account the specific research question, hypotheses, and the context of the study.

SEM Analysis

The confirmatory test result showed a good fit as shown in Table 3. Adaptation level and the challenges faced and the benefits are compared in this analysis.

A model is said to fulfill the criteria of goodness of fit if it satisfies certain values which are given in Table 3. Based on these values, the estimated value for the model is 4.370, which satisfies the required condition. Similarly, the required value of the RMSEA should be less than 0.07. Against this value, the estimated model value is 0.065, which highly validates the result. Similarly, model fit indices (GFI = 0.97, AGFI = 0.96, CFI = 0.98, NFI = 0.95, and TLI = 0.94) for this model indicate that the model fits well.

Suggestions and Recommendations for Organizations to Embrace and Implement Industry 5.0 Principles Successfully

Foster a culture of innovation: Encourage a culture of innovation within the organization by promoting collaboration, creativity, and risk-taking. Create channels for employees to contribute ideas and provide incentives for innovative thinking.

Invest in workforce training and development: Recognize the importance of upskilling and reskilling the workforce to adapt to the changes brought by Industry 5.0. Provide training programs and resources to enhance employees' digital literacy, technical skills, and problem-solving abilities.

Collaborate with technology providers: Establish partnerships or collaborations with technology providers and experts in emerging technologies. Stay updated on the latest advancements and leverage their expertise to integrate cutting-edge technologies into your manufacturing processes effectively.

Ensure data privacy and security: As Industry 5.0 relies heavily on data collection, analysis, and connectivity, organizations must prioritize data privacy and security. Implement robust cyber security measures, including encryption, access controls, and regular audits, to protect sensitive information.

Establish cross-functional teams: Create cross-functional teams comprising professionals from various departments, such as engineering, production, IT, and marketing. Encourage collaboration and knowledge sharing to drive innovation and ensure a holistic approach to implementing Industry 5.0 principles.

Pilot projects and proof of concepts: Start with small-scale pilot projects to test the feasibility and effectiveness of Industry 5.0 initiatives. Gather data, measure performance metrics, and analyze the outcomes to refine and improve the implementation strategy before scaling up.

Foster collaboration between humans and machines: Emphasize the importance of human–machine collaboration in the manufacturing process. Encourage employees to embrace and leverage technology as a tool to enhance their productivity, creativity, and problem-solving capabilities.

Embrace sustainability and resource efficiency: Integrate sustainable practices and resource-efficient processes into your manufacturing operations. Focus on reducing waste, optimizing energy consumption, and adopting circular economy principles to minimize environmental impact.

Engage with industry networks and associations: Participate in industry networks, conferences, and associations focused on Industry 5.0. Engage in knowledge sharing, stay informed about industry trends, and collaborate with peers to accelerate the adoption of Industry 5.0 principles.

Continuously monitor and evaluate progress: Regularly monitor and evaluate the progress of Industry 5.0 initiatives within your organization. Use key performance indicators to measure the impact on productivity, innovation, customer experience, and sustainability. Adapt and refine your implementation strategy based on the findings.

Conclusion

Industry 5.0 represents a transformative shift in the manufacturing industry, emphasizing the collaboration between humans and advanced technologies. By leveraging the benefits of customization, sustainability, and human ingenuity, Industry 5.0 has the potential to redefine manufacturing processes and drive innovation across various industries. However, addressing challenges such as workforce upskilling and data security will be crucial for successful implementation. Embracing the principles of Industry 5.0 will pave the way for a future where manufacturing is not only efficient but also adaptive, sustainable, and human-centric.

Declaration of Conflicting Interests

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The Future of Talent Management: Leveraging Automation and HR Analytics for Success—A Critical Review of Literature

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Abstract

In the constantly evolving and highly competitive modern world, talent management has become a crucial aspect of any organization's success. The conventional techniques of managing human resources are no longer sufficient to cater to the ever-increasing demands for efficiency and effectiveness in operations. With advancements in automation technology coupled with HR analytics tools, businesses have an opportunity to revolutionize their approach towards talent management practices. Therefore, it is essential for companies to embrace these changes if they want to remain relevant and achieve sustainable growth in this fast-paced digital era. This research analyses using data visualization tools how automation and HR analytics can be leveraged for successful talent management in the changing business landscape. Retaining skilled employees is crucial for organizational growth, but technological advancements have made talent management more complex than ever before. We suggest investing in learning platforms which can help organizations provide advanced training programs on emerging technologies like AI and big data analytics.

Keywords

Attrition, automation, HR, talent, talent management

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Literature Review

Talent Management

With the changing business landscape and the rise of technology, the traditional approach to talent management is no longer adequate (Gärtner & Kern, 2021; Jewani et al., 2021). Organizations need to embrace automation and HR analytics to stay ahead of the competition (Arora et al., 2021; Bhattacharya, 2021). Talent management encompasses a comprehensive process, starting from identifying talented individuals to developing their skills through training and nurturing them throughout their career journey within the company (Konovalova et al., 2021; Saxena & Pradesh, 2021). The retention of skilled employees plays a vital role in driving organizational growth as it enables businesses to maintain consistency in delivering superior performance over time (Karwehl & Kauffeld, 2021b). However, with technological advancements reshaping how we work today, talent management has become more complex than ever before (Konovalova et al., 2021). Karwehl and Kauffeld (2021b) and Utomo et al. (2021) in their research highlight that organizations need to adopt innovative approaches for sourcing new talents while ensuring that they have an inclusive culture where diversity is valued and embraced. Moreover, investing heavily in learning platforms such as e-learning tools or gamification techniques can help organizations provide cutting-edge training programs for employees on emerging technologies (Arora et al., 2021; Bhattacharya, 2021). Many recent researchers (Fernandez & Gallardo-Gallardo, 2021; Karwehl & Kauffeld, 2021b; Utomo et al., 2021) therefore conclude that talent management strategies must be agile enough to adapt continuously to evolving market trends while prioritizing employee development initiatives simultaneously—this will ensure long-term business growth by fostering innovation and creativity.

Traditional Talent Management Challenges

Traditional talent management involves manual processes that are time-consuming and prone to errors (Karwehl & Kauffeld, 2021b). Hiring, onboarding, performance management, and employee development are some of the areas that have been affected by these challenges (Figure 1).

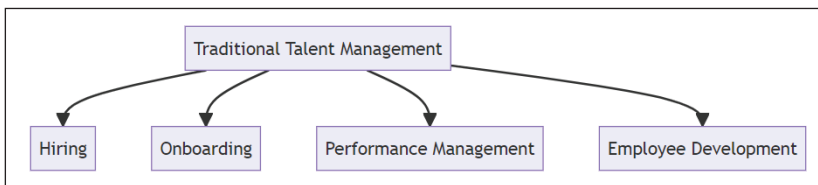


Figure 1. Traditional Challenges in Talent Management.

Recruiters spend a lot of time sorting through resumes and interviewing candidates, which can be both time-consuming and costly (Karwehl & Kauffeld, 2021b). Performance evaluations are often subjective and lack data-driven insights, making it difficult for managers to make informed decisions (Konovalova et al., 2021). The conventional approach to talent management has long been plagued by a multitude of issues that impede its effectiveness. Al Harthy (2022), KPMG International (2022), and Panova et al. (2022) also highlight the processes such as recruitment, orientation, performance evaluation and skill enhancement that have traditionally relied on manual methods are often tedious, time-consuming, and susceptible to errors. Also, with limited data-driven insights and overly subjective performance evaluations, managers are left with inadequate information to make informed decisions (Kaur & Kaur, 2022; Suvalova, 2022). This shortcoming presents a significant challenge in developing an optimal workforce that is equipped to tackle future challenges and succeed in the ever-evolving global market (KPMG International, 2022; Panova et al., 2022). These limitations greatly hinder the ability of organizations to efficiently manage their workforce in an ever-changing business landscape where agility is paramount. Consequently, Gupta and Sharma (2022), Kale et al. (2022), and Shet and Nair (2022) propose that companies must adopt innovative strategies and incorporate modern technologies, alongside automated processes, to enhance talent management practices. Gifford et al. (2021) discuss during their research the redesign of talent strategy in the age of distraction and disruption, emphasizing the use of HR analytics for measuring HR processes and the application of HR analytics in competence management. Jewani et al. (2021) delve into the examination of data-driven human resource management during the era of the Fourth Industrial Revolution. Specifically, they focus on several aspects: first, the adoption of multi-level fit employee selection through machine learning; second, utilizing various forms of HR analytics within strategic firms; and finally, employing social media as a tool in this process. Gärtner and Kern (2021) formulate a theoretical framework that explores the application of predictive HR analytics and talent management, emphasizing the influence of artificial intelligence on human resource management within the specific context of Malaysia. Arora et al. (2021) explore the role of HR analytics in effective employee engagement and its outcomes, the impact of HR analytics on organizational performance, and the bibliometric analysis of HR analytics literature. Bhattacharya (2021) explore the incorporation of data and SMAC technologies within the HR field. They delve into how these technologies facilitate organizational performance through automating HR processes and enhancing behavioral competencies. Furthermore, researchers analyse AI technologies as a means to evaluate various aspects of HR functions. Bagchi and Pattnaik (2021) investigate the influence of talent analytics on employee retention, focusing on the viewpoint of employees. They underscore the significance of employing analytics in order to gain insight into and tackle employee needs and preferences. Saxena and Pradesh (2021) conducted a literature analysis of HR analytics from 2002 to 2019, providing insights into the trends, research gaps, and future directions in the field of HR analytics. Konovalova et al. (2021) have created a

theoretical structure to examine the different viewpoints and barriers associated with HR analytics in the context of digitization within human resources management. This framework clarifies both the difficulties and possibilities that emerge when implementing HR analytics in a digitalized setting. Mukherjee et al. (2021) emphasize the implementation of HR analytics in competency mapping, underscoring its value in recognizing and enhancing employees' essential competencies to optimize their performance and advance their professional development. Karwehl and Kauffeld (2021b) discuss both traditional and new ways in competence management in their research but with a limited dataset. Utomo et al. (2021) discuss the traditional and new approaches to competence management, emphasizing the application of HR analytics in assessing and developing competencies in employees. Ghatak (2022) and Suvalova (2022) explore the integration of data and SMAC technologies in HR analytics. Hemanth Kumar et al. (2022) investigate the impact of HR analytics on employee engagement and its subsequent outcomes. They emphasize the significance of utilizing HR analytics to effectively enhance employee engagement, which in turn leads to improved organizational performance. Kale et al. (2022) conducted a study to examine the effects of HR analytics on overall organizational performance. The research emphasizes the beneficial impact of employing HR analytics in driving success within organizations and emphasizes the necessity for organizations to adopt HR practices that are driven by analytical data. Vural Allaham (2022) conducted a bibliometric analysis to examine the literature on HR analytics. This study aimed to delve deep into the current trends, themes, and research directions within this field. The findings from this analysis offer a comprehensive overview of the existing literature while also identifying potential areas for future research. Saputra et al. (2022) put forward a model for talent analysis utilizing big data. The research delves into the latent capabilities of big data analytics in managing and nurturing talents, ultimately offering an organizational framework enabling entities to exploit insights derived from data in order to achieve optimal talent acquisition and development processes. Uma et al. (2023) in their investigations center on the analysis of recruitment practices within the framework of artificial intelligence. The research aims to explore how AI technologies are employed in recruiting procedures, while also shedding light on both the advantages and hurdles that arise from incorporating recruitment analytics. Gurusinghe et al. (2021) studied predictive HR analytics and talent management in detail. The research framework explored the use of analytics in predicting talent needs, identifying high-potential employees, and enhancing talent management strategies. The study emphasized the potential of HR analytics in improving talent management practices. Sivarethinamohan et al. (2021) studied the redesign of talent strategy in the age of distraction and disruption, emphasizing the use of HR analytics for measuring HR processes and the application of HR analytics in competence management. Majam and Jarbandhan (2022) explored prioritizing data in the Fourth Industrial Revolution, focusing on the expansion of multi-level fit employee selection using machine learning and the use of different types of HR analytics in strategic firms in the context of social media. Gupta and Sharma (2022) studied AI in the Malaysian context. The study highlighted AI as

a futuristic tool for HR Analytics. Hemanth Kumar et al. (2022) examined HR analytics through cases and emphasized the significance of employing HR analytics as a means to amplify employee engagement levels and ultimately boost overall organizational performance. Saputra et al. (2022) proposed a framework for talent analytics using big data. The study explored using big data analytical tools in talent management and provides a framework that organizations can use to leverage data-driven insights for effective talent acquisition and development. Uma et al. (2023) primary focus revolved around the application and implications of artificial intelligence in recruitment analytics. The study thoroughly explored how organizations employ AI technologies within their recruitment processes, shedding light on both its advantages and obstacles encountered when implementing such analytical practices. Chung et al. (2023) emphasized the creation of a forecasting system for employee attrition by employing stacking ensemble learning. Their study introduces an innovative strategy that integrates various machine-learning techniques to enhance the precision of predicting attrition rates. This particular model holds considerable significance for public sector organizations as it enables them to identify employees who are likely to quit and implement proactive strategies aimed at retaining these individuals. Ali and Elias (2023) explored the potential application of HR analytics in talent management within the public sector. The importance of leveraging data-driven insights to make informed decisions about talent acquisition, development, and retention was highlighted in their research. The authors emphasize the need for public sector organizations to adopt HR analytics practices to effectively manage their workforce and enhance organizational performance. Cho et al. (2023) investigated HR analytics in public personnel management and provided insights on its practical application. They presented a range of cases and examples to illustrate how analytics can be utilized in various human resource functions. Implementing HR analytics within the public sector was studied extensively as a part of their research.

Recent research emphasizes the significance of HR analytics in enhancing talent management. Through advanced analytical methods, organizations can achieve valuable insights into their workforce and utilize data-driven approaches to improve employee engagement, retention rates, and overall organizational performance. However, it is crucial to acknowledge the impediments linked with HR analytics implementation including privacy issues regarding data and the requirement for skilled professionals.

The Role of Automation in Talent Management

Automation can help streamline talent management processes, making them more efficient and effective (Saputra et al., 2022; Uma et al., 2023). For instance, recruitment automation can help recruiters automate the screening process, shortlisting candidates that match specific job requirements. This saves time and reduces the risk of human error (Hemanth Kumar et al., 2022; Kale et al., 2022; Majam & Jarbandhan, 2022).



