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The readership for this journal includes academics, researchers, professionals, and executives engaged in business and retailing.

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Articles

Outperforming managers in setting strategic targets by using a novel Computer-Aided Management (CAM) approach

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Abstract
The minimal availability of scientific literature suggests that managers hardly consider internal organizational consequences as organizational Alignment, implementation effort, and Capacity to change when setting strategic targets. This study bridges this gap in the literature by employing a self-developed algorithm that assists managers by focusing on consequences that would make the target's implementation nearly impossible. In our study: too little organizational alignment, setting too ambitious targets, and insufficient capacity to change. We first quantified how 3,300 managers in 500+ organizations set targets by themselves in terms of these three consequences. We defined this group as Classical Management (CM). Then, in the second batch of 1,000 managers in 90 organizations, we provided our algorithm that quantified their targets' internal consequences. We defined this group as Computer-Aided Management (CAM). Our finding is that comparing two target-setting approaches (CM versus CAM) indicated that the latter chose targets with a "consequence score" six times better than the former. Our recommendation: in an organizational transformation, ask as many employees and managers as possible and let an algorithm upgrade their input to refine the decision-making process.

Introduction

The application of artificial intelligence for strategic management purposes seems to be near, at least from a conceptual perspective ("Robo-advisors," according to Davenport et al., 2018). Yet, the minimal availability of scientific literature seems to indicate that managers in practice hardly consider the internal organizational consequences of strategic target-setting like organizational Alignment about the target, the Effort to implement the target, and whether the organization has adequate Capacity to change. Let alone; they apply artificial intelligence to support strategic decision making in such a way. In this paper, we focus on how artificial intelligence can help to address these three consequences that otherwise would make a strategic target's implementation very challenging, not to say nearly impossible. We work according to Bayesian probability: will a large sample of organizations be a bellwether for any next organization. In other words, we use a benchmark to come to specific probabilities. Bayesian probability theory provides a mathematical framework for inference or reasoning using probability. Many scientific researchers successfully employed the Bayesian probability theory (Olshausen, 2004).

Organizational Alignment

Research concerning horizontal Alignment is considerably lacking, and studies available at the time were focused merely on two areas. In their literature review, Kathuria et al. (2007) found a significant imbalance between vertical and horizontal Alignment in organizations. Their forecast and suggestion pointed to the increasing importance of horizontal Alignment in firms, and therefore multi-point research should continue to grow in this direction. Alagaraja and Shuck (2015) explored the link between organizational Alignment and employee engagement and further emphasized the connection between the two and their facilitating influence on individual performance. Self et al. (2015) emphasizes knowledge

management at the employee level within the scope of organizational Alignment. Effective knowledge management bolsters strategic thinking and contributes to practices that positively affect organizational Alignment. In response to the inference that strategic Alignment improves organizational performance, Ilmudeen et al. (2019) used IT and business sectors data. They found this relationship remained accurate overall but varied by sector orientation. For instance, quality-oriented strategic Alignment showed a positive relationship to all performance measures, while marketing-oriented strategic Alignment showed "an insignificant relationship with operational excellence." Therefore, the study suggests that dimensional strategies are better than whole or single strategies and allow management to focus on individual alignment scopes.

As horizontal organizational management becomes more common, we'd like to further explore goal clarity and team performance. Van der Hoek et al. (2018) demonstrate that goal clarity positively affects team performance but is not facilitated by teamwork, promoting further research in this area. In a study of 71 teams in five different banks, Hu and Liden (2011) concluded that goal and process clarity on the team level contribute positively to team performance. This positive relationship is even stronger with the use of servant leadership. In a study covering nearly 1700 employees in 45 different geographic areas, Hassan (2013) concluded that higher levels of role clarity contribute to increased employee satisfaction rates and, in turn, lower turnover rates.

The Effort to implement and Capacity to change

Through an analysis of "stretch goals" – goals that seem impossible to reach – Sitkin et al. (2011) sought to assess which organizations would benefit the most from pursuing stretch goals and concluded that "stretch goals are, paradoxically, most seductive for organizations that can least afford the risks associated with them." Along with the typical challenges such as technological and structural, Palthe (2014) stresses the importance of whether people want to change or have to change when addressing effective organizational change processes. Using regression analysis and correlation tests, Ramezan et al. (2013) confirmed the significant positive relationship between organizational change capacity and organizational performance. In their study on organizational change capacity, Kircovali and Cemberci (2020) show that it consists of three dimensions: context, process, and learning. Contrary to other previous studies in the field, Kircovali and Cemberci emphasize that individual evaluation of each dimension is essential rather than using a mean value in assessments. This study developed a new approach to set strategic targets that takes internal organizational consequences as organizational Alignment, Effort to implement, and Capacity to change (Van de Poll, 2018) into account. Towards this aim, we designed a new methodology to model aspects of strategic decision-making into a generically applicable calculation rule. This new technique involves strategic decision-making by using large numbers of employees.

A Guttman-Poll scale (van de Poll, 2018), an upgraded version of the widely employed Guttmann scale, was employed to quantify the consequences objectively. The developed model is based on the input from large numbers of employees to support an organization's upper management, where the employees become the 'eyes and ears' of upper management. The algorithm helped improve the quality of targets set by the managers considerably. The details of the model are omitted in this paper to conserve space. Readers should refer to Van de Poll (2018) for more information.

Methodology
Procedure and participants

We deemed a comparison of the *content* of the strategic targets out of scope. Such an analysis would make it very difficult to compare organizations on a scale: after all, every strategic situation is different. We also decided not to consider the topics about which there would be internal (mis-) alignment, for which topics there would be overstretched goals, and for which topics there would be too little Capacity to change. We decided we would entirely focus on the *level* – rather than the content – of (1.) organizational Alignment, (2.) the Effort to implement, and (3.) the Capacity to change. We could not look up how well an organization was doing about these three consequences in the corporate data warehouse: we had to ask people. We first designed an extensive survey based on the Guttman scale (Stauffer et al., 1950) to quantify these consequences objectively but then upgraded for employee polling (Guttman-Poll). We researched how 3,362 managers in 441 organizations set targets by themselves. This first group set

targets without the help of our algorithm. We defined this group as "Classical Management (CM)." We obtained 12,253,476 answers from 112,548 employees. Then, we researched another 1,041 managers in 91 different organizations. Here, we had 42,826 employees, providing 3,710,476 answers. This second group set targets with the help of our algorithm. We defined this group as "Computer-Aided Management (CAM)." The employee polls were executed to gather the respondents' input first for the CM-organizations, and then the CAM-organizations and took place from 2015 to 2021.