Figure 2. Integration of Automation into the Talent Management Processes.

Onboarding automation can also help new hires get up to speed quickly, reducing the time it takes to get them productive (Figure 2). The integration of automation into talent management processes offers a multitude of benefits that extend far beyond simply increasing efficiency (Uma et al., 2023). By leveraging the power of technology, organizations can optimize their recruitment efforts and elevate the overall quality of their candidate pool by streamlining screening processes with sophisticated algorithms (Ali & Elias, 2023; Cho et al., 2023). This methodical approach allows recruiters to focus on other critical aspects such as developing relationships with candidates or designing strategic hiring plans while minimizing human error (Afzal & Ansari, 2022; Shet & Nair, 2022). Moreover, automating onboarding procedures serves not only to expedite new hire productivity but also enhances employee engagement from day one through personalized experiences tailored specifically for everyone (Kaur & Kaur, 2022; Sahay & Kaur, 2022). The use of automated platforms enables HR departments to provide comprehensive training modules and resources digitally accessible at any time—allowing employees greater flexibility in learning at their own pace whilst facilitating compliance protocols and ensuring adherence to company values (Batovrina et al. (2022), Ghatak (2022), and Sahay and Kaur (2022) recommend integrating automation technologies within talent management practices which holds enormous potential for optimizing all areas involved in attracting top talents, reducing costs associated with manual processing errors whilst elevating an organization’s reputation as a tech-savvy employer committed to welfare.

The Benefits of HR Analytics for Talent Management

HR analytics can help organizations prioritize data when it comes to talent management (Batovrina et al., 2022; Ghatak, 2022; Hemanth Kumar et al., 2022; Kale et al., 2022; Sahay & Kaur, 2022). Analytics can help identify trends and patterns for organizations to improve their talent management processes (Batovrina et al., 2022; Ghatak, 2022; Hemanth Kumar et al., 2022; Kale et al., 2022; Sahay & Kaur, 2022; Saputra et al., 2022; Vural Allaham, 2022).

By collecting vast amounts of valuable information related to employee performance, engagement levels, and turnover rates within the organization’s workforce, HR analytics allows for detailed examination and interpretation of trends that help identify underlying patterns (Figure 3). With deeper insights gained from such analyses through sophisticated analytical tools and techniques available today—companies can optimize their staffing strategies by strategically targeting skill gaps or underutilized talents among employees while reducing costs associated with recruitment or training needs. Additionally, Afzal and Ansari

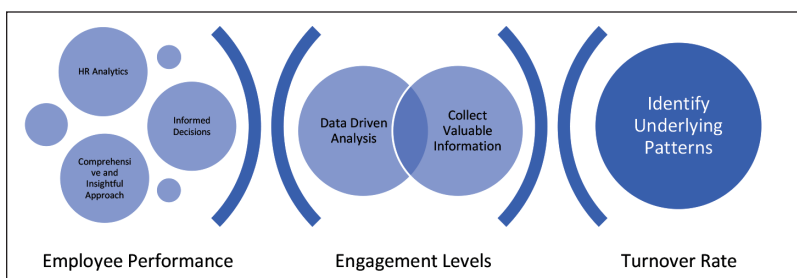


Figure 3. HR Analytics can Provide a Comprehensive and Insightful Approach to Talent Management, Enabling Organizations to Make Informed Decisions Based on Data-driven Analysis.

Source: Adapted from KPMG International (2022).

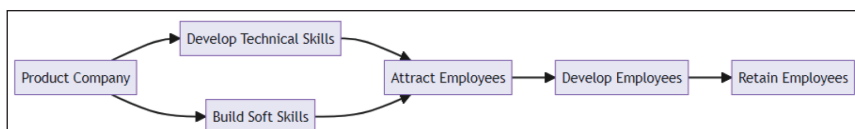


Figure 4. Approach of a Product Company to Utilizing HR Analytics for Talent Management.

(2022) recommend that by monitoring crucial metrics over time using HR Analytics software solutions—firms gain an understanding into what drives employee satisfaction/retention so that they may adjust policies accordingly—resulting in happier workers who are more likely to stay loyal long-term contributors towards meeting company objectives overall.

When it comes to utilizing HR analytics for talent management, there is a difference in the approach of a product company and a service company. They differ in their application of HR analytics to attract, develop, and retain employees. A product-based organization that leverages HR analytics might prioritize developing its workforce's technical skills over building soft skills (Figure 3). This could be because they are more focused on delivering cutting-edge products or services which require specific technical abilities. On the other hand, a service-based firm would likely have an emphasis on honing customer-facing capabilities like communication and problem-solving as such competencies are central to providing excellent customer experiences. Moreover, the nature of work engagement itself may affect how companies approach talent development using data-driven methods—Product-focused firms will typically feature cross-functional teams with specialized roles where contributions are measured primarily based on individual performance while Service-oriented businesses place heavy importance not just on individual job output but the overall team output (Afzal & Ansari, 2022; Al Harthy, 2022; Karwehl & Kauffeld, 2021a; KPMG International, 2022).

Leveraging Automation and HR Analytics for Talent Acquisition

Combining automation and HR analytics can help organizations improve their talent acquisition process (Gurusinghe et al., 2021; Panova et al., 2022; Suvalova, 2022). Recruitment automation can help identify top candidates, while HR analytics can help identify the characteristics that make them successful. This can help recruiters identify the right candidates for the job, reducing the risk of bad hires. HR analytics can also help identify the sources of top talent, allowing recruiters to focus their efforts on the most effective sourcing channels (Suvalova, 2022).

Some researchers (Bokatenko & Sidorov, 2021; Fernandez & Gallardo-Gallardo, 2021; Sivarethinamohan et al., 2021; Suvalova, 2022) have concluded after analysis that Talent Acquisition is an integral part of talent management and requires a range of strategies and processes, from initial job postings to advertising and interviews. Automation and HR analytics can play a valuable role in recruiting, allowing organizations to find and select candidates who match their desired criteria (Karwehl & Kauffeld, 2021b; Utomo et al., 2021). Automating the recruitment process allows employers to quickly identify and evaluate potential candidates, reducing the time and resources needed to ensure they are selecting the right people for the job (Bokatenko & Sidorov, 2021).

Gärtner and Kern (2021), Gifford et al. (2021), and Jewani et al. (2021) discussed at length in their research that when recruiting with automation and HR analytics, the system gathers information about the candidate's skills, interests, experience, and qualifications. This data is then analysed to match suitable candidates with the appropriate job openings, accounting for a range of factors including salary requirements and industry experience. Automating the recruiting process can make it easier to identify the right people and move them through the recruitment process faster, as well as helping to ensure that the right questions are being asked and that the best decision is being made when selecting candidates.

In addition to streamlining the recruitment process, automation and HR analytics can also enhance the candidate experience. Automated recruitment software can provide more real-time feedback about job openings and openings in the organization. This can help potential applicants discover potential opportunities and submit their applications sooner, giving employers a larger pool of qualified candidates to choose from.

Automation is an increasingly important tool for talent management because it helps to eliminate manual processes and can reduce the amount of time needed to recruit, select, and onboard new staff (Bagchi & Pattnaik, 2021; Bhattacharya, 2021). Automation provides several benefits, including improved accuracy of data entry and job descriptions, increased efficiency in selection processes, improved communication and collaboration among recruiters and hiring managers, and increased visibility and control over the recruitment process (Konovalova et al., 2021; Mukherjee et al., 2021).

Many of the tasks associated with talent management, including onboarding and training, can be automated to reduce the amount of time and effort needed to complete them (Bhattacharya, 2021; Gifford et al., 2021). Automation helps

businesses to provide more tailored and personalized training, allowing them to focus on the individual's specific needs and interests. Automated onboarding can provide businesses with useful insight into the hiring process and enable them to better evaluate the quality of their talent pool. Automated processes also help to reduce manual paperwork and time needed to search for suitable candidates (Konovalova et al., 2021; Saxena & Pradesh, 2021).

Leveraging Automation and HR Analytics for Talent Retention and Development

Automation and HR analytics can also help organizations retain their top talent and develop their skills (Cho et al., 2023). Performance management automation can help managers set goals and track progress, while HR analytics can help identify the areas where employees need to improve (Fernandez, 2019). This can help managers provide targeted feedback and development opportunities. Automation can also help identify high-potential employees, allowing the organization to invest in their development (Erokhin et al., 2020). In today's fast-paced corporate environment, companies are turning to innovative solutions such as leveraging automation and HR analytics for talent retention and development (Fernandez, 2019; Mishra et al., 2021). This approach offers a depth of benefits that traditional methods simply cannot match. By utilizing automation technology in the hiring process, companies can reduce costs while simultaneously increasing efficiency by streamlining tasks such as resume screening and applicant tracking.

Additionally, many studies (Erokhin et al., 2020; Fernandez, 2019; Mishra et al., 2021) have recommended HR analytics which allows employers to gather valuable insights on employee behavior patterns which enables them to make informed decisions regarding training programs or promotional opportunities—thus ensuring higher employee satisfaction rates over time. Overall, embracing these technologies is not only vital for staying ahead of competition but also ensures that businesses remain agile enough to adapt quickly in an ever-evolving market landscape (Erokhin et al., 2020; Ferreira et al., 2023; Madhvapathy & Rajesh, 2018).

Research Gap

The lack of research on integrating automation and HR analytics for successful talent management is a significant gap. While previous studies have explored the link between HR analytics and organizational performance, few have focused on the specific impact of automation in talent management. Acquiring and retaining talented individuals through automation technologies is an area that requires further exploration. Research is required to examine how automation and HR analytics affect employee engagement, motivation, satisfaction, and commitment. How can organizations strike the right balance between technological advancements and human-centric practices to enhance talent management strategies? Research gap exists:

- To investigate the implications, benefits, and challenges of integrating automation and HR analytics in talent acquisition, employee engagement, experience, and ethical considerations.
- Lack of extensive factor-based research on automation and HR analytics in talent management.
- HR analytics' link to organizational performance and sustainability.
- The impact of automation in talent management.
- Acquiring and retaining talented individuals using HR Analytics.
- Effects of automation and HR analytics on employee engagement and experience.
- Striking the right balance between technology and human-centric practices.

Research Methodology

By leveraging advanced technologies and sophisticated algorithms, organizations can gain deep insights into employee behavior patterns, performance metrics, skill gaps and other critical factors that influence organizational success. This transformational approach empowers businesses to make data-driven decisions with greater accuracy and speed while simultaneously streamlining workflows across various departments. From identifying high-potential employees to developing custom training programs based on individual needs, automation combined with HR analytics is driving a new era of smarter workforce planning. Overall, by deploying innovative tools like AI-powered chatbots or machine learning-based predictive models alongside traditional HR practices like employee surveys or assessments; companies can unlock a wealth of untapped potential within their human resources department which can ultimately lead them towards achieving optimal outcomes both in terms of productivity and profitability.

To gather comprehensive insights into the factors influencing employee attrition and performance, a secondary dataset was used, and a data visualization model was created. The data set obtained from Kaggle comprised an extensive sample size of 1,470 respondents from a multinational organization spread across 35 columns that analyse key metrics using HR Analytics tools. By delving deep into crucial aspects like age, gender, job satisfaction levels, work environment conditions, educational background, job roles and responsibilities held by employees in different departments along with their corresponding salaries and overtimes worked amongst others; we have been able to obtain insightful observations regarding the underlying causes driving employee retention or churn rates. Further analysis reveals interesting patterns when considering tenure at current positions vis-à-vis training time spent on upskilling themselves for new roles within the company hierarchy, which provides valuable input towards developing effective strategies aimed at optimizing workforce engagement and motivation while also improving overall organizational productivity.

Observations

Figures 1 and 2 provide a comprehensive visual representation of the intricate connections among several crucial factors that contribute to employee attrition and performance. These figures offer a detailed overview of the complex interrelationships between various key variables that influence an organization's

workforce, such as job satisfaction, workload, skill set, work–life balance, career growth opportunities, and compensation packages. Through these images, we can gain deeper insights into how each variable impacts overall employee retention rates and performance levels within an organization (Table 1).

These factors that have been studied include:

Table 1. Influencing Factors List.

S. No.	Influencing Factors
1	Age
2	Gender
3	Hourly rate charged
4	Job involvement
5	Job level
6	Job role
7	Job satisfaction
8	Marital status
9	Monthly income
10	Monthly rate
11	Number of companies worked in
12	Attrition
13	Business travel
14	Daily rate
15	Department
16	Distance from home
17	Education
18	Education field
19	Employee count
20	Employee number
21	Environment satisfaction
22	Over 18
23	Overtime
24	Percent salary hike
25	Performance rating
26	Relationship satisfaction
27	Years at company
28	Years in current role
29	Years since last promotion
30	Years with current manager
31	Standard hours
32	Stock option level
33	Total working years
34	Training times last year
35	Work life balance

Source: Adapted from IBM HR Analytics Employee Attrition & Performance at Kaggle.



Figure 5. A Sample Data Visualization Model used for HR Analytics.

Observations and Data Analysis

The dataset we examined, contained 35 columns, depicting each relevant factor and 1,470 rows, depicting the respondents providing a comprehensive view of various factors related to employee attrition. As in Figure 5, the primary outcome of interest in this dataset is the Attrition column, which is the key variable to analyse and understand the factors influencing employee attrition.

Upon examining the dataset and the data visualization charts, the top 20 outcome impact interaction correlations are as follows:

1. Overtime: 48.95%
2. Job role: 29.97%
3. Stock option level: 27.65%
4. Monthly income: 22.54%
5. Number of companies worked in: 17.28%
6. Environment satisfaction: 17.28%
7. Age: 16.74%
8. Job satisfaction: 14.48%
9. Distance from home: 14.43%
10. Relationship satisfaction: 11.91%
11. Years with current manager: 11.62%
12. Daily rate: 11.38%
13. Business travel: 11.16%
14. Years since last promotion: 9.70%
15. Education field: 9.30%
16. Marital status: 8.94%
17. Work–life balance: 8.87%
18. Job involvement: 8.30%
19. Total working years: 6.81%
20. Years in current role: 6.30%

From this analysis, it is evident that Overtime, Job role, and Stock option level are the top three factors that have the highest impact on employee attrition, with interaction correlations of 48.95%, 29.97%, and 27.65%, respectively. Other factors, such as Monthly Income, Number of Companies Worked in, and Environment Satisfaction, also play a significant role in influencing attrition rates. To better understand and address employee attrition, it is imperative to focus on these key factors and explore HR retention strategies. This may include offering more flexible work hours, providing better job role opportunities, and offering more attractive stock option plans. Additionally, it is essential to consider other factors, such as work–life balance, job satisfaction, and employee relationships, to create a more comprehensive and effective employee retention strategy.

Utilizing the powerful Data Visualization Tool of Microsoft PowerBi, it is possible to generate visually stunning and comprehensive real-time graphs and charts that accurately depict the complex interplay between a myriad of important variables. These can include age, gender, job satisfaction levels, environment satisfaction ratings, educational background details such as field of study or level achieved, specific job roles held by employees within an organization along with their corresponding incomes and overtime hours worked. Additionally crucial factors like percentage salary increases over time (or lack thereof), tenure length at current employer sites versus past positions elsewhere in one's career journey plus any pertinent training received during these various stages all come into play. Furthermore, we can also analyse aspects such as relationship status both inside & outside work life—are individuals happy or struggling? Finally, there is consideration given for attaining a suitable balance between work responsibilities/

expectations versus personal lives which can be weighed against other relevant data points using this versatile tool.

Advanced real-time HR predictive analytics tools have revolutionized the way organizations manage their workforce. By leveraging sophisticated algorithms and machine learning techniques, these cutting-edge tools can accurately forecast attrition rates with unprecedented accuracy. Armed with this critical insight, HR departments are now empowered to take timely steps to address high employee turnover before it becomes a major problem. They can also provide salary incentives or other performance-based rewards to curtail attrition and boost overall employee engagement. Thanks to these powerful analytical capabilities, companies that embrace real-time HR predictive analytics are better equipped than ever before to optimize their human capital strategies for maximum impact on business outcomes.

The Future of Talent Management: Integrating Automation and HR Analytics

Ferreira et al. (2023) and Hanna (2021) highlight in their research that the future of talent management lies in the integration of automation and HR analytics. Organizations that adopt this approach are better equipped to make informed decisions regarding talent management. They can effectively identify high-potential employees, enhance their skills through development programs, and successfully retain them for extended durations. As a result, these organizations can drive long-term organizational success and maintain a competitive edge in the market (Fernandez, 2019; Madhvapathy & Rajesh, 2018; Mishra et al., 2021). The future of talent management seems to be headed towards a more technologically advanced approach, where the integration of analytics with HR functions is becoming increasingly prevalent across all industries (Ali & Elias, 2023; Cho et al., 2023). This shift towards a technology-based system promises to offer companies and organizations an enhanced level of efficiency, productivity, and profitability while simultaneously fostering greater growth opportunities for their employees. The ability to collect data-driven insights on employee performance can help businesses make informed decisions about hiring practices as well as enable them to develop personalized training programs that cater to individual strengths and weaknesses within their workforce. The merging of technology with human resources has significant potential to transform the way firms manage their workforce going forward—paving the path for a brighter future in terms of talent management strategies worldwide (Ali & Elias, 2023; Cho et al., 2023; Erokhin et al., 2020; Hanna, 2021; Romanov, 2021).

Essential Factors to Consider when Incorporating Automation and HR Analytics into Talent Management

Implementing automation and HR analytics in talent management requires careful planning and execution. Organizations need to identify the areas where automation and analytics can have the most significant impact. They also need to ensure that

the data they collect is accurate and reliable. Erokhin et al. (2020) and Fernandez (2019) advocate the requirement of investing in the right technology and tools and ensuring that employees are trained on how to use them effectively. At the same time, some experts argue that implementing automation and HR analytics in talent management can have negative effects on employees (Saputra et al., 2022; Uma et al., 2023). This technology may lead to job loss or a reduction of human interaction within the workplace. Additionally, relying solely on data-driven decisions could overlook valuable intangible qualities such as emotional intelligence and creativity when evaluating candidates for hire or promotions (Hemanth Kumar et al., 2022; Kale et al., 2022; Vural Allaham, 2022). Therefore, Erokhin et al. (2020) suggest that careful consideration should be taken before introducing automation and HR analytics into talent management processes to ensure they do not harm employee morale or hinder important decision-making factors.

The role of data collection and security in implementing automation and HR analytics for talent management is crucial (Saputra et al., 2022). This involves collecting vast amounts of information on employee performance, productivity, engagement levels, skills development needs as well as external factors such as market trends. Effective implementation requires a thorough understanding of the potential implications that data collection may have on individuals' privacy rights while ensuring their personal data remains secure throughout the process. Additionally, Chung et al. (2023), Mishra et al. (2021), and Uma et al. (2023) in their research highlight that it is essential to recognize how collected data can inform decision-making processes within an organization when used appropriately. HR professionals must not only ensure compliance with local laws governing personal information but also utilize modern technological tools that help collect and analyse employee-related metrics effectively (Fernandez, 2019). It will enable organizations to predict future workforce requirements accurately while maintaining ethical considerations related to individual privacy concerns. Overall, Cho et al. (2023), Saputra et al. (2022), and Uma et al. (2023) suggest that successful implementation necessitates a comprehensive approach encompassing proper planning from strategizing through the execution stage coupled with robust cybersecurity measures tailored explicitly for personnel files safeguarding against cyberattacks.

In the contemporary world of business, ensuring data privacy and maintaining high levels of data integrity is paramount when it comes to automating HR functions (Madhvapathy & Rajesh, 2018; Saputra et al., 2022; Uma et al., 2023). This becomes even more critical when leveraging advanced tools such as HR analytics that offer insights into employee attrition rates and performance trends. The significance of protecting sensitive personal information about employees cannot be overstated in today's digital landscape where cyber threats abound. Any organization aiming to leverage technology for streamlining its HR processes must prioritize measures aimed at safeguarding against potential breaches that could cause irreparable harm to its workforce or expose confidential company information (Afzal & Ansari, 2022; Kaur & Kaur, 2022). Furthermore, utilizing

sophisticated tools like HR analytics requires a robust approach towards upholding data accuracy and consistency. By doing so, businesses can confidently rely on these systems' ability to provide real-time predictive analyses that accurately reflect current employee engagement levels and performance ratings without fear of any inaccuracies due to poor quality input sources. Therefore, Kaur and Kaur (2022) and Sahay and Kaur (2022) suggest prioritizing both data privacy protection and maintaining consistent standards regarding the integrity of this crucial resource should remain top priorities for any business enterprise.

When implementing HR automation and utilizing analytics to forecast employee attrition and performance, it is critical to give due consideration to the deletion of data that has outlived its usefulness. This step plays a crucial role in streamlining HR functions across different business enterprises by allowing them to focus on relevant metrics that influence organizational growth. With this approach, businesses can proactively decide rather than being bogged down by outdated or irrelevant data which can lead to inaccurate conclusions. Therefore, investing time in identifying obsolete information will help companies effectively navigate through the complex landscape of managing human resources while ensuring optimal utilization of technology-based solutions for long-term success.

Case Studies of Successful Automation and HR Analytics Integration in Talent Management

In the current corporate landscape, automation and HR analytics integration have become integral aspects of talent management. The emergence of this trend has resulted in numerous successful case studies that showcase its effectiveness. Delving deeper into these cases reveals insightful details about how companies are leveraging technology to optimize their workforce. From optimizing employee recruitment processes to streamlining performance evaluations, automation and HR analytics integration is enabling businesses to make data-driven decisions that yield positive outcomes for both employees and employers alike. These innovations allow organizations to better understand the needs of their workforce while simultaneously identifying opportunities for growth within their teams. Overall, successful implementation of automation and HR analytics can significantly enhance a company's talent management strategy by fostering improved communication between leadership and staff members as well as encouraging efficient resource allocation throughout an organization. As more companies embrace this approach, we can expect even greater levels of innovation in the field going forward.

Numerous leading organizations have skillfully integrated automation and HR analytics into their talent management processes to achieve optimal outcomes. A noteworthy example of such an organization is IBM, which has deftly employed automation to streamline its recruitment process while reducing the time-to-hire by a staggering 90%. Furthermore, they have also effectively harnessed the power

of HR analytics to meticulously analyse and identify key characteristics that drive success among sales professionals (Mukherjee et al., 2021; Saxena & Pradesh, 2021; Sivarethinamohan et al., 2021). With these insights at hand, IBM can now effortlessly source candidates who possess not only the right set of skills but also crucial personality traits that are indispensable for thriving in this role. Such cutting-edge approaches reflect how forward-thinking organizations consistently strive towards staying ahead in today's fiercely competitive business landscape where acquiring top-tier talent can be incredibly challenging yet extremely rewarding when done correctly (Bokatenko & Sidorov, 2021; Fernandez & Gallardo-Gallardo, 2021).

Intel serves as yet another compelling example of a company that has successfully leveraged automation to optimize its workforce. By deploying sophisticated algorithms and data analytics tools, Intel has been able to accurately identify high-performing employees across all levels of the organization—from entry-level associates up through senior executives—with unprecedented accuracy and precision. Once these exceptional individuals have been identified, Intel's automated system then provides them with personalized development opportunities tailored specifically to their unique skillsets and professional goals. This targeted approach not only helps cultivate individual talent within the company but also fosters a sense of loyalty among these elite performers who feel valued by their employers. Overall, this innovative use of technology by Intel underscores just how powerful automation can be when it comes to optimizing human resources management in today's increasingly competitive business landscape (Sivarethinamohan et al., 2021; Vatosios & Happonen, 2021).

Companies such as IBM, Google and Amazon have implemented automation and HR analytics with impressive results. These technological advancements offer a multitude of benefits for companies that adopt them. Automation allows for increased efficiency in workflow processes, freeing up valuable time for employees to focus on more complex tasks. Additionally, the use of HR analytics provides valuable insights into employee performance trends and can aid in predicting future talent needs (Al Harthy, 2022; Gurusinghe et al., 2021; Karwehl & Kauffeld, 2021a). IBM is an excellent example of a company that has used automation through its Watson platform. This AI technology enables various industries to streamline operations by automating mundane tasks traditionally performed by humans. The implementation of this system has resulted in significant cost savings and improved productivity across all departments. Google also recognizes the value of leveraging data-driven decision-making through its people analytics program—Project Oxygen. By analysing factors like employee feedback surveys, promotion rates, retention numbers and manager evaluations among others; they identify key drivers behind workplace success leading to meaningful improvements over attrition (Al Harthy, 2022; Gurusinghe et al., 2021; Karwehl & Kauffeld, 2021a; KPMG International, 2022; Panova et al., 2022; Suvalova, 2022).

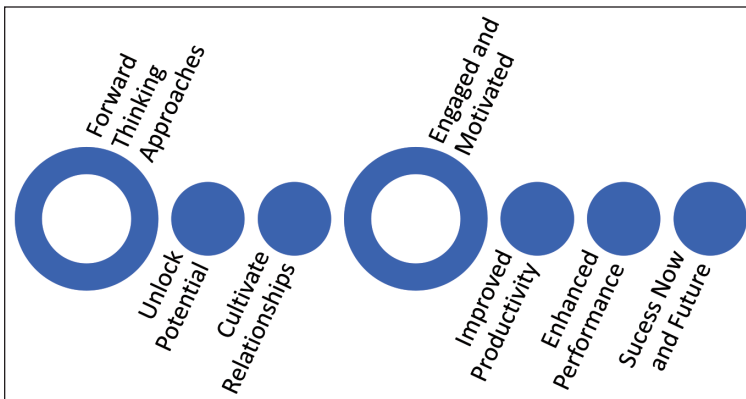


Figure 6. Critical Aspects of the Talent Management Process.

Future Research Prospects

Considering the rapid advancements in technology, such as artificial intelligence and machine learning, future research should explore the ethical considerations and implications of using automation and HR analytics in talent management. Future research could delve deep into data privacy protection and probable algorithm bias which could inadvertently discriminate against certain individuals or groups. Any potential dehumanization of talent management processes, exploring ethical considerations around automation and HR analytics in talent management in organizational contexts could also be studied in detail sectors.

Conclusion: The Importance of Embracing the Future of Talent Management

In conclusion, talent management is a critical aspect of organizational success, and the future lies in the integration of automation and HR analytics (Figure 6). This approach can help organizations identify top talent, develop their skills, and retain them for longer periods. It can also help streamline talent management processes, making them more efficient and effective. Organizations that embrace this approach will be well-positioned for competition. As companies seek to stay ahead in a highly competitive market, it is vital for them to adopt innovative strategies that attract and retain top-tier employees. Effective talent management encompasses everything from identifying high-potential candidates through robust recruitment processes, providing continuous learning opportunities and development programs to foster employee growth, and promoting diversity initiatives aimed at building an inclusive work culture where everyone can thrive. By adopting these forward-thinking approaches towards managing human resources effectively, organizations can unlock untapped potential within their

workforce, and cultivate long-term relationships while ensuring they remain engaged, motivated, and committed towards achieving common goals.

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Unlocking Innovative Work Behaviour Through Bibliometric Analysis

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Abstract

The sole purpose of this article is to discover the information stored within the term 'innovative work behaviour (IWB),' with a specific focus on types of documents, contributions by nations/regions, journals, authors and keywords. The authors have used VOSviewer version 1.6.19 and R-Studios for conducting bibliometric analysis as an approach to represent the growth for this area during a specified period. The findings of the article reveal that IWB has developed into coherent research theme from past decades. Through analysis, various trends can be assessed, for example, the frequently used keywords (innovation, innovative work behavior), top nations/regions (U.S.A., Italy). The study concurs with some theoretical insights. Theoretically, bibliometric analysis decodes the collective information of the established field. IWB is used inter-changeably with 'conception', but it has a distinct character of its own which can be used for understanding and continuous development, this is necessary to ensure enhancement in the organization. Moreover, it provides an opportunity for researchers to dive in the present state of IWB. The study also aids in the lookout for future research direction. Present study has used bibliometric analysis to review time-based development (publications, keywords, institutions) in IWB for a period of more than 20 years, that is, 2001–2022. In conclusion, this bibliometric analysis offers an inclusive overview of the status of IWB research, which could assist an enhanced understanding of the development in this field in the past years.