We added to each of the CAM-polls a maturity model with five maturity levels showing how to improve on the questions in the questionnaire sequentially. Additionally, the algorithm calculated the organizational consequences in terms of Alignment, Effort, and Capacity of setting each of the five maturity levels as the improvement target. Then, we compared the consequences of the targets set by the CM group's managers with those of the CAM group managers. Asking as many employees as were available in these organizations, this wisdom of the crowd offered the second group much more data on which to base their decisions. Aggregated views from large numbers of individuals have proven to outperform financial market models and models in other areas like project management (Surowiecki, 2005; Giles, 2005). Table 1 gives an overview of these two groups.

Measures

We employed an improved version of the widely used Gutmann scale to objectively quantify the level of Alignment, Effort, and Capacity to change (van de Poll, 2021). This improvement technique asks employees about verifiable facts and -behavior, taps actual situation and the employees' ambition, caters

Table 1
Sample size

	N	Min	Max	Avg.	StDev.
Human (CM)					
Number of questionnaires	441				
Number of teams	3,362				
Number of employees	112,548				
Answers given	12,253,476				
Teams per questionnaire		1	80	7.6	9.7
Number of employees per team		5	835	33.5	67.7
Number of questions per questionnaire		9	234	54.3	29.2
Human + algorithm (CAM)					
Number of questionnaires	91				
Number of teams	1,041				
Number of employees	42,826				
Answers given	3,710,778				
Teams per questionnaire		1	92	11.4	16.9
Number of employees per team		5	992	41.1	92.3
Number of questions per questionnaire		8	92	40.9	13.1
Total database					
Number of questionnaires	532				
Number of teams	4,403				
Number of employees	155,374				
Answers given	15,964,254				

Min.: lowest value. Max: highest value. Avg: average value. StDev: standard deviation.

to target setting, and provides additional managerial insights into, e.g., organizational Alignment and knowledge sharing. Here is an example of the Gutman-Poll format:

Q. How have you defined your team objectives?   Now   In 6 months
   1. We have no team objectives (yet)   ☐   ☐
   2. We have a qualitative description   ☐   ☐
   3. We have formal, SMART key performance indicators. ☐   ☐

Contrary to the original Guttman scaling, which works with current-status data (a term used by Diamond, McDonald, and Shah, 1986), we included a time dimension in the analysis. For example, the team might not have team objectives right now, but they might have in 6 months. The answers in the example above can be considered 'objectively real' (Ahrens & Chapman, 2006). To reduce interpretation bias, we forewent adjectives and adverbs that couldn't be verified (e.g., "good"). And we added "proof-words" like, e.g., 'periodically,' 'formally,' and 'documented,' to reduce self-reporting bias (discussed by Donaldson and Grans-Vallone, 2002). Objective and verifiable multiple-choice answers helped prevent employees from adding an emotional or cognitive meaning (Frese & Zapf, 1988). We then applied Levene's test (Levene, 1960) to test the homogeneity of variance across groups within the dataset. Levene's test is less sensitive than the Bartlett test to depart from normality. In this study, we failed to reject the null hypothesis (that the group variances are equal) since the value of Levene's test statistic (P=0.37) is less than the critical value (α=0.05).

Data analysis

Clustering is an essential tool in the literature to classify the data. The K-Means clustering is the simplest and most common clustering method that can group large amounts of data with relatively fast and efficient computation time, which is the case in this study (Bain et al., 2016). Table 2 shows which dimensions we used to cluster organizations for the three consequences.

Table 2
Consequences of a target: definitions

Measurement	Calculation
Organizational alignment	
1a. Alignment within the team	Dendrogram about the "In 6 months"-score
1b. Team alignment with the management target	Dendrogram between respondents and target
Effort	
2a. Relative amount of improvements	% respondent-questions to improve
2b. Division of improvements	Effort for top-¼ vs. for bottom-¼ improvers
Capacity to change	
3a. Time freed up by stopping non-priorities	% non-priorities versus % priorities
3b. Share knowledge & stop reinventing the wheel	% respondents that can share knowledge

For organizational Alignment, we used a dendrogram (cluster analysis) to measure to what extent employees differed in their outlook concerning their "In 6 months"-answers. The same dendrogram contained the management target to measure the Alignment (distance) between the individual respondents and this target. For each of these axes (1a and 1b in Table 2), we calculated where to divide the axes in a "low" and a "high" value, resulting in four quadrants. Here, the preferable consequence of organizational Alignment would be employees agreeing among themselves and with the target (van de Poll. 2018). We analyzed the "Effort to implement" using a similar construction. Two axes resulted in four quadrants, with each quadrant a consequence score (most to least favorable). Here, we looked at the percentage of (the number of respondents * the number of questions) that had to be improved. And we looked to what extent this 'burden of change' was equally divided over the respondents. For the "Capacity to change," we did not ask employees about their competencies and experience with change.

Instead, we created two 'proxy' dimensions. We calculated how the amount of work indicated by the management target would be higher or lower than the ambition the employees had set for themselves (comparing the "Now"- and "In 6 months"-scores). A lower amount of work than planned by respondents would free-up time by not spending any capacity on non-priorities. The other dimension was the % of respondents already scoring close enough to the target (with their "Now"-scores) that they could be considered an extra force to help with the implementation. Again, these two axes resulted in four quadrants. We deliberately "dumbed down" our clusters into four quadrants for each of the three aspects (Alignment, Effort, Capacity) in order not to overwhelm managers with an incomprehensible range of consequences. Already, with three 2×2 quadrants, there were 64 (4^3) possible consequence combinations from which to choose.

Results

Table 3 summarizes the results of the two groups.

Table 3
Comparing two target setting approaches

Measurement	Human (CM)	Human +Alg. (CAM)	Factor
Team scores containing:			
Any score '1' (negative)	74%	26%	3
Any scores '1' or '2' (negative)	95%	47%	2
Perfect score (12 out 12, positive)	2%	65%	33
Overall "consequence score"			
Average per team	7.3	9.9	
Teams scoring a "consequence score" of:			
Score = 3	100%	100%	1
Score = 4	99%	100%	1
Score = 5	91%	100%	1
Score = 6	82%	98%	1
Score = 7	68%	96%	1
Score = 8	49%	93%	2
Score = 9	34%	81%	2
Score = 10	**11%**	**61%**	**6**
Score = 11	4%	44%	11
Score = 12	2%	19%	10

Human +Alg.: an upper manager/management team aided by our algorithm

We calculated per team and maturity level a "consequence score." For each consequence (Alignment, Effort, capacity), the score ranged from "1" (being in the worst quadrant) to "4" (being in the best quadrant). Consequently, the overall score started at "3" (1+1+1) if a target reached the worst possible quadrant for each of the three consequences. The maximum score was "12" (4+4+4) when a target landed everywhere in the most favorable quadrant. For example, Table 3 shows that 74% of the targets contained the worst score for one or more of the three consequences with just the manager setting the target. In 95% of teams, there were one or more "1"- and "2"-scores. Only 2% of the teams chose a 'perfect score' (the target ended three times in the best quadrant). Adding the algorithm changed the quality of the selected targets considerably. First, the maturity levels added variety and immediately gave managers something they could choose from. Only 26% of the targets (five different maturity levels for each team) contained one or more "1"-scores. Similarly, any scores '1' or '2' (negative) dropped from 95% to 47%. More importantly, 65% of the teams had a target/maturity level to choose from that had a perfect consequence score. Clearly, with just the managers setting the target (the CM group), the selected target was purely

based on 'external considerations' (e.g., market forces or technological developments). However, with the aid of the development algorithm (by obtaining employee input), the CAM group set much smarter targets. We postulate that a "consequence score" of 10 or higher is a sensible choice regarding Alignment, Effort, and Capacity to change. In 11% of the CM teams, managers selected a target with a consequence score of 10 or higher while it increased to 61% for managers in the CAM group, almost a six-fold increase. With the algorithm's aid, the average consequence score improved from 7.3 to 9.9 (on a scale from 3 to 12). This score of 9.9 is almost the consequence score of 10 or higher we deemed a requirement. We have visualized the percentage of teams scoring a specific consequence score in Figure 1.

The bottom half of Table 3 (the column "Manager + Alg.") shows managers do not set targets *solely* based on our consequence score. We infer that the consequence score alone was not the only deciding factor for managers to choose a target: the content of the improvement target was a factor as well. In that latter case, we would see 65% of teams choosing the maturity level with the perfect consequence score; in reality, this happened only in 19% of the teams. We found that CAM consistently produces smarter improvement targets with more manageable organizational consequences compared to CM. Fig. 1 compares the performances of CM and CAM methodologies.
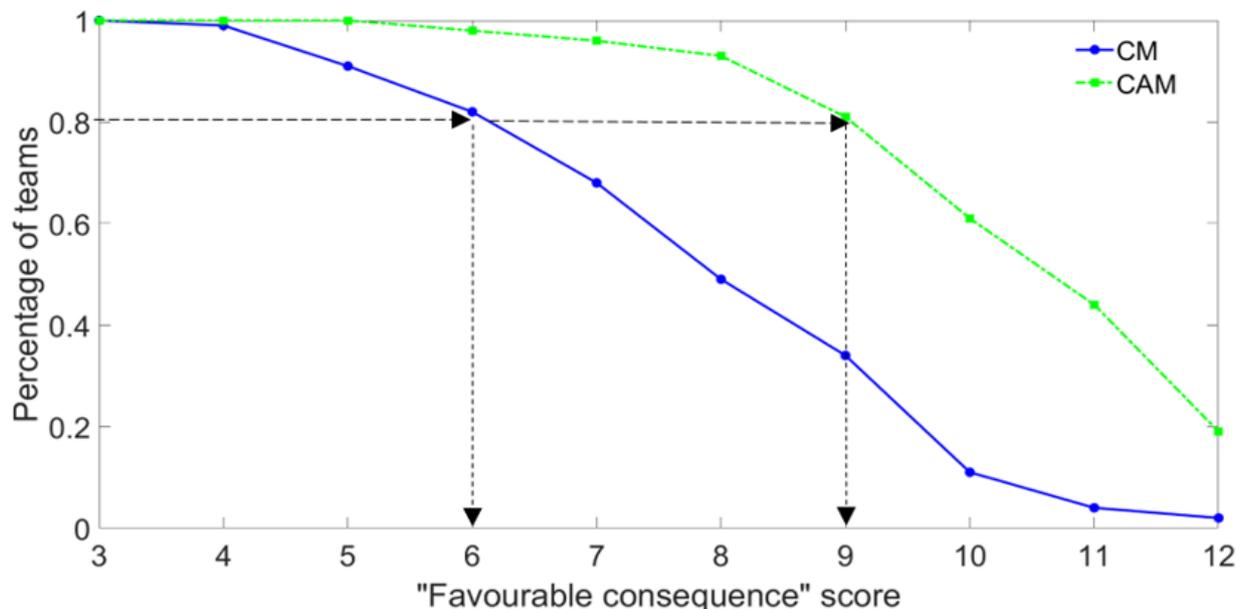
Figure 1. Comparing two target setting approaches

The difference between the two approaches increases slowly initially (around Favorable consequence score 4), but the gains increase rapidly. For example, 80% of teams produced a score of 6 with CM. However, it increased to a score of 9 with CAM. Based on the results of this research, CAM appears to be a promising technique for setting strategic targets in organizations and contributing to the Robo-advisers the Hard Business Review referred to Davenport et al. (2018).

Discussion

Organizational transformations usually determine whether an organization will thrive or not survive. Then, the quality of target setting is paramount. The wisdom of the crowd in combination with artificial intelligence improved our "consequence score" almost an order of magnitude. Not 6% or 60%, but 600%. This percentage could be even higher, but managers also opted for targets that made business sense: our "consequence score" was not the only deciding factor.

It was not possible to compare the effects of a CM and a CAM target in the *same* organization. There wasn't a board of directors that wanted to forego smarter targets for a part of their organization, just to hand us an A/B test in the name of science. Additionally, we understand that Alignment, Effort, and Capacity to change - though of great importance – aren't the only factors that determine a successful target setting. We also realize that our three factors purely look at the consequences for the workload of

those who have to implement the transformation. We did not factor in aspects like, e.g., financial consequences or technological implications.

Limitations and future research

Even just focusing on the target's workload for the organization, some cautionary remarks are to be made about our research. In Alignment, we calculate with the ambition of the respondents (Table 2, item 1a). But the plan or intention to improve something does not mean employees will start everything they plan to improve. The literature about *goal* clarity, as referenced in the introduction, does not automatically imply *roadmap* clarity on how to reach that goal.

In Effort, we calculate the improvement workload among the employees (Table 2, item 2b). Literature on "stretched goals" usually focuses on the organization as a whole, not on those parts that undoubtedly will be *over*stretched.