Keywords

Innovation, innovative work behavior, work engagement, psychological, empowerment, creativity, innovative work behaviour

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Introduction

The development of mankind has originated need for various aspects. These aspects vary from person to person. The heterogeneous needs enrooted the seed of creativity. 'Change' has been constant over the years. *Knowledge* is a sustainable resource for all beings (Deb, 2021; Del Giudice et al., 2017; El-Kassar et al., 2022) and as the wide user of knowledge, mankind frequently inclines to create something new. Innovative work behaviour (IWB) is critical to the advancement of workplaces, people, economies and in countries that must adapt to change and competition while also increasing the organization value (Ausat et al., 2022; Koednok & Sungsanit, 2018). Creativity is *omnipresent*, that is, it can occur anywhere necessitated. The pre-requisites for innovation are creative visions and notions (Rietzschel & Ritter, 2018). The branch that deals with the management of innovation at different workplaces is coined as *innovation studies* (Anderson & King, 1991). The company's competitiveness has a significant influence on creativity. In case of business a consistent creativity can be witnessed over many years (Berg, 2016; Groza et al., 2016). Innovation is the finest strategy to survive in the shifting culture (Kleysen & Street, 2001). Organizational creativity is characterized as the source of innovation because the process of creativity maps the road for new ideas, commodities and solutions (Amabile et al., 1996; Amabile & Pratt, 2016; Perry-Smith, 2006; Valaei et al., 2017). The innovation-oriented literature talks about the significant input, that is, *creativity*, which ensures a long-run existence and upgradation of the entity (Botelho, 2020; Nguyen et al., 2023). Employee are an important asset to an organization and in order to enhance innovation in the operations/process/method, organization needs to rely on their employees (Chen et al., 2023; Ramamoorthy et al., 2005). The encouragement and support of every employee to discover and uncover strategies to reach goals and complete tasks is vital to the company's development of innovation (Szczepańska-Woszczyna & Dacko-Pikiewicz, 2014). In the words of various researchers, 'A series of intentional constructing, outlining, and applying new ideas that boost work-role, group, or organisational performance is referred to as innovative work behaviour (IWB)' (Bos-Nehles et al., 2017; De Jong & Den Hartog, 2010; Janssen, 2000; Mustafa et al., 2021; Purwanto, 2022; Scott & Bruce, 1994; Waheed et al., 2023). IWB surrounds itself with three distinct processes, that is, setting up a new notion, idea generation (Linsey et al., 2005; Yilmaz et al., 2016); obtaining external aid, idea promotion; creating a blueprint of idea, idea application (Radaelli et al., 2014). Hence, it can be concluded that an organization has a wholesome effect of IWB on its outcome (Baer et al., 2003; Janssen, 2001). Another important feature of IWB is its connection to learn at all levels, which can be characterized as successful applications with significant lessons (Høyrup, 2010).

In 1969, the term bibliometric was coined (Pritchard, 1969). Bibliometric or Scientometric is a quantitative analysis application constructed of mathematical and statistical tool of analysis. These have been widely used to identify research clusters and growth prospects in a certain area (Nederhof, 2006). Various

disciplines have implemented bibliometric analysis to gain an insight in analysis of performance (Montero-Díaz et al., 2018). In other words, bibliometric can be put as a tool which shifts the analysis from a narrower (one publication, scientist or institute) to a broader (domestic or international) view with an add-on of excising the trend (Shi et al., 2020). The bibliometric analysis also works as a yardstick for measuring the academic influence (Heberger et al., 2010). Bibliometric can be considered as a map to find new trends, which will support scholars to design and plan the future study (Zhang, 2020).

Bibliometric has a wide range of applications. Many studies looked at elements, such as productive authors, influential journals, publishing data, affiliations and countries, when evaluating publication statistical characteristics (Chen et al., 2018). The paper reports on bibliometric analysis of IWB in research published from (2001–2022). The number of articles published, the evolution of terminology, citation methods, the most productive writers and journals in the topic of IWB are all taken into account. Current themes in the research and development of IWB, as well as the status and development trend of IWB, were analysed based on bibliometric analysis of contents. The study below produces various results, the prime conduct was overviewing the fields in which IWB was studied, if IWB occurs in more than one field than IWB can be declared interdisciplinary or multidisciplinary. The relevance of journals will be traced by journal analysis. The analysis of journals will also display the multiple themes in the field of IWB. The research productivity or publishing pattern of an author will be analysed using the analysis of authors (Culnan, 1986). To monitor the contribution of institutions, analysis of institutions will be conducted. Different clusters of IWB will be traced via keywords co-occurrence analysis, co-authorship analysis or co-citation analysis (Kraus et al., 2020). The rise of interest of scholars in bibliometric with the origination of different analysis tools like *Gephi*, *Leximancer* and *VOSviewer* (providing practical analysis) have attributed to the compilation and a smooth access of various database (Scopus and Web of Science) with an availability of large number of data. Indeed, the bibliometric methodology has been used in business research in a range of domains, including business strategy (Kumar et al., 2021a), electronic commerce (Kumar et al., 2021b), finance (Durisin & Puzone, 2009; Linnenluecke et al., 2017; Xu et al., 2018), human resources, management (Ellegaard & Wallin, 2015; Zupic & Čater, 2015) and marketing (Backhaus et al., 2011; Donthu et al., 2020; Hu et al., 2019; Samiee & Chabowski, 2012).

The most significant research gaps in the area of IWB have been completely addressed by the current study. Notably, previous scholarly attempts did not cover the most recent time frame, namely the year 2022, indicating a time gap in previous studies (Hassan et al., 2021; Peerzadah et al., 2023; Salam & Senin, 2022). The ‘Web of Science’ was mostly used as the database in earlier research in this field (Peng et al., 2021). Furthermore, it is remarkable that evaluations of bibliographic coupling based on institutional affiliations are still a novel area that has to be investigated in the aforementioned subject.

Objectives

The present study aims to enclose the following:

- To disclose the type of documents and number of publications from the year 2001 and 2022
- To assess inter-disciplinary subjects in the domain of IWB
- To trace the leading contributors (language, country, institutions, journals, and authors)
- To unveil trending keywords in this field

Methodology

The Database

As suggested in previous studies, there exists various database for bibliometric studies (Web of Science, Scopus, Dimensions) (Huang et al., 2023; Kumpulainen & Seppänen, 2022). In order to bridge the research gap, Scopus was used as the database in the present study as it contains publications from different disciplines, years, regions, institutions as it is the best database for peer-reviewed quotations and bibliography summaries (Jiménez-García et al., 2020). The data were accessed on 25 May 2023. The Scopus database is used for bibliometric analysis of various areas in social science discipline. There are more than 20,000 peer-reviewed journals, 370 book series and 5.5 million academic articles in the collection. The search for the related documents were done using the search key as ‘INNOVATIVE WORK BEHAVIOUR’.

A total of 8,382 appeared for the search out of which the data was restricted to the year 2001–2022. This limitation resulted to the count of 7,685 documents. The search string for the above is inserted below as,

TITLE-ABS-KEY(innovative work behaviour)AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “cp”) OR LIMIT-TO (DOCTYPE, “re”) OR LIMIT-TO (DOCTYPE, “ch”) OR LIMIT-TO (DOCTYPE, “bk”) OR LIMIT-TO (DOCTYPE, “cr”) OR LIMIT-TO (DOCTYPE, “ed”) OR LIMIT-TO (DOCTYPE, “no”) OR LIMIT-TO (DOCTYPE, “er”) OR LIMIT-TO (DOCTYPE, “sh”) OR LIMIT-TO (DOCTYPE, “dp”) OR LIMIT-TO (DOCTYPE, “le”) AND (EXCLUDE (PUBYEAR,2023) OR EXCLUDE (PUBYEAR,2000) OR EXCLUDE (PUBYEAR,1999) OR EXCLUDE (PUBYEAR,1998) OR EXCLUDE (PUBYEAR,1997) OR EXCLUDE (PUBYEAR,1996) OR EXCLUDE (PUBYEAR,1995) OR EXCLUDE (PUBYEAR,1994) OR EXCLUDE (PUBYEAR,1993) OR EXCLUDE (PUBYEAR,1992) OR EXCLUDE (PUBYEAR,1991) OR EXCLUDE (PUBYEAR,1990) OR EXCLUDE (PUBYEAR,1989) OR EXCLUDE (PUBYEAR,1988) OR EXCLUDE (PUBYEAR,1987) OR EXCLUDE (PUBYEAR,1986) OR EXCLUDE (PUBYEAR,1985) OR EXCLUDE (PUBYEAR,1984) OR EXCLUDE (PUBYEAR,1983) OR EXCLUDE (PUBYEAR,1982) OR

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 EXCLUDE (PUBYEAR,1970) OR EXCLUDE (PUBYEAR,1969))

Methods of Analysis

The statistical tool conferred for analysis is, an evaluating and quantifying tool used to acknowledge number & growth drift of a particular subject or a set of methodologies used to analyse or measure texts and information, referred as *bibliometric* (Bahuguna et al., 2023; Ellegaard, 2018; Hung, 2012; Liu et al., 2022). Bibliometric is a science in which quantitative approaches are used in various disciplines and are based on numerous features of written articles, such as subject, author, citations, title and so on (Hussain et al., 2011; Kannan & Thanuskodi, 2019). The use of statistical or mathematical methods aids in reaching the objective related to the literature in the specified area. The keywords are significantly focused to establish a concrete definition related to IWB, many keywords with small variations are used for the same purpose. Through quantitative examination of the change regulation of literature information and quantity structure, the research progress of a given field may be assessed and evaluated in a systematic manner (Mao et al., 2018). The selection of the literature for bibliometric studies is an important factor to assure validity and consistency (Lamboglia et al., 2020). Performance analysis (research and publication performance) and science mapping (structures and dynamics) are two of the most common applications of bibliometric approaches (Cobo et al., 2011; Zupic & Čater, 2015). There exists many software to conduct the bibliometric analysis 'Bibexcel, CiteSpace, CitNetExplorer, VOSviewer' (Moral-Muñoz et al., 2020). VOSviewer is a tool for constructing and visualising bibliometric networks, developed by *Nees Jan van Eck* and *Ludo Waltman*. The rationale of selecting VOSviewer and Bibliometrix package over competing software can be traced in its special advantages. Since it is extremely effective at doing *co-authorship* and *bibliographic coupling* analyses, crucial for our study. Its ability to handle large datasets effectively produces dynamic visualizations providing unparalleled analytical insights. Furthermore, the credibility of VOS Viewer in academic circles supports the validity and methodological soundness of the present research. The present research employees VOS viewer software version 1.6.19 and Bibliometrix package, R v.4.3.1 to conduct the study.

h Series Index and Impact Factor

The year 2005 brought the term *h-index* (Hirsch, 2005), which instantly gravitated informetric community. The prime focus towards creation of *h-index* is to

acknowledge the achievement of scientist in various field. In other words, the *h*-index is used to quantify the work contributed by the scientists in their respective fields (Guns & Rousseau, 2009; Kamrani et al., 2021). With the commenced idea of taking various co-authors into consideration. *h*-index can be calculated on the basis of citations and publications produced. The *h*-index is used to test the productivity junction with other bibliometric measures (Batista et al., 2006; Bertran et al., 2020; Van Raan, 2006):

h-index is always $\leq$ total numbers of papers published

In 1955, *Eugene Garfield*, for the very first time, inscribed about *impact factor* (IF) in a magazine known as '*Science Magazine*' (Garfield, 1955). Not only do average IFs vary over time, but they also vary by field (Althouse et al., 2009). The IF of a journal is used as a proxy for the quality and projected impact of all papers published in that journal. The quasi-qualitative nature of IF and its high accessibility, since it is immediately offered by ISI (Institute for Scientific Information) for the most global and prominent journals, which are some of the reasons for its success (Bordons et al., 2002). IF as a bibliometric indicator employs the cautious usage as the final IF is decided after considering many other variables (Scully & Lodge, 2005). Before calculating an IF all the complexities must be understood as a slight error could paint a completely wrong picture (Seglen, 1997).

The 2022 impact factor of a journal would be calculated as follows:

2022 impact factor = A/B .

where A = the number of times that all items published in that journal in 2020 and 2021 were cited by indexed publications during 2022.

B = the total number of 'citable items' published by that journal in 2020 and 2021. ('Citable items' for this calculation are usually articles, reviews, proceedings, or notes; not editorials or letters to the editor).

Source: uic.edu

Visualizations

The visualization for the study is constructed with the help of VOSviewer version 1.6.19 and Bibliometrix package for R v.4.3.1. Simply put, visualizations assists in a better analysis and understanding of bibliometric results (Jiang et al., 2019; Wheeldon & Ahlberg, 2011). The research constituents (collaborations, co-authorship and keywords) can also be better examined through visualization (Muhammad et al., 2022). VOSviewer provides an option for three different types of visualizations, that is, the network visualization, the overlay visualization and

the density visualization. The present study selects the network visualization for all the visualizations.

Results

Analysis of Characteristics of Documents

Tables 1 and 2 concur the first objective. To arrive at preliminary results produced from different types of documents and to track the number of documents produced. We simply sift and analyse the data. In total, 12 types of documents were available. Table 1 displays the 12 types of documents, that is, 7,685 reports in the area of IWB. The number of articles totalled to 4,881, which accounts for 63.51% and opted frequently. Documents like, editorial (0.32%), note (0.26%), letter (0.012%), etc., were comparatively less significant.

The selection criteria of IWB displayed the result, which summed to 7,685 documents. Table 2 displays the total contribution from 2001–2022. The maximum publication can be viewed in the year 2022 and the minimum in 2001. Every year displays a different number of publications, following an increasing trend. The sources for these publications can be traced to various reputed journals, (see, *Sustainability Switzerland*, *Frontiers in Psychology*, *SAE Technical Papers*, *Engineering Structures*, etc.).

Analysis of Subjects

This part achieves the second objective of identifying *inter-disciplinary* streams in the area of IWB. Table 3 displays the subject-wise analysis of IWB. Ten

Table 1. Document Type Information During 2001–2022.

Sl. No	Document Type	Number	Percentage
1.	Article	4,881	63.51
2.	Conference paper	1,880	24.4
3.	Review	401	5.21
4.	Book chapter	307	3.99
5.	Book	166	2.16
6.	Conference review	47	0.61
7.	Editorial	25	0.32
8.	Note	20	0.26
9.	Short survey	9	0.11
10.	Erratum	9	0.11
11.	Data paper	1	0.012
12.	Letter	1	0.012

Table 2. Chronological Publication from 2001–2022.