In terms of Capacity, we limit that Capacity to change to non-priorities and knowledge sharing (Table 2, items 3a and 3b). As such, our approach is a proxy of Capacity to change at best: basic parameters as the competencies of employees or the available technology haven't been factored in. Future research will help find generally applicable ways to integrate such parameters and create even more positive "consequence scores."

Conclusions

Managers hardly consider the internal organizational consequences when setting strategic targets. This study presents a new technique integrating the classical management (CM) approach with computer-aided management (CAM). We observed that CAM shows 65% of the teams with an alternative target featuring the most favorable consequences (12 out of 12). When managers develop an improvement target themselves (CM), only 2% of the targets qualify for "most favorable" consequences. This percentage indicates that the managers in the second group (CAM) factored in both the external factors and the internal consequences. We are confident we can break to the "10 times better" threshold in future studies by further refining our algorithm. We want to highlight that our definition of organizational Alignment, Effort to implement, and Capacity to change is a workable proxy, not an entirely theoretically underpinned approach covering all aspects of these three consequences. More research is needed to develop more refined definitions that hold their ground in organizations' daily practice.

Acknowledgement

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The role of knowledge management capabilities in the performance of Botswana water utilities corporation

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Abstract

The research article provides an insight into the role of knowledge management capabilities in the performance of Botswana Water Utilities Corporation. In this research paper, organizational performance is measured under the following: - (a) Quality of service (b) Employee attraction and retention (c) Customer satisfaction. The researchers used mixed methods in investigating the research problem which revolves around the role of knowledge management capabilities and the performance of the organization. The research findings confirm that the recognition of knowledge management capabilities if well managed and utilized will increase the organizational performance in respect of quality of service, employee attraction and retention, and customer satisfaction. The research went further to discuss current challenges facing the organization and in the same vein offered possible solutions on how to minimize the identified challenges.

Introduction

1.1 Background

In recent times, there is a general dictum among the public that water is the most valuable and fastest depleting natural resource and that it is indispensable in every facet of life. The view has contributed greatly to the current streams of research on water management (e.g., Guvernator and Landaeta, 2020; Chiu and Chen, 2016; Donate and Pablo, 2014). It is in this perspective that this research attempts to explore the role of knowledge management capabilities (KMC) in the performance of Botswana Water Utilities Corporation (WUC).

In general terms, water is required in food production, sanitation, drinking, electricity generation and for industrial use. The need to achieve universal water security is reflected in the United Nations (UN)'s sixth Sustainable Development Goal (SDG). The Goal aims to "Ensure availability and sustainable management of water and sanitation for all" by 2030 in a report by the United Nation (UN, 2020). The report indicated that, as of 2017, 2.2 billion people lacked safely managed drinking water while 4.2 billion (more than 50% of the world population) lacked safely managed sanitation and that water scarcity is threatening to displace 700 million people by 2030 (UN, 2020). In the UN report, it was reported that 3 billion people (approximately 38% of the world population) lacked basic hand washing facilities at home. The statistics echo the urgent need for water service providers to efficiently and sustainably manage the water provisioning and sanitation services as well as for consumers to use water sustainably.

According to UN (2020) and Mvulirwenande et al. (2016), water operators in developing countries face serious performance challenges which lead to poor service delivery. These challenges include low levels of service coverage, financial constraints, high rates of non-revenue water (NRW), intermittent supplies, poor water quality, governance problems, and lack of appropriate knowledge as well as capacities. Globally, some developing countries experience funding gaps of approximately 61% which hinder them from reaching their water and sanitation targets (UN, 2020). Sandelin, Hukka and Katko (2019) observed that water utilities operators need to manage their knowledge assets in order to be

efficient and sustainably perform at their optimum level. According to Bratianu and Orzea (2010:42), KM comprises of "initiatives, processes and strategies and system that sustain and enhance the creation, storage, analysis, sharing and reuse of knowledge". Muthuveloo, Shanmugam and Teoh (2017) affirmed the view and stated that, KM is increasingly becoming a source of competitive advantage for organizations by assisting firms to reach optimum operational efficiency levels.

Over the years, intergovernmental organizations and non-governmental organizations (NGOs) have spearheaded global efforts to assist water sectors in developing countries to combat some of the aforementioned challenges. In March 2017, the World Bank approved a $145.5 million loan to Botswana for the Emergency Water Security and Efficiency Project (World Bank, 2017). The aim of the Project was to "improve the availability of water supply in drought vulnerable areas, strengthen wastewater management in selected systems and improve the operational efficiency of the Water Utilities Corporation". Furthermore, Nyandoro (2018) argued that the key reason for water supply challenges in Botswana is persistent drought. The observation is supported by the 33 years data from 1980 to 2013 which reveals that, approximately 18 of these years were drought years (Nyandoro, 2018). During the drought years, dam levels dropped significantly, thus, affecting the water supply of the country.

In the 2015-2016 drought year, water supply challenges were attributed to El-Nino related occurrences. As a result, the overall dam levels dropped below a fifth of their capacity and ground water sources in several water supply catchment areas either dried up or became saline (World Bank, 2017). It can be argued that drought is a natural disaster that challenged water supplies and cannot be attributed to inefficiencies in water operations. However, Nyandoro, (2018) argues that KM was lacking in the management of water operations in a country that is prone to drought. Furthermore, other contributing factors such as institutional overlap in implementing water policy, misleading cultural interpretations about water, high rates of water losses and wastages, escalating demand driven by a growing population, *inter alia*, can be attributed to Knowledge Management (KM) rather than solely on natural disasters.

Therefore, this study intends to explore the Knowledge Management Capability (KMC) problems affecting the Botswana water sector as argued by Setlhogile and Harvey (2015:2); they observed that, "there is a great deal of ignorance about the state of water resources in Botswana compounded by shortages of scientific data and ineffective monitoring". Nyandoro (2018) affirmed that, the lack of KMC and strategies in Botswana's water sector as well as research in KM maybe a greater threat to the country's water section than the occurrence of natural disasters such as droughts and changes in climate. In another study, Nyandoro (2018) proposed the establishment of a research think tank that should focus on generating knowledge on strategic natural resources such as water.

Nyandoro (2018) further argued that "knowledge generation and skills capacity of institutions that deal with water should be developed with a long-term focus" through events such as annual symposiums or conventions on water. Such platforms may offer the Botswana water sector and its stakeholders an opportunity to learn new management and innovative practices; analyse and review alternative policy responses in order to understand how water sectors in countries with similar climatic conditions as Botswana are managed. Several studies on KM have shown that KM has a positive impact on the performance of organizations (Abusweilem and Abualoush, 2019; Muthuveloo et al., 2017; Chiu and Chen, 2016).

As a result, there is growing interest in KM in the water sector of Botswana. Sayyadi (2019) and Sadeghi and Rad (2017) found that knowledge-based firms in advanced economies who have incorporated KM principles in their operations are more effective and profitable compared to those that have not incorporated knowledge management practices in their operations. Donate and De Pablo (2014) explained that the knowledge-based view of the firm (KBV) postulates that knowledge (specifically innovative knowledge) is what a company requires to outperform its competitors in a particular industry. The theory considers a firm to be a "distributed knowledge system" composed of knowledge holding employees and the firm's role is to coordinate the work of those knowledge holding employees to create knowledge and value for the firm (Donate and De Pablo, 2014:364).

In light of the above discussion, this paper attempts to explore the role of KMC on the performance of the Water Utilities Corporation (WUC) of Botswana. In this research paper, organization performance

shall be measured under the following (a) quality of service, (b) employee attraction, (c) customer satisfaction, and (d) employee retention.

1.2 Problem statement

Botswana is faced with serious water challenges which threaten the socio-economic development of the country. The country is challenged by the limited supply of water in the phase of increasing water demand. With respect to supply, the country is considered to be a drought-endemic country and receives variable and low average annual rainfall of approximately 450 mm (Nyandoro, 2013). During drought years, dam levels drop significantly thus affecting the water supply of the country. Moreover, on the demand side, due to Botswana's growing economy and infrastructural development, the national demand for water continues to grow at an increased pace (WUC, 2020). Setlhogile and Harvey (2015) explain that the country's population increase, economic growth and improved living standards have increased water demand and consumption, putting pressure on available water resources.

Acute water shortages are mostly experienced in the areas of Masunga, Ghanzi, Tsabong, Tswapong South, Gumare, Goodhope Cluster, Mmathethe, Lotlhakane East, Hukuntsi and Molepolole, with short-term mitigations implemented through water bowsing (WUC, 2020). In recognition of the severity of the water situation in Botswana, in 2017, the World Bank approved a $145.5 million loan to Botswana for the Emergency Water Security and Efficiency Project (World Bank, 2017). The funds were earmarked for improving water supply in drought-prone communities, strengthening wastewater management in selected systems and improving the operational efficiency of the WUC.

The Corporation is heavily dependent on groundwater to meet its customers' demand. According to WUC (2018), groundwater accounts for about 60% of total water supply in Botswana. However, WUC continues to face challenges in groundwater due to natural factors such as high salinity, low rates of replenishment due to low rainfall and the deep-seated nature of the country's aquifers (WUC, 2018). Other challenges facing groundwater resources are old borehole infrastructure and high leakages, vandalism and theft of equipment, illegal abstraction, and uncoordinated developments in the well fields leading to groundwater pollution and over-abstraction (WUC, 2018). Other challenges such as declining borehole water levels and high leakages due to dilapidated infrastructure continue to pose a challenge (WUC, 2018).

As pointed out earlier, besides the aforementioned supply and demand factors, there are also KM related factors that are exacerbating the country's water supply challenges. Unlike drought and the adverse climatic conditions which are beyond human control, KM related factors can be controlled. The KM issues identified by WUC (2020), Nyandoro (2018) and United Nations Development Programme (2012), among others, include a lack of expert skills, poor management of human resources, and lack of adaptive strategy for managing knowledge. For instance, the 2015 Botswana Water Accounts Report submitted that system water losses averaged 19–26% which was approximated at US$1.01 million (Centre for Applied Research and Department of Water Affairs, 2015). According to the World Bank (2017), WUC's NRW increased from about 11% of production in 2008 to about 40% in 2017. Poor maintenance of existing infrastructure was identified as the chief contributing factor to water losses (Centre for Applied Research and Department of Water Affairs, 2015). The costly water losses are highly likely linked to the above-mentioned KM problems at the WUC, and this highlights the need for KM strategy in the water sector of Botswana.

The significance of KM in the water sector is further pointed out by Guvernator and Landaeta (2020) and Sandelin et al. (2019) who emphasised the need to guard against knowledge drain. The researchers explained that the operational workforce of municipal utility organizations has developed throughout the years a technical knowledge base related to the operation, troubleshooting, and maintenance of water systems. When this operational workforce leaves the organization due to retirement, death, chronic illness or transfers, the knowledge capabilities of the water utility organization are negatively affected thereby putting its sustainability at great risk (Guvernator and Landaeta, 2020). It then becomes important for organizations such as WUC to have an effective KM strategy to ensure knowledge retention and that knowledge is successfully transferred to the younger generation joining the workforce of the water utility.

Knowledge is a key resource to organizations as it is the foundation for executing tasks and learning. Therefore, water utility organizations require a suitably knowledgeable workforce to oversee their daily

operations and maintenance in order to provide continuous reliable service 24 hours for each of the 365 days in a year. It is in light of the above issues that this research attempts to examine and develop a conceptual framework that would promote KM for WUC in order to achieve a better organizational performance. The promotion of KM at WUC and in the water sector in general will be instrumental in helping the country to find the path to long term water security.
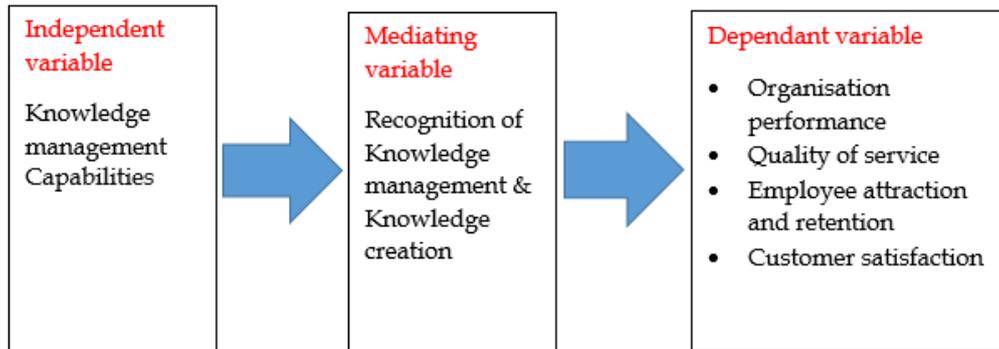
Figure 1: Proposed conceptual framework for the study:

In terms of the above problem statement, the proposed conceptual framework to be investigated in this research paper is illustrated in Figure 1 in respect of the independent, dependent and possible intervening variable.