Publishing Year	Total Publications	Percentage	Publishing Year	Total Publications	Percentage
2001	32	0.41	2012	293	3.81
2002	51	0.66	2013	347	4.51
2003	65	0.84	2014	428	5.56
2004	83	1.08	2015	403	5.24
2005	103	1.34	2016	441	5.73
2006	136	1.76	2017	572	7.44
2007	138	1.79	2018	502	6.53
2008	157	2.04	2019	659	8.57
2009	180	2.34	2020	808	10.5
2010	199	2.58	2021	845	10.9
2011	291	3.78	2022	952	12.3

Table 3. Analysis of Subjects.

Sl. No	Subjects	Total Article Contribution
1.	Engineering	2,505
2.	Social sciences	1,277
3.	Business, management and accounting	1,229
4.	Computer science	1,192
5.	Materials science	1,106
6.	Medicine	1,005
7.	Physics and ssstronomy	685
8.	Energy	586
9.	Psychology	571
10.	Environmental science	545

Source: Scopus.

different subjects cover the term ‘IWB’, where the top three subjects are engineering (32.59%), social sciences (16.61%) and business, and management and accounting (15.9%). The subject with smallest publication in the field of IWB is environmental science (7.09%).

Analysis of Language, Country, Institutions, Journals and Authors

The third goal, identifying the top contributors in the area of IWB, is achieved in this portion of the study. The area of IWB is published in 23 different languages, where the majority of publications are ranged in the English (97.15%) language.

Table 4. Language Information of Periodical Articles During 2001–2022.

Language	Article Count	Percentage	Language	Article Count	Percentage
English	7,466	97.15	Bosnian	02	0.02
German	49	0.63	Romanian	02	0.02
Spanish	40	0.52	Ukrainian	02	0.02
French	38	0.49	Greek	02	0.02
Russian	37	0.48	Afrikaans	01	0.01
Chinese	34	0.44	Japanese	01	0.01
Italian	26	0.33	Moldavian	01	0.01
Portuguese	22	0.28	Moldovan	01	0.01
Dutch	04	0.05	Persian	01	0.01
Malay	03	0.03	Polish	01	0.01
Slovenian	03	0.03	Slovak	01	0.01
Czech	03	0.03	Croatian	01	0.01

Table 5. Publication from the Top Countries/Regions (2001–2021).

Country	Total Publications	Total Publications Ranking & Percentage %	Country	Total Publications	Total Publications Ranking & Percentage %
USA	1,467	1 (18.71)	India	337	8 (4.54)
Italy	1,137	2 (14.54)	Australia	328	9 (4.30)
China	668	3 (9.17)	Canada	317	10 (4.14)
			Netherlands	236	11 (3.03)
United Kingdom	647	4 (8.26)	Portugal	222	12 (3.00)
Germany	512	5 (6.57)	Brazil	187	13 (2.47)
France	507	6 (6.48)	Pakistan	158	14 (2.19)
Spain	345	7 (4.60)	Malaysia	135	15 (1.78)

Out of 7,685 documents, 7,466 documents were in English. Table 4 shows the various languages (German, French, Spanish, Russian, Chinese, etc.) in which publications are produced. The rationale behind English being the primary language for publication is that it is the most prevalently used language in research and is widely spoken/understood around the world (Adler & Johnson, 2000; Brambrink et al., 2000; Chiu & Ho, 2005).

Table 5 represents the contribution done in the field of IWB, geographically. This analysis encloses the diversity in the field of IWB and partially fulfils our third objective of discovering *the leading countries* in this field. From the global perspective, the leading countries in this field are United States America (1,467), Italy (1,137), China (668), United Kingdom (647) and Germany (512). Western

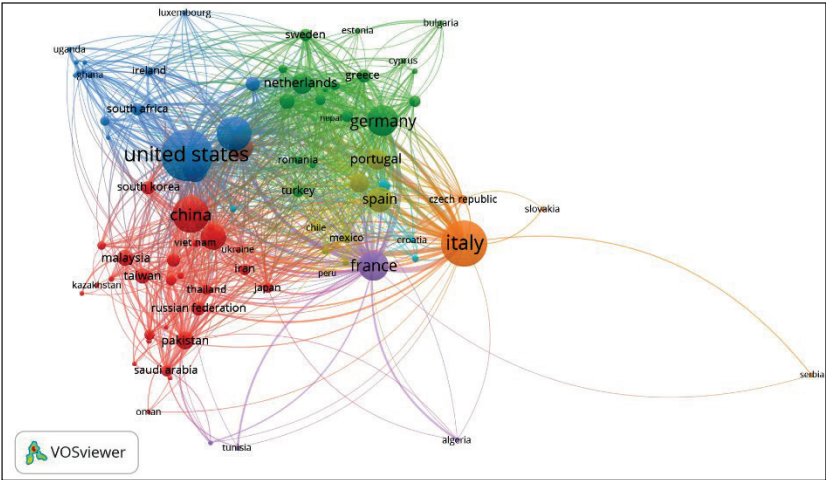


Figure 1. Country Wise Collaboration of Authors.

Source: VOSviewer.

countries contribute significantly in the field of IWB, while Asian countries contributes less.

Collaborations (among authors/experts) result into new discoveries and insights. Collaboration imparts creativity (Sampaio et al., 2016). Figure 1 showcases the *inter-country co-authorship analysis* of countries in the field of IWB. The analysis reveals the number of associations of one country’s authors with other country (Khandelwal et al., 2021). The figure has various aspects. Only countries with a minimum of 5 documents and 10 citations were selected. The eight bigger circles in the figure represents the countries (USA, Italy and China), where the majority of collaborations has taken place among the authors in the respective field while the 1,134 links represent collaboration among various countries present in the figure. United States have 1,520 documents in collaborations with a link strength of 723, which is the highest among all, followed by Italy with 1,180 documents and 587 link strength, China with 748 documents and 415 link strength. The figure also conveys the lack of research in developing countries.

The total institutions around the world that publishes in the field of IWB sums up to 11,766. Table 6 enumerates the leading 15 institutions in the relevant field, between 2001 and 2022. The major contribution can be assessed from the European Continent (Italy *Politecnico di Milano*, *Politecnico di Torino*, *Università degli Studi di Firenze*, Paris CNRS Centre National de la Recherche Scientifique). The contribution from the developing country is in a scant position, indicating low density of research.

Figure 2 portrays the *bibliographic coupling* of the institutions in the field of IWB. Bibliographic coupling explains how two different documents cite a

Table 6. Most Productive Institutions.

Sl. No	Institute	Tp
1.	Politecnico di Milano, Italy	115
2.	CNRS Centre National de la Recherche Scientifique, Paris	114
3.	Politecnico di Torino, Italy	94
4.	Università degli Studi di Firenze, Italy	78
5.	Università degli Studi di Napoli Federico II, Italy	78
6.	Consiglio Nazionale delle Ricerche, Italy	76
7.	Alma Mater Studiorum Università di Bologna, Italy	68
8.	Ministry of Education China	57
9.	Universidade do Minho, Italy	49
10.	Università degli Studi di Padova, Italy	49
11.	Universidade de Lisboa, Portugal	48
12.	Chinese Academy of Sciences	44
13.	Universidade do Porto, Portugal	41
14.	University of Toronto, Canada	41
15.	Università degli Studi di Perugia, Italy	40

Source: Scopus.

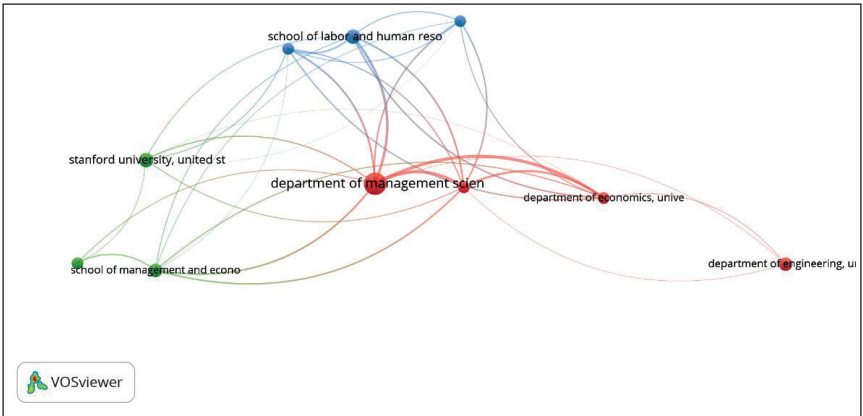


Figure 2. Bibliographic Coupling of Institution.

Source: VOSviewer.

common document (Maseda et al., 2022). This study seeks the bibliographic coupling of the institutions, which means how two different institution references the publication of the same institution. Thus, explaining how a citation provides the information of similarities among documents. An assumption that underlies bibliographic coupling is that the two documents which referenced the third documents are related. The same can be also viewed in the cluster. The minimum

Table 7. Most Influential Journals.

Sl. No	Journal	TP	IF	SJR	SNIP
1.	<i>Sustainability Switzerland</i>	64	3.88	0.664	1.198
2.	<i>Frontiers in Psychology</i>	48	4.23	0.891	1.422
3.	<i>SAE Technical Papers</i>	43	1.1	0.240	0.368
4.	<i>Engineering Structures</i>	34	5.58	1.607	2.177
5.	<i>Construction and Building Materials</i>	33	7.69	1.888	2.214
6.	<i>European Journal of Innovation Management</i>	29	5.45	1.142	1.861
7.	<i>International Journal of Environmental Research and Public Health</i>	29	4.61	0.828	1.280
8.	<i>Creativity and Innovation Management</i>	27	3.64	0.986	1.395
9.	<i>Nuclear Engineering and Design</i>	26	1.9	0.853	1.234
10.	<i>Energies</i>	25	3.25	0.632	1.025

Source: Compiled from Scopus and Websites, respectively.

Note: The authors have only taken 10 journals in consideration and has excluded conference proceeding, book, book series and trade journal. The impact factor was collected from the official websites of the journal as on May 25th 2023.

threshold for the documents were kept to 5. The visualization provides three clusters with 33 links and total link strength of 189. The top three institution that majors in coupling and cluster is the Department of management sciences (Hazara University, Pakistan) followed by School of Economics and Management (Tongji University, China) and Department of Economics (University of Insubria, Italy).

The publications made in the field of IWB is published in more than 100 journals. The first 10 journals with their total papers, impact factor, SJR and SNIP are enlisted in Table 7. The IF identifies the significance of a journal. SJR creates a distinction amid a journal's popularity and prestige, and the ratio of degree of topicality and citation impact of a journal (Colledge et al., 2010). The journals quantity up to 4.65% of the total publications. The top three journals with most articles are *Sustainability Switzerland*, *Frontiers in Psychology* and *SAE Technical Papers*. Another way to look at this table is from the IF column. The IF of all the journals is displayed which indicates the citing frequency of a publication from a particular journal. IF also helps in the ranking of the journals. Thus, on the basis of IF, the top three journals are *Construction and Building Materials*, *Engineering Structures* and *European Journal of Innovation Management*.

Figure 3 shows the citation analysis of different journals in the field of IWB. Out of 4,407 journals, more than 150 journals were cited more than 50 times. *Creativity and Innovation Management* was cited more than 2,000 times followed by the *Journal of Occupational and Organization Psychology* with 1,880 citations and *Fuel* with 1,399 citations.

As can be acknowledged from Table 8, top 10 authors were affiliated to four countries namely Pakistan, Italy, France and Germany. The majority of the authors belong to European continent. The articles published by these authors ranges from



Source: Scopus.

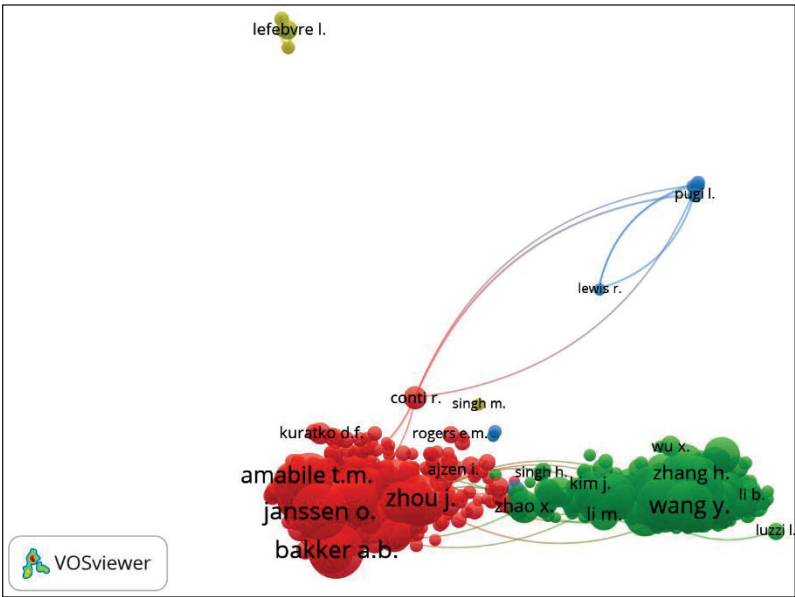


Figure 4. Co-Citation Visualization.

Source: VOSviewer.

the year 2001 to 2022. Afsar, Bilal is the top ranked author among all, affiliated from Pakistan with a contribution of 24 articles and the highest *h*-index among all of 29, followed by Meli, Enrico affiliated from Università degli Studi di Firenze, Italy with an article contribution of 22 publication and *h*-index of 27.

Co-citation analysis aids the understanding for cognitive structure (Surwase et al., 2011). In author's co-citation analysis *frequently cited authors* can be traced, the unit of analysis is co-cited and frequently cited authors (Osareh, 1996). Figure 4 represents the co-citation visualization of authors in the field of IWB. The number of citation of an author plays a very significant role. There are 4 clusters, where the cluster in red represents the authors with highest citations (Janssen 1,249 citations, Bakker 1,185 citations). The authors in red (539 authors) and green (448 authors) clusters are the authors who have more than 500 citations.

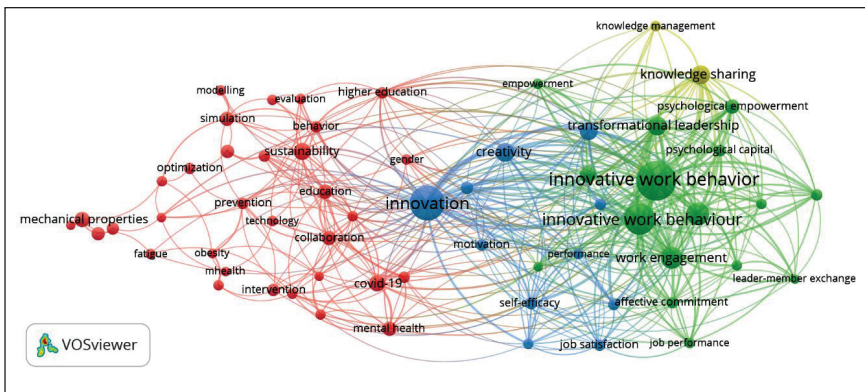
Analysis of Keywords

This section accomplishes the last objective of the study. Keywords describe the authors' perceptions of the most essential terms in their publications (Pesta et al., 2018). Table 9 aims to identify the most common keywords used to discover the articles in the field of IWB. To analyse the keyword below 'author's keywords' were taken to consideration. In the presence of 7,685 articles a total number of 6,527 keyword appeared. Only 697 keywords appeared more than

Table 9. Analysis of Keywords.

Sl. No	Keywords	Occurrences
1.	Innovative work behavior	326
2.	Innovation	251
3.	Innovative work behaviour	204
4.	Innovative behavior	105
5.	Work engagement	96
6.	Transformational leadership	75
7.	Knowledge sharing	74
8.	Creativity	72
9.	Leadership	68
10.	Innovative behaviour	57

Source: VOSviewer.

**Figure 5.** Analysis of Keywords.

Source: VOSviewer.

20 times. Only 697 keywords were found to have a frequency of more than 20 occurrences, with 'innovative work behavior' (326), 'innovation' (251), and 'innovative work behaviour' (204) ranking as the top three most frequently used/appeared keywords.

The co-occurrence of keywords is based on the concept of 'presence', 'occurring frequency' or 'similar keywords'. There exist three methods to search keywords, on the basis of all keywords, author keywords and indexed keyword (Su & Lee, 2010). Figure 5 shows the link strength of 1,120 among 62 items in the four clusters. The distance among the nodes describes the relation, which means the shorter the node, the stronger the relationship and vice versa. The keywords also categories the nomenclature according to the region/territory (e.g., behavior and behaviour).

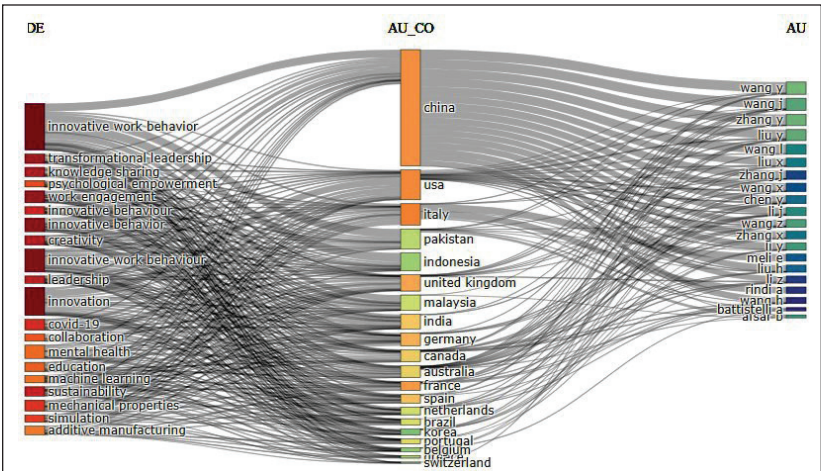


Figure 6. A Three-Field Plot Showing the Network Between Keywords (Left), Countries (Middle) and Authors (Right) for Innovative Work Behaviour.

Source: Bibliometrix.

This part of the study presents the bird-eye view of the publication pattern of IWB. The three-field plot (Sankey Diagram) analysis sheds light on the intricate interaction between keywords, countries and authors of the maximum cited references for the 20 most researched terms in the domain of IWB. The height of the nodes (countries) is proportional to the frequency of using a certain keyword within the field. Figure 6 describes that keywords, such as innovative work behaviour, transformational leadership, knowledge sharing, psychological empowerment, work engagement, innovative behaviour, creativity, as the main centre of interest in this field for the countries like China, U.S.A. and Italy.

Conclusion

The study presents the bibliometric analysis on innovative work behavior during 2001–2022. The database selected for the study was Scopus. A total of 8,382 documents appeared for the search term out of which 7,685 documents were selected for the study. The study is aligned with the objectives. The first section of the study deals with the elaboration about the methodology selected for the study, that is, VOSviewer version 1.6.19 and Bibliometric Analysis. The second part discloses the various results of innovative work behavior. Analysis of documents is the first section of result, where the number of documents produced per year is presented with different types of documents (articles, notes etc.). Followed by the analysis of subjects were the subjects involved in the field of innovative work behavior was explored (engineering, social sciences, etc.). Analysis of language, country, institutions, journals and authors are identified next. As an add-on, the

study also presents different visualizations such as, inter-country co-authorship analysis, bibliographic coupling, citation analysis and keywords analysis of the relevant area. This information is significant in exploring the field of innovative work behavior. The institution with the most publications is Politecnico di Milano in Italy, and it can be inferred from this that the majority of institutions active in the field of IWB are also found in the European continent. In the inter-country co-authorship United States of America, Italy and China are the significant countries with majority collaborations with other countries. The author with the most output is Bilal Afsar from Hazara University in Pakistan, and *Sustainability Switzerland* is the journal with the most publications and has been cited more than 200 times. Keywords like 'innovative work behavior', 'innovation', 'innovative work behaviour' appeared for more than 200 times in the searched articles. These keywords also serve as the hot-spots for further studies. The publication trends and inter-disciplinary tables (Tables 2 and 3) displays the rising trend, denoting the increasing interest of researchers in the field. Global interest in this area can also be traced by institution- and country-specific research on IWB. This study also advocates for 'Geographical Diversity' since the institutions, journals and countries are from different parts of the globe. This variation implies a different viewpoint on innovative work behavior from different parts of the world. The visual depiction to illustrate the interrelationships among keywords, countries and authors through Sankey diagram within the framework of extensively cited references within the IWB domain. The visualization underscores pivotal keywords that hold centrality in the field. Notably, certain countries, including China, the United States and Italy, emerge as noticeable contributors to research pertaining to these focal keywords.

Implications, Limitations and Direction for Future Research

A thorough study on bibliometric analysis imbibes various implications. However, the certainty of implications of bibliometric analysis will always vary with the scope. Some of the implications built on the basis of the present study are as follows:

- Influential studies: Through bibliometric analysis, a variety of authors, publications and their areas of expertise can be tracked. Because of this implication, bibliometric analysis is appropriate across a wide range of subjects.
- Study roadmap: The analysis aids in determining the investigation's context. Different types of visualization serve in locating the hotspots and gaps in the trending information, improving comprehension of the subject.
- Numeric approach: The number of publications, citations of a journal/article/authors, co-authorships and co-citations can indicate the volume of research completed to date and establish a standard for different institutions and nations to meet.

The study offers various advantages but some limitations are always present. The limitations can be interpreted as the passage for future research. The period of study was from 2001 to 2022. Future researchers could increase the time period for more comprehensive outcomes. In the bibliometric analysis all factors, such as journal, authors, subjects, type of documents, institutions and countries, were analysed except funding/sponsor, future researchers can also take this significant factor in account. The database opted for the study was Scopus, other database like web of science, dimensions and google scholar were not taken into consideration, this can be used as an opportunity by future researchers to choose other database for the study.

A vast area of study has been uncovered in the field of innovative work behavior in previous studies (e.g., innovative work behavior and work engagement, knowledge sharing, organizational culture, leadership, employee skills and aptitudes) (Middleton & Hall, 2021). The major studies can also be witnessed from the developed nation and not from the developing economies. IWB has been confined to a very few subjects; hence, this narrows exploration. Thus, future researcher can shift their focus to gauge the innovative work behavior in the situations of emerging nations and subjects, respectively.

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Studying the Impact of COVID-19 Pandemic on Buying Behaviour of Indians Through Literature Survey

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Abstract

The COVID-19 pandemic has significantly affected the thought process of all consumers all over the world. Many consumers are preferring online shopping and digital payments over traditional methods. To remain competitive, businesses had to adapt to these changes and cater to the demands of consumers. This study investigates the impact of the pandemic on consumers and how firms in India have adjusted to the changes. The authors adopted the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) method to analyse the literature. The study was conducted using Google Scholar to find research works published from January 2020 to December 2022. The articles selected from PRISMA were analysed and peculiar observations have been reported. The consumers are shifting towards online shopping, but traditional methods of shopping have their own place. Therefore, the shift from online to offline is not permanent for all the consumers.

Keywords

Literature review, consumer behaviour, pandemic, online shopping, India

Introduction

The term ‘consumer’ refers to individuals who purchase goods and services for personal use or to fulfil the needs of their households and families in a group (Grundey, 2009). The notion of ‘consumer behaviour’ exists because of consumers’

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varied and dynamic requirements and anticipations, as each individual responds differently to sudden market shifts. Consumer behaviour refers to spending time, money and effort to consume goods and services. This includes what, why, when and where, apart from frequency and the usage of their purchase, from searching, selecting, paying, utilising, reviewing and discarding goods and services (Jisana, 2014; Kotler & Keller, 2017; Valaskova et al., 2015). The research into consumer behaviour becomes relevant as it helps us understand the factors that influence it, as it has significant implications for businesses, policymakers and society.

Understanding consumer behaviour helps businesses and organisations understand their target audience's wants, needs and preferences. It can provide insights into market trends and the impact of economic conditions on consumer spending. The findings can be used to improve marketing and sales strategies and develop products and services to meet consumer demands. The behaviour of consumers is influenced by many factors, including social, cultural, psychological and economic factors. Understanding these influences is essential for understanding individuals' and groups' behaviour and developing effective public policies (Sheth et al., 1991).

Consumption is routine, but it has a context. Knowing the background is essential, as four primary contexts influence or disrupt consumer behaviour (Sheth, 2020; Wood & Neal, 2009). The first is the *Social context* that undergoes changes due to life events such as weddings, parenthood and moving from one city to another and includes the workplace, neighbourhood, friends and neighbours (Loxton et al., 2020; Manyiwa, 2002).

Technology is the second context. New technologies disrupt established practices as they become relevant. The most incredible technological advancements in the contemporary age are smartphones, the internet and e-commerce. Online search and ordering have significantly changed how we shop and use products and services (Dennis et al., 2009; Gretzel et al., 2006). The *superego* (conscience and ego ideal) creates rules and regulations that impact consumption patterns. These rules and regulations form the third components that disrupt consumer behaviour are particularly relevant to public and shared capacities and discourage the use of unhealthy products such as alcohol and smoking. Public policies related to health, environment and economic livelihood can promote adopting products and services that positively impact society (Sheth et al., 1991). The fourth and least predictable context is infrequent *natural calamities* such as earthquakes, natural disasters, war and global pandemics like the COVID-19 pandemic that we have witnessed (Ichim, 2010; Perriman et al., 2010).

Consumer can do online and offline shopping (Grewal et al., 2010). Online shopping refers to purchasing products or services through the internet using a computer, phablet or smartphone. It offers convenient access to a comprehensive range of products and services, often with the ability to link prices and product features and access to customer reviews. Online shopping also offers the potential for 24/7 shopping and doorstep delivery (Kumar & Maan, 2014). On the other hand, offline shopping involves visiting physical stores or shops to purchase products or services. This consumption mode allows for hands-on examination of

products and the ability to interact physically with and try out the products before purchasing. Offline shopping also provides opportunities for face-to-face customer service and instant gratification through immediate possession of the product (Ewe & Ho, 2022). Both modes of consumption have advantages and disadvantages; personal preferences and availability can influence consumer behaviour and specific needs. Whether they shop physically (offline) or online, consumers have different senses of taste and requirements (Gao & Su, 2017). The consumer's choice to shop offline versus online can be prejudiced by several factors, comprising the product's feel and look, the need for instant gratification and delivery times (Smith & Rupp, 2003).

This study aims to investigate the immediate and enduring consequences of the COVID-19 pandemic on consumers in India, utilising an analysis of current literature. Like many past disruptive disasters, the pandemic has adversely affected the Indian economy and human well-being (<https://www.imf.org/external/pubs/ft/ar/2020/eng/spotlight/COVID-19/>). Unlike terrorism and natural catastrophes, like previous disease epidemics, the current outbreak does not cause physical damage to infrastructure. Its longevity, which has lasted for over 3 years and is still ongoing, is evidence of its enduring nature. (<https://www.who.int/news/item/23-04-2021-COVID-19-continues-to-disrupt-essential-health-services-in-90-of-countries>). The COVID-19 pandemic, however, stands out for having a worldwide reach.

The COVID-19 pandemic navigated alterations in consumer behaviour and spending patterns. The noticeable changes were visible in the mode and frequency of shopping: the type of items purchased, the location of such purchases and the use of digital payments, particularly in developing nations like India (Verma & Naveen, 2021). Each factor significantly impacts production, consumption and the supply chain. Numerous researchers from industry and academia started to analyse and understand the change in consumers' buying behaviour. Therefore, the present business must understand the difference and act accordingly. Based on the same understanding, we try to summarise the peculiar finding from these studies through a literature review. Our literature review studies are conducted to fulfil the following research objectives:

1. How has the COVID-19 pandemic intensified consumer behaviour in India, and what measures can businesses take to accommodate these shifts?
2. To summarise the findings of the research work selected for the literature study.
3. To identify shortcomings in the current research;
4. To formulate a comprehensive agenda for future research.

The rest of the article will proceed as follows. The second section discusses some literature studies on changes in consumer behaviour resulting from COVID-19. The third section presents the methodology of screening the articles for the literature study and the fourth section analyses each screened journal to identify the contributions and gaps. Finally, in the fifth section, we conclude the research with key findings and a scope for future research.

Literature Review

This segment explores the literature reviews related to alterations in consumer behaviour brought about by the COVID-19 pandemic. This task of analysing the previous review studies helps to outline existing literature in the concerned area and helps to build a motive and need for the study. We used Google Scholar to search for pertinent publications by examining research studies on shifts in consumer behaviour driven by the COVID-19 pandemic. The search unearthed five published research papers on the changes in customer behaviour caused by COVID-19. The authors conducted an in-depth analysis of the research articles to assess progress in this area. The conclusions drawn from the five studies have been condensed in this section.