1.3 Objectives of the study
The objectives of this study are as follows:

To investigate and analyse how the implementation of KMC can promote the general performance of WUC.

To investigate the relationship between KMC and the quality of customer service.

To investigate the relationship between KMC and employee attraction.

To investigate the relationship between KMC and customer levels of satisfaction.

To examine the relationship between KMC and employee retention.

To examine the influence of the Recognition of KM and Knowledge Creation as intervening variable on the performance of WUC.

To provide recommendations to Botswana's WUC on how they can leverage KMC to enhance organizational performance.

1.4 Research questions
The research questions are aligned to the following research objectives as follows:

How does KMC promote the general performance of WUC?

Does the implementation of KMC enhance customer level of satisfaction?

In what ways does KMC influence employee retention?

How does KMC influence the quality of customer service?

How does the recognition of KMC influence Knowledge creation and the performance of WUC?

The rest of this paper is organised as follows: Section 2 of this paper provides a brief review of relevant literature; Section 3 discusses the research methodology; Section 4 presents the research findings; Section 5 analyses the research findings; and Section 6 points out the limitations of the study and also suggests directions of related future studies.

Literature Review
2.1 Knowledge management capabilities
Knowledge management capabilities is a concept pioneered by Gold, Malhotra and Segars (2001) who proposed that it is made up of knowledge infrastructure capabilities (KIC) and knowledge process capabilities (KPC). Knowledge infrastructure capabilities can be measured through an organization structural infrastructure (physical layout and organization hierarchy), technical infrastructure (e.g.,

information technology, business intelligence, distributed learning) and cultural infrastructure (set of values, beliefs, behaviours, and symbols) (Gold et al., 2001). The three constructs of KIC affect knowledge management in an organization (Chiu and Chen, 2016). Knowledge process capabilities consists of organizational capabilities that manipulate knowledge stored in the form of standard operating procedures and routines throughout the organization (Gold et al., 2001). It is made up of four stages, namely acquisition (creating new knowledge using existing knowledge), transformation (conversion of knowledge from different forms for profitable utilisation within the organization), application (storage, retrieval, application, contribution and sharing of knowledge), and protection (preventing illegal or inappropriate use or theft of organizational knowledge) (Chiu and Chen, 2016; Gold et al., 2001). Similar to KIC, KPC also influences an organization's ability to effectively initiate and maintain programs of KM. Gold et al. (2001) empirically showed that infrastructural and process capabilities are prerequisites for effective knowledge management which in turn contributes to organizational effectiveness (or performance). The aforementioned KMC definition by Gold et al. (2001) is followed in this study.

2.2. Knowledge creation

Knowledge creation is one of the four mainly recognised KM practices which include knowledge storage, knowledge application and knowledge transfer (Abusweilem and Abualoush, 2019; Donate and Pablo, 2014; Zack, McKeen and Singh, 2009). According to Alavi and Leidner (2001), knowledge creation involves developing new knowledge content or replacing existing content in the organization's explicit or tacit knowledge pool. Abusweilem and Abualoush (2019) state that knowledge creation includes all processes through which the organization seeks to produce and acquire knowledge, whether it is between implicit knowledge and explicit knowledge. Nonaka and Toyama (2007) postulate that knowledge generation includes four processes, namely socialisation, externalisation, combination and internalisation; thus, making up what is famously known as the SECI model. Socialisation refers to the conversion of implicit knowledge to a new implicit knowledge while externalisation represents the transformation of implicit knowledge into explicit knowledge. Combination is a process of creating new network structures of explicit knowledge by integrating pieces of explicit knowledge into new integral structures. Internalisation is the process of embodying explicit knowledge as tacit knowledge (Nonaka and Toyama, 2007). This study focuses on knowledge creation since it is the first step in KM. It will be used as indication of the recognition by organizations that KM is important in performance.

2.3 Organizational performance

According to Zack et al. (2009), today's dynamic and highly competitive business environment has left businesses with no option but to focus on organizational performance so as to ensure competitiveness and sustainability. In one way or the other, organizational performance provides a reflection of the way an organization exploits its tangible and intangible resources to achieve its goals. Abusweilem and Abualoush (2019), Sayyadi (2019), Muthuveloo et al. (2017) explained that organizational performance comprises of both financial and non-financial performances; where the former refers to tangible or the monetary benefits such as the return of investment, revenue, and profit margins, while the latter refers to elements such as customer satisfaction, employee retention, service quality and other intangible benefits. Abusweilem and Abualoush (2019) posit that performance is the core activity in organizations as it determines the long-term survival of the organization. As a result, organizations require prudent management of money, energy and time so as to optimise the return on investment. In this research paper, organization performance is measured in terms of the following non-financial aspects: (a) quality of service, (b) employee attraction, (c) customer satisfaction, and (d) employee retention.

2.4 Empirical studies on KMC and/or KM and Performance.

Due to the growing emphasis on the importance of KM to the performance of organizations, there has been proliferation of studies on the nexus between KM and organizational performance in the past two decades. A few of those studies are briefly reviewed here. Abusweilem and Abualoush (2019) set out to examine the relationship between business intelligence systems (BIS) and knowledge management processes at Housing Bank for Trade in Irbid in Jordan using a survey study. Results showed that organizations with effective KM can significantly affect the organization's activities, relationship to the market and its innovations which leads to superior performance. In a survey study, Chiu and Chen (2016)

examined the effect of KMC on organizational effectiveness with organizational commitment as a mediating variable at the Taipei Water Department in Taiwan. Their findings confirmed that KMC is not solely sufficient to drive organizational effectiveness and that organizations also need to encourage organizational commitment. Only KPC was found to be having a significant relationship with organizational effectiveness thus contradicting results from a study by Gold et al. (2001). In a study exploring learning organization theory and the potential to retain knowledge workers, Lee-Kelley, Blackman and Hurst (2007) showed that organizations need to implement KM strategies in order to increase employee retention, especially that of knowledge workers.