Nikbin et al. (2022) employed the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) methodology to analyse the articles. The authors searched keywords such as 'economic crisis', 'recession' and 'marketing' to find relevant articles. However, the authors restricted the scope of the study to 41 Scopus-indexed English language publications focusing on two crucial concerns:

1. In the face of the COVID-19-triggered recession, should businesses increase or decrease their marketing budgets?
2. What marketing mix strategies should businesses adopt to thrive worldwide after the pandemic?

According to the author's recommendation, firms should not cut down their marketing budgets in the face of COVID-19, and they can employ marketing mix techniques and strategies for the 4Ps, such as product, place, price and promotion. The authors explained the 4Ps in detail, as shown in Figure 1.

Perera et al. (2021) examined, arranged and analysed research citations on consumer hoarding behaviour during the COVID-19 pandemic through existing 43 pre-existing literature from sources such as Google Scholar, JSTOR and Web of Science, focusing on three main themes:

1. Behaviour related to panic buying,
2. Emerging patterns in consumer behaviour and
3. Behaviour relating to purchasing goods online.

The researchers observed that consumers had gained trust in online shopping. The changes included concern for value-oriented goods and services, discontent with excessive consumerism and an emphasis on recycling and instilling traditional and uncomplicated values in their children. The researchers identified additional factors influencing consumer buying behaviour, including consumer emotions, involvement with social and mainstream media, Government intervention and knowledge distribution. The authors concluded that to understand panic buying tendencies, evolving consumer behaviours and patterns related to online purchasing, global e-commerce firms must adjust to technological changes and modify their business strategies.

Product	Place	Price	Promotion
• Avoid cutting R&D costs and, instead, emphasise it more. • Withdraw non-profitable products • Redesign product lines • Introduce new and also affordable products • Emphasise durability and functionality characteristics in new product development • Reduce the size of non-food products • Increase the size of food products • Improve services	• Find new profitable markets. • Eliminate costly channels and intermediates • Move to online channels • Leave markets that you are not strong in it and reallocate scarce resources to needs in which you are stronger in them	• Keep the same prices, but offer products with higher quality/offer superior value • Do not reduce the price by lowering quality. • Reduce the price by reducing the size. • Keep the original price and offer temporary price discounts	• Offer price discount • Increase advertisement and promotion budget • Reduce the costs of traditional advertisement • Invest more in online marketing • Invest more in social media marketing • Offer coupons, bonuses, and free sample • Use of celebrities for product launch • Send direct emails to customers

Figure 1. Marketing Mix Strategies and Practices During COVID-19 and Recession.

Source: Nikbin et al. (2022).

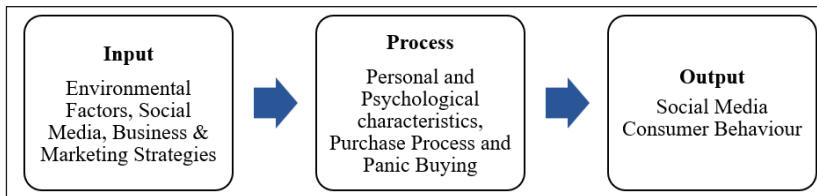


Figure 2. The Input-Output Process Model.

Veiga and Diogo (2022) utilised a bibliometric coupling method to examine 89 literature studies published on the Web of Science during the preliminary stages of the COVID-19 Pandemic in August 2020. They identified six significant constructs: consumer behaviour and corporate tactics, macro-environmental influences, panic purchasing, personal and psychological traits, buying process and social media. Figure 2 illustrates the conceptual model employed by the authors to analyse the current literature on consumer behaviour.

The authors worked on themes like segmenting the behaviours of Gen Z and Alpha, employment status, family size, shopping habits, lifestyle, clustering consumer surroundings, the orientation of brands towards gender, sexual orientation diversity, articulating tangible and measurable benefits for marketing, marketing strategies, usage rates of automated communication, conversion-to-sale ratio, identifying important stimuli such as price or quality, macro influencers, the emergence of the market place on social networks to understand consumer behaviour during the time of crisis.

Timotius and Octavius (2021) observed the dynamics of consumer behaviour before and during the pandemic, using the PRISMA method to evaluate seven literature studies that satisfied the cohort and cross-sectional analysis criteria based on factors such as age, gender, store types and environmental concerns. The authors collected the data from five databases: EBSCO, Google Scholar, PubMed, Science Direct and Web of Science. The authors noted that panic buying and hoarding occurred in various countries and that the COVID-19 pandemic significantly impacted changing consumer behaviour, with age and gender having a different impact. Men viewed shopping as a utilitarian task; in contrast, women viewed it as a fun and relaxing activity and were likelier to follow health and safety practices while grocery shopping. The authors analysed multiple countries and concluded that the pandemic in India affected both customer and brand protection and technology usage. Customers who purchase from retail stores, either online or in-person, are more concerned about these difficulties.

The authors further suggest that retailers must adapt to changes by modifying their business model with technology providing adequate internet security for developing trust and integrating the offline and online stores. The research has limitations because it is impossible to generalise consumer behaviour in the retail category due to varied cultural and contextual elements. Cruz-Cardenas et al. (2021) studied consumer behaviour and post-purchase satisfaction using bibliometric analyses by employing the input process output model of consumer behaviour (Figure 2) from the 70 literature studies in Scopus databases published during 2021 and 2022. The authors included two search criteria to understand psychological characteristics: COVID-19 and consumer behaviour in China and the USA. They employed external influences (micro and macro environmental factors), marketing tactics, the consumer process (personal and psychological aspects), the decision-making process and the output (results). It was observed that the macroeconomic factors include the political, economic, social and legal environment framework. The microeconomic factors include family, friends, acquaintances, society, the media and companies engaging or communicating via technology. At the same time, the marketing strategies and influences include the 4Ps, that is, product, price, place and promotion. The purchasing behaviour constituted selecting products and points of purchase.

The five literature studies we discussed above did not specifically focus on changing consumer behaviour in India. Therefore, we analysed various studies focusing on the impact of COVID-19 on different regions of India to gain insights into how consumer behaviour has shifted. The following section outlines our methodology for conducting the literature review.

Methodology for Literature Review

This section outlines the methodology employed to understand how the COVID-19 pandemic has influenced the behaviour of Indian customers. The initial step involved gathering relevant literature and critically analysing each work. We began our search with Google Scholar in January 2023 and focused on works

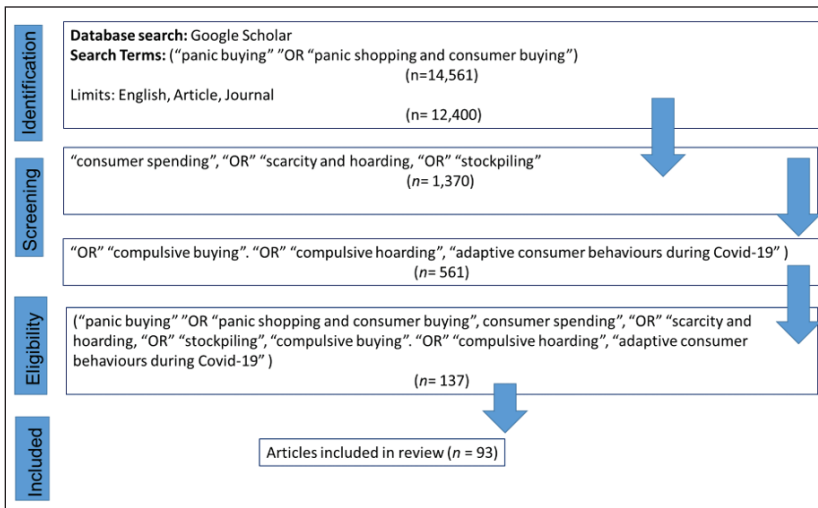


Figure 3. Research Methodology.

published between January 2020 and December 2022. Subsequently, we narrowed the literature by screening the obtained results for this period. Figure 3 illustrates the approach taken to select the articles for review.

During the initial screening, we utilised keywords such as ‘panic buying’ and ‘panic shopping and consumer buying in COVID-19’, resulting in around 12,400 outcomes. For the second screening, we expanded the search by adding a few more keywords, such as ‘consumer spending’, ‘scarcity and hoarding’ and ‘stockpiling in COVID-19’, which produced approximately 1,370 papers. In the third screening, we included additional keywords, such as ‘compulsive buying’, ‘compulsive hoarding’ and ‘adaptive consumer behaviours during COVID-19’ in the first two searches, resulting in approximately 561 results. In the fourth screening, we combined all the keywords from the first, second and third searches resulting in 137 results. The last keyword search was refined to focus on research papers from the Indian context, resulting in 93 works of literature.

All four screenings cumulatively led to 14,561 hits and were a mix of academic and non-academic publications. A considerable portion of these publications comprised industry reports, newspaper articles, blog posts and personal perspectives of the journalist from various parts of the globe, while blogs, newspaper articles, books and chapters were excluded. Conducting a search based on publishers yielded the following number of published works: Springer (10), MDPI (10), ResearchGate (7), Emerald (7), Elsevier (5), Sage (3), Wiley (3), Taylor & Francis (2), Dergipark (2), Frontiers (2), Science Direct (1) and Singapore Management University (2). Additionally, there was one publication each from Science Direct, Social Science Studies Peer Journal PPW, Academia, Amity University, Chalmers University, PBME, Rhinewest, SLJOL and University of Barcelona.

Based on their relevance to our research, we selected 13 studies out of 93 articles eliminating blogs, newspaper articles, books and chapters. The selection process involved considering the publishers and the number of citations received by each article. Table 1 lists the 13 research articles used as resources to understand consumer buying behaviour in India due to COVID-19.

Analysis of Research Articles

This segment comprehensively analyses the contributions of the 13 research articles in Table 1. The COVID-19 pandemic has compelled countries worldwide to implement mandatory measures, such as social distancing, to prevent the virus's spread. The pandemic also adversely affected India, with the Government imposing a stringent nationwide lockdown. Fear among consumers led to a shift in their behaviour, which has become the new norm since March 2020. In the subsequent sections, we will examine each of the articles individually to draw significant conclusions about the changes in consumer behaviour.

1. Patil et al. (2022) analysed the purchasing behaviour of consumers for essential supplies during the lockdown period. The authors analysed it in terms of frequency of in-store shopping, online shopping, the store visited, mode of payment, mode of travel, average trip distance and panic buying through an online survey of 730 households covering 20 states in India. The questionnaire addressed socio-economic characteristics and purchase activity before and during the lockdown.

The authors observed the effect of income on consumer buying patterns across cities. It was also observed that people made fewer trips and bought more goods than needed. During the pandemic, the neighbourhood Kirana shops performed well because consumers travelled less in vehicles or walked for lesser distances due to the lockdown. The authors identified in-store and online interruptions indicating supply chain issues during the pandemic. The study was limited in its scope as the data collection was limited to respondents who were proficient in reading and writing English and had internet access, despite being conducted across 20 states in India. Furthermore, due to some respondents leaving optional questions unanswered, there was variability in the data points across different components.

2. Anubha et al. (2022) used a convenience sample of 309 respondents during May and June 2021 to study the relationship between perceived risk, perceived scarcity and social influence, considering stockpiling as a mediating effect during the second stage of the COVID-19 pandemic. The researchers used the structural equation modelling (SEM) approach to test the research model. Only after the authors were confident that the respondents had piled up stocks and were ready to participate in the study

Table 1. List of Research Articles Selected for Review.

Sl. No.	Title	Year	Author/s	Journal	Publisher	Citations
1	Consumer responses towards essential purchases during COVID-19 pan-India lockdown	2022	Patil, G. R., Dhole, R., Bhavatharshan, B. K., Pawar, D. S., Sahu, P., & Mulani, A.	National Library of Medicine	Elsevier	4
2	Stockpiling during COVID-19: The solicitation of the stimulus-organism-response model	2022	Anubha, Narang, D., & Jain, M. K.	MDI	Sage	0
3	Impact of COVID-19 on changing consumer behaviour: Lessons from an emerging economy	2022	Das, D., Sarkar, A., & Debroy, A.	International Journal of Consumer Studies	Wiley	10
4	Impact of COVID-19 crisis on stocking and impulse buying behaviour of consumers	2021	Gupta, R., Nair, K., & Radhakrishnan, L.	International Journal of Social Economics	Emerald	27
5	COVID-19 impact on buying behaviour	2021	Verma, M., & Naveen, B. R.	Vikalpa—The Journal for Decision Makers	Sage	34
6	Impact of change in consumer behaviour and need prioritisation on retail industry in Rajasthan during the COVID-19 pandemic	2021	Goswami, S., & Chouhan, V.	Materials Today	Elsevier	28
7	A study of changing consumer behaviour of four metro cities in India	2021	Khan, M. R., Sikandar, M. A., Kazi, R., & Sikandar, A.	Materials Today	Elsevier	6
8	COVID-19 is driving fear and greed in consumer behaviour and purchase pattern	2021	Satish, K., Venkatesh, A., & Manivannan, A. S. R.	South Asian Journal of Marketing	Emerald	7
9	Impact of epidemics and pandemics on consumption pattern: evidence from COVID-19 pandemic in rural-urban India	2021	Kumar, R., & Abidin, M. S.	Asian Economics of School and Banking	Emerald	18
10	Scalability of e-commerce in the COVID-19 era	2021	Dinesh, S., & MuniRaju, Y.	International Journal of Research of Research	Granthaalayah	27
11	Consumer buying behaviour towards e-commerce during COVID-19	2020	Veeragandham, M., Patnaik, N., Tiruvaipati, R., & Guruprasad, M.	International Journal of Research in Engineering Science and Management	Rajalaxmi Education Trust	21
12	Impact Of COVID-19 pandemic on consumer behaviour	2020	Patil, B., & Patil, N.	Mukt Shabd Journal	UGC Care List	27
13	An empirical analysis into sentiments, media consumption habits, and consumer behaviour during the coronavirus (COVID-19) outbreak	2020	Chauhan, V., & Shah, M. H.	Purakala	UGC Care List	62

were they approached through online or offline modes based on their availability.

The authors observed that the consumers believed in storing an ample supply of essential products for future use, which eventually encouraged stockpiling and was positively correlated with the perceived risk of infection from COVID-19. The study also observed that consumers hoard due to perceived scarcity. The researchers also observed that consumers, with their prior experience of the first stage of the pandemic, combined with social pressure from friends, family and the media, encouraged others to stockpile because they could see the advantages of doing so. Future studies should include the benefits of stockpiling and perceived security, well-being and family safety. Also, stress, tension and guilt mediators were not considered, which should be researched.

3. Das et al. (2022) investigated how COVID-19 has impacted consumers' evolving lifestyles, including changes in affordability, heightened awareness of health and hygiene products and adaptation to new buying behaviours. The authors framed an open-ended questionnaire in three different Indian languages apart from English. It was administered to five respondents, one from Government, private, MSMEs and three entrepreneurs apart from seven daily wage earners. Rs. 100/- was offered to everyday wage earners as a motivation to participate in the study, and the responses were later transcribed in English.

After analysing responses from an open-ended questionnaire, the authors constructed a close-ended questionnaire, which was reviewed by professionals in academic and industry settings, both online and offline. The questionnaire consisted of three sections: the first part focused on the socio-demographic profile. The second section included questions about the factors influencing changes in the consumers' lifestyles and the third section contained questions about the consumers' adaptation. The questionnaire was distributed offline (in malls, popular restaurants and shops) and online (LinkedIn, WhatsApp and Facebook) between August and September 2020.

The study findings indicated that the impact of COVID-19 on affordability was more significant for consumers working in the unorganised sectors than those in the organised sector. The occupation type, employment status and family income significantly influenced consumer behaviour. Those who had lost jobs or had low family earning status showed higher health awareness. Lifestyle changes rather than affordability greatly impacted the demand for wellness and entertainment products. Consumers' understanding of health and hygiene products significantly influenced the need for such products, while affordability influenced the demand for reasonably priced alternatives for daily needs.

The study has limitations, as it was conducted during the lockdown, which would have made it very challenging to carry out the survey. Additionally, the authors could not reach out to all the varied groups, communities and cultures due to India's diversity and vast geographic size, which would have allowed them to gain more insights into consumer behaviour. Also, the study was restricted to entertainment,

health products and daily necessities. To further improve marketing strategies facing disruption, this study should be expanded to include a variety of goods.

4. Gupta et al. (2021) defined the concept using the theory of reasoned action to describe the construct of 'consumer fear due to COVID-19' and comprehend the effects it has on the stockpiling and impulse purchasing behaviour of 417 respondents. The authors selected the sample using the judgemental and convenience sampling technique, and they distributed the questionnaire to the sampled population through email and WhatsApp.

The first part of the questionnaire asked about the respondents' demographics. The second section covered the three study constructs: stocking behaviour, impulse buying behaviour and consumer fear linked to COVID. The model's conceptual validity and unidimensionality were assessed using the exploratory factor analysis and confirmatory factor analysis. SEM investigated the impact of COVID-19 on customer stocking and impulsive buying. Twenty-four respondents participated in a pre-test of the questionnaire. It was observed that the COVID-19 pandemic significantly impacted consumer behaviour, as evidenced by stocking patterns and impulsive purchases.

Future research should consider additional variables like the moderating effects of demographic traits (age, gender, education and family income), psychographic characteristics (consumer purchase behaviour in crises affecting the stocking and impulse buying behaviour), and cultural differences. It should also consider converting physical transactions to digital ones due to pandemic-related restrictions.

5. Verma et al. (2021) used partial least squares SEM to determine if the COVID-19 lockdown has changed consumer purchasing behaviour and the factors influencing purchase choices post-lockdown. The sample group was established using simple random between 30 March and 18 April 2020 and was approached online with questionnaires via email and social media platforms such as Facebook and WhatsApp. The authors gathered responses from 367 respondents.

The survey was divided into five sections capturing the demographics, economic nationalism, planned and impulsive purchases, and ethnocentric purchasing patterns. Consumers were seen to practice economic nationalism by purchasing Indian brands in the cosmetic, fashion and electronic sectors due to COVID-19. The pandemic increased the willingness of consumers to buy made-in-India brands rather than their attitude towards foreign-origin products.

6. Goswami and Chouhan (2021) studied the effects of variations in consumer behaviour due to the COVID-19 pandemic by analysing the variation in purchase and consumption patterns of 1,700 respondents in Rajasthan. The first section of the questionnaire focused on consumers' buying preferences in essential and non-essential goods. The second included a questionnaire seeking the consumers' opinions about their needs and

wants, priorities, future consumption preferences and attitudinal remarks on a 5-point Likert scale. The third section included questions about the consumer's demographic information.

The study's background included the predictors (such as consumer awareness of COVID-19, attitudes and the type of product) and outcomes (consumer behaviour, priorities and methodology changes). The authors used SEM to understand the significant link between the predictors and outcomes. The results showed decisive effects on awareness of COVID-19, attitude and behaviour and the nature of goods when shopping. Additionally, it demonstrated the link between increased social distance and lower spending, especially in the retail sector.

7. Khan et al. (2021) conducted an online survey on 183 respondents residing in four Indian cities of Mumbai, Pune, Hyderabad and Delhi during 15–31 July 2020. Based on their age and income level, city-based consumers' changes in buying behaviour towards health or hygiene products during COVID-19 were observed.

Based on the 20 respondents' feedback, the authors refined the questionnaire, reducing the questions from 31 to 21. The revised questionnaire identified three variables: health and hygiene products, learning time spent using digital devices and income reduction during the pandemic. The data showed that COVID-19 affected the purchasing decisions of city-based consumers for personal care or hygiene items and the use of digital devices, with differences based on income level and age.

Notably, the research found that the high-income group was more concerned about their health during the pandemic and spent more money purchasing health and hygiene products. This aligns with increased sales volumes of these products reported by the Indian Medicines Pharmaceuticals Corporation Ltd firm post-pandemic. Additionally, the study states that individuals in the high-income category spent more time studying online or learning new skills using screens during the pandemic conditions.

8. Satish and Manivannan (2021) studied consumer behaviour and purchase habits before and after COVID-19 through an online survey of respondents aged 18–60. The survey resulted in 1,038 correct responses, which were used for further analysis. After analysis, they concluded that consumers need to understand the value of consumption minimalism as they hoard goods out of fear of shortage, leading to a deficit for others. Lockdowns caused by situational triggers influence consumer purchasing behaviour, online purchases, cashless transactions, spending more on necessities and altering social standards such as hygiene purchases.

The study has limitations as it only examined three variables, fear, greed and anxiety, which are common during pandemics but failed to draw any practical implications from consumer experiences during the lockdown.

9. Kumar and Abdin (2021) used an email survey to investigate how COVID-19 has affected consumer purchasing behaviour in rural and urban India. The study involved 175 respondents and aimed to identify successful marketing methods for future pandemics.

The consumption pattern in India was significantly affected by the pandemic. Consumers initially resorted to panic buying and limited their spending to necessities such as food and medications. Keeping healthy during a pandemic was their top priority. The authors also observed changes in consumption habits, a decrease in spending habits other than those related to job loss, a reduction in income and a decrease in our ability to spend. Urban consumers' consumption patterns changed more than rural consumers'.

10. Dinesh and Muniraju (2021) used both primary and secondary research to understand the changes in consumer behaviour due to COVID-19 based on 195 respondents. The researchers collected preliminary data from the state of Karnataka, and the secondary data included industry reports, news articles and various websites.

The study observed that the frequency of online purchases increased during the pandemic, likely due to concerns about purchasing from physical establishments and travel restrictions. The study noted that online shopping changed the pandemic, with customers gaining access to a more comprehensive range of goods and sellers being able to reach a broader geographic region with fewer resources. The research also suggests that online retailers in India must constantly innovate, invest in infrastructure and seek profitable partnerships with local retailers.

Smaller offline retailers will need to concentrate their energy and efforts on meeting the increasing consumer demand in the 'new normal' scenario to draw customers, and offline stores will need to become wiser with the advent of innovative technology. Online businesses must continually innovate to increase existing and first-time consumers' confidence, trust and involvement. Additionally, they must ensure that the consumers' data must be protected by implementing appropriate monitoring methods to increase the confidence and trust of existing and first-time customers. The study is limited to one state and can be extended to other states in India.

11. Veeragandham et al. (2020) attempted to understand consumer purchasing behaviour in the e-commerce sector. The authors wanted to ascertain if COVID-19 affected consumers' attitudes towards online shopping, the mode of payment and their willingness to continue online shopping after the pandemic. Both primary and secondary data analysis was used in the study. The primary data included 223 respondents from Andhra Pradesh and Telangana states, including students and working professionals. The secondary data covered newspapers, journals, reports, blogs, periodicals and conference papers.

The research showed that the traditional way of buying changed to online buying, and consumers aged 18–35 started using the facility more compared to people above

55 years. A total of 46% of individuals preferred e-commerce sites because of the convenience of online shopping, the ease with which one can browse various offers and online fulfilment. In comparison, 43% of individuals still preferred e-commerce and traditional buying. As the unified payment interface, net banking and credit cards increased, 43% of individuals preferred using debit cards, whereas 31% still preferred paying in cash. To understand consumer behaviour, the authors recommend studying social classes as a variable across all the Indian states.

12. Patil et al. (2020) aimed to explore the challenges posed by COVID-19 on lifestyle and subsequent changes in consumer purchasing behaviour through a study involving 33 responses. An explanatory research design was used for the analysis. Data were collected using a convenience sampling technique and secondary sources such as research papers, periodicals, newspapers and COVID-19-related websites during the three lockdown phases between 22 and 31 March 2020. The study also examined the preventative measures adopted by consumers while purchasing essential goods during the lockdown.

The study looked at factors such as the market condition, the demand and supply for commodities, transportation, the lockdown's legal implications and the pandemic's socio-economic effects. The authors observed that consumers were ignorant and not taking enough precautions until the government-imposed restrictions. Due to shortages of vital commodities and disruptions in the supply chain, even online retailers could not accept orders. Consumers bought substitute products and stocked up on products. The authors finally observed that financial and psychological factors were impacted due to COVID-19.

13. Chauhan and Shah (2020) evaluated consumers' sentiments, behaviour and spending patterns after the first month of COVID-19. The researchers also examined how media consumption patterns have changed across genders and ages and how people use social media to remain in touch and be informed.

The study focused on respondents living in Vadodara and Gandhinagar, located in Gujarat. The authors employed a convenience sampling method and obtained responses from 353 people. The questionnaire used in the study included questions on demographic information, consumer concerns and sentiments, media consumption habits and the purchasing behaviour of Indian consumers. The authors observed a paradigm shift in online and offline purchasing where hygiene products have become essentials, and other sectors like apparel have become discretionary. Significant changes in media consumption were observed as the need for social distancing, the demand for work from home, schools struggling to conduct classes and disrupting daily routines increased. With consumers confined to their home usage of mobile applications, social media such as WhatsApp, Facebook, YouTube and Instagram were used to connect with friends and families.

Consumer shopping behaviour changed during the pandemic, with individuals delaying the purchase of non-essential goods and services. Product shortages at

stores led consumers to compromise on preferred brands and engage in stock-up behaviours in anticipation of a potential lockdown extension. The study also observed a decrease in in-store and online purchases as consumers already had a stockpile of essential items and groceries due to panic. Furthermore, many people preferred buying online, likely due to an increased perceived risk of infection with in-store purchases.

Although consumers shifted towards social media sites and digital channels for purchasing products and services during the pandemic, this shift did not make up for the overall spending on essentials. However, the study observed a decrease in discretionary spending. It was observed that the change in consumption patterns and consumer behaviour was because of considerably diminished purchasing power in the hands of the consumer. The study was confined to two cities of Gujarat and hence cannot be generalised; future studies can be extended to include towns and cities in India.

Conclusions and Scope for Future Research

Based on the literature review, several conclusions can be drawn regarding the impact of the COVID-19 pandemic on Indian consumer behaviour over the last 3 years. The study found that different stages of the pandemic resulted in varying consequences.

During the first wave of the pandemic, between March and November 2020, consumers resorted to panic buying necessary goods, including groceries, health, hygiene and medical products, and resorted to enhanced online shopping. The second wave of the pandemic, from March to May 2021, saw an increased loss of lives and a significant increase in demand for medical supplies, with a growing trend towards digital payments and reduced spending on non-essential items.

The third wave between October 2021 and March 2022 saw consumer spending more on PPE Kits and vaccination-related items. The period also saw a significant increase in contactless delivery, leading to the growth of e-commerce. Factors such as changes in income, employment status and shift in consumer attitudes and preferences could have influenced consumer buying behaviour in India.

- An increase in online shopping is a possible consequence of the pandemic on consumer behaviour in India. With physical distancing measures and many brick-and-mortar stores closed or operating at reduced capacity, consumers may have used e-commerce platforms to make their purchases. This shift towards online shopping may have been further encouraged by the availability of home delivery options and contactless payment methods.
- The COVID-19 pandemic could have affected consumer attitudes and preferences in India, leading to potential changes in their buying behaviour. For instance, there might have been a greater emphasis on health and wellness, resulting in increased demand for products and

services that promote these objectives. Likewise, there may have been a move towards more sustainable and ethical consumption as consumers become more conscious of their purchases' environmental and social implications.

- Businesses in India have had to adapt to these changes in consumer behaviour to remain competitive. It may have included offering more online and home delivery options, promoting their products' health and wellness benefits and demonstrating a commitment to sustainability and ethical practices.

The COVID-19 pandemic is expected to have a notable effect on the purchasing habits of consumers in India. Consequently, businesses have had to adapt to meet their customers' evolving demands and inclinations. After reviewing the literature, the authors concluded that there is still plenty to learn about COVID-19. Although research has been done to study the effects during and after the pandemic, we have yet to fully comprehend its impact on India's public health and mental health as well as its political, economic, sociological, technological, legal and environmental aspects. We must remember that India is a vast and diverse nation and that regional variations in consumer behaviour during and after the pandemic may exist. The cross-cultural comparison of consumer behaviour across regions should be the main focus of future research.

Consumers of all ages adopted more sustainable consumer behaviours throughout the pandemic, raising awareness of sustainable consumption and production. Future studies could examine how Gen Z consumer attitudes towards sustainability have changed during the last 3 years and investigate the factors that affect sustainable behaviour based on emotions, government policies and technology adoption. What are the potential strategies for leveraging Gen Z users to promote sustainable consumption, and what factors influence their willingness to pay more for sustainable products?

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