Using a case study protocol and semi-structured interviews, Guvernator and Landaeta (2020) assessed how municipal utility organizations in Southeastern Virginia transferred their operational knowledge in order to enhance organizational performance. Results showed that knowledge retention and organizational learning which are important in organizational performance can be facilitated through the use of programs that help to identify, recognize, and support internal coaches, teachers and mentors. Zack et al. (2009) explored how KM influences overall organizational performance and financial performance using a sample of 88 firms in Canada, USA and Australia. In their survey study, results showed that KM has a significant positive impact on overall organizational performance but no significant impact on financial performance. However, results showed that organizational performance mediates in the relationship between KM and financial performance. Muthuveloo et al. (2017) also examined the impact of tacit KM on organizational performance by surveying managers, senior managers and directors of manufacturing organizations both local and foreign companies located in Malaysia and listed in Federation of Malaysian Manufacturers. Results showed that KM generally impacts organizational performance. This revealed the importance of knowledge creation and management for optimal organizational performance and also highlighted the key benefits that an organizational could gain from knowledgeable workers.

The studies largely support the notion that KM or KMC contribute positively to the overall performance of organizations. From the literature review, the following hypotheses which are aligned to the research problem and the questions of the research were developed.

Hypothesis one:
Null hypothesis: Knowledge Management Capabilities do not affect organizational performance.
Alternative hypothesis: Knowledge Management capabilities do affect organizational performance.
Hypothesis two:
Null hypothesis: Knowledge Management capabilities do not affect customer satisfaction.
Alternative hypothesis: Knowledge Management capabilities do affect customer satisfaction
Hypothesis three:
Null hypothesis: Knowledge management capabilities do not affect employee attraction and retention.
Alternative hypothesis: Knowledge management capabilities do affect employee attraction and retention.

Research Methodology

The study adopted a mixed method approach which is the concurrent application of both the quantitative and qualitative approaches. This increases the overall strength of the study since the weaknesses in each one of designs is compensated for by the other design. A survey strategy was adopted in line with previous empirical studies and data was collected from eight of the sixteen water supply Management Centres (MCs) in Botswana which were selected at random. Random selection ensured that each MC had an equal probability of being included in the study. The target population of 1 231 comprised of all the employees from the selected MCs, customers, contractors, suppliers, KM practitioners and academic experts in KM. A sample size of 278 was determined using Krejcie and Morgan (1970) formula and stratified random sampling was used to identify respondents of each group or stratum as shown in Table 1. The general advantage of stratified sampling is that it helps to minimize the element of biasness in the selection of the respondents from each stratum.

Table 1: Selection of the respondents using stratified sampling techniques

The Eight Management Water Supply Centres selected	Total Number of Employees in each Centre	% Total of employees in each centre	Percentage (%) of the Sample size (278) in each Centre.
1. Each Centre			
Francistown	220	18	50
Lobatse	200	16	45
Kanye	85	7	19
Mahalapye	160	13	36
Mochudi	150	12	33
Palapye	168	14	39
Letlhakane	120	9	25
Ghanzi	88	7	19
2. Knowledge Management Practitioners.	20	2	6
3. Academic Experts in the area of KM	20	2	6
Total	**1 231**	**100**	**278**

A questionnaire with both closed and open-ended questions was used to collect data since it allowed collection of quantitative data (closed-ended questions on a Five-point Likert scale) and qualitative data (open-ended questions). The reliability (correctness or accuracy) of the questionnaire was tested using Pearson Cronbach's alpha while validity was ensured through consultation with academic experts in KM research and also a pilot study. The statistical software for social sciences (SPSS) was used to analyse quantitative data and test the hypotheses. Qualitative data was analysed through content analysis which entails extracting according to entails a systematic analysis of the occurrence of words, phrases, and concepts (Creswell, 2009).

Research Findings

A Pearson Cronbach's alpha of 0.89 was calculated. According to Chiu and Chen (2016), an alpha value greater than 0.7 shows that the data collection instrument is reliable, stable and internally consistency. The results will be discussed according the three hypotheses.

Hypothesis one:

Null hypothesis: Knowledge Management Capabilities do not affect Organizational Performance.
Alternative hypothesis: Knowledge Management Capabilities do affect Organizational Performance.

In testing the above hypothesis, a regression model was fitted for the KMC on the mediating variable, which is recognition of the importance of KMC, and the Table 2 below illustrates the result.

Table 2: Recognition versus Performance

Obs	parameters	RMSE		R-Sq	f	Prob.
182	4	0.599		0.352	32.217	0.000
Variable	coeff	Std Error	t	Prob	Lower Limit	Upper Limit
KM Capabilities	0.234	0.069	3.39	0.001	.098	0.370

In the case of organizational performance, the Table 2 shows that the fitted regression model (F=33.217, prob. =0.000) is significant. The R-square is 0.352 which means that the model explains 35.2% of the variation of the recognition variable. It indicated that KMC with the following values: t = 3.39, prob. = 0.001<0.01) is significant. The analysis also confirms that KMC affect the recognition of the importance of KM positively. Since the above regression results have indicated that there is a relationship between KMC and the mediating variable, this implies that "Recognition" explains the nature of the relationships between KMC and Organizational Performance, and this then encouraged the researcher to go ahead to

test these mediating effects. In this case, the dependent variable is Organizational Performance and KMC is the independent variable.

Table 3: First Performance Regression Model

Obs	parameters	RMSE	R-Sq	F	Prob.	
185	4	.937	.182	13.453	0.000	
Variable	Coeff	Std Error	t	Prob	Lower Limit	Upper Limit
KM Capabilities	.178	.108	-1.65	0.100	-391	.035

Table 3 above illustrates a situation where Recognition of KMC was not considered while Table 4 below illustrates a situation where it was considered and included as the independent variable. In Table 4, Recognition of KMC is now considered as an independent variable and the result of the analysis indicates that KMC (t=1.84, prob. = 0.068<1), which was not statistically significant before, became significant.

Table 4: Regression model with Recognition of KMC

Obs	Parameters	RMSE	R-Sq	F	Prob.	
182	5	.938	.191	10.411	0.00	
Variable	Coeff.	Std Error	T	Prob	Lower limit	Upper limit
KM Capabilities	-205	.112	-1.84	0.068	-425	.015
Recognition of KM Capabilities	.126	.117	1.07	0.286	-106	.357

The R-square also increased from 0.182 to 0.191. The implication is that recognition mediates the effects of knowledge management capabilities on organizational performance.

Hypothesis two:

Null hypothesis: Knowledge Management capabilities do not affect Customer Satisfaction.

Alternative hypothesis: Knowledge Management capabilities do affect Customer Satisfaction

Table 5: Recognition of Knowledge Management Capabilities and Customer Satisfaction

Obs	Parameters	RMSE	R-Sq	F	Prob.	
181	4	0.627	0.292	24.282	0.00	
Variable	Coeff.	Std Error	T	Prob	Lower limit	Upper limit
KM Capabilities	0.135	0.077	1.75	0.082	-017	0.287

Table 6: First Regression Model

obs	Parameters	RMSE	R-Sq	F	Prob.	
182	4	0.954	0.051	3.198	0.025	
Variable	Coeff.	Std Error	T	Prob	Lower limit	Upper limit
KM Capabilities	0.184	0.116	1.58	0.117	-0.46	0.413

Table 7: Second Regression Model

obs	Parameters	RMSE	R-Sq	F	Prob.	
180	5	0.939	0.077	3.632	0.007	
Variable	Coeff.	Std Error	**T**	Prob	Lower limit	Upper limit
KM Capabilities	-230	0.117	-1.97	0.050	0.000	-460
Recognition of KM Capabilities	-242	0.113	-2.15	0.033	-465	0.020

Since the regression results have indicated that there is a relationship between KMC and the mediating variables, this implies that "Recognition" explains the nature of the relationship between KMC and Customer Satisfaction. The results also encouraged the researchers to go ahead and test this mediating effect. Consumer Satisfaction was proxied by the use of the variable "current relationship between the organization and customers", which corresponded to the question, "How do you rate the current relationship between your organization and the customers" and was not measured directly. In this case, the dependent variable is Customer Satisfaction, and the independent variable is the KMC. Table 6 shows that the fitted regression Model (F=3.198, Prob. = 0.025) is significant. The R-square is 0.051 which means that the Model explains 5.1% of the variation of Consumer Satisfaction.

According to Table 7, when the recognition variable was included in the regression model, there was an increase in the KMC (t = 1.95, Prob. = 0.050), which was not statistically significant before, became significant. In the same perspective, R-square also increased from 0.057 to 0.077. The implication is that Recognition meditates the effects of KMC on Consumer Satisfaction by increasing the satisfaction.

Hypothesis three:

Null hypothesis: Knowledge Management Capabilities do not affect Employee Attraction and retention.
Alternative hypothesis: Knowledge Management Capabilities do affect Employee Attraction and Retention.

Table 8: Recognition versus Employee Attraction and Retention

Obs	Parameters	RMSE	R-Sq	F	Prob.	
178	4	.596	.358	32.34	0.000	
Variable	Coeff.	Std Error	**t**	Prob	Lower limit	Upper limit
KM Capabilities	-.037	.049	-0.76	0.451	-1.133	.059

Table 8 shows that the fitted regression model between Employee Attraction and Retention and KMC is highly significant (F= 32.34, Prob. = 0.000). The R-square is 0.358 which means that the model explains 35.8% of the variation of the Recognition variable. The result means that KMC affects the Recognition of the importance of Knowledge Management positively. The result further encouraged the researcher to test the issue of recognition as the mediating factor and its effects.

Employee Attraction and Retention was proxied by the use of the variable "Relationship between Management and employees", which corresponded to the question, "How do you rate the relationship between Management and other employees in the organization?" and it was not measured directly. In this case, the dependent variable is Employee Attraction and Retention, and the independent variable is KMC. This relationship is illustrated in the first regression model below shown in Table 9. The fitted regression model (F = 7.309, prob= 0.000) is significant. The R-square is 0.114 which means that the model explains 11.4% of the variation of Employee Attraction and Retention. It also indicated the values of KMC (t = 0.050, Prob. = .099 <1) is significant.

The results mean in practical terms that Knowledge Management capabilities affect employee attraction and retention positively, and this therefore means that the more knowledge management capability the more attraction and retention. However, the effect of Recognition as a mediation variable when included in the study, further buttressed the importance or significance of KM Capabilities and this is illustrated in Table 10.

Table 9: First Regression Model

obs	Parameters	RMSE	R-Sq	F	Prob.	
175	4	.918	.114	7.309	0.000	
Variable	Coeff.	Std Error	t	Prob	Lower limit	Upper limit
KM Capabilities	-.083	.050	0.050	0.099	-0.16	.181

Table 10 shows that when the recognition variable was included in the regression model, the model gained more explanatory power, for R-square increased from 0.114 to 0.130. In addition to this, KMC became more significant. This result indicates that Recognition mediates the relationship between Knowledge Management capability (t=2.43, Prob. =0.016<.05) and employee attraction and retention.

Table 10: Second regression Model

obs	Parameters	RMSE	R-Sq	F	Prob.	
173	5	0.911	0.130	6.264	0.000	
Variable	Coeff.	Std Error	t	Prob	Lower limit	Upper limit
KM Capabilities	0.186	0.076	2.43	0.016	0.035	0.337

All the three hypotheses confirmed the importance of KMC in improving the performance of the organization with particular reference to customer satisfaction and employee attraction and retention in the WUC of Botswana.

To confirm the above statistical findings the content analysis of the qualitative data was done using the Likert scale and the aggregated results are shown in Table 11. Of the 193 respondents, 90% indicate that a full understanding and the utilization of knowledge capability in their organization can lead to better performance of the organization. According to the respondents, in order for this to be achieved the following are the most important ways or methods that can be used: (a) Training of staff and sharing knowledge, (b) Change of culture by inculcating a high performance culture in all employees, (c) Reduce favouritism and hire as par qualification, (d) Listening to employees and considering their work experience is important, (e) Monitor capability through surveys for knowledge reliability, and (f) Include knowledge management capabilities in the organization strategic plan. It was also observed that respondents are of the opinion that the ability of the organization to have and maintain good knowledge management capability will enhance the quality of service of the organization by: (a) Creating knowledge which will make the organization more efficient. "Quality service requires advanced knowledge ", a respondent said. Thirty-seven of the respondents mentioned this point; (b) Increasing customer satisfaction through self-service management of customer contracts. Customers will easily access organizational information on products and services; and (c) Making informed decisions where employees will be well informed of the organization which will enable them to help customers with relevant information.

The results of the qualitative data support the research findings of the quantitative data in respect of the test of the three hypotheses, and it confirms the importance of KMC in improving the performance of an organization. Both results (qualitative and quantitative) indicated that KMC will influence

organizational performance of WUC in respect of customer satisfaction, quality of customer service and employee attraction and retention.

Table 11: Knowledge Management Capabilities and Organizational Performance

	Strongly agree (1)	Agree (2)	Don't know (3)	Disagree (4)	Strongly disagree (5)
Do you think a full understanding and utilisation of knowledge capabilities can lead to better performance in your organization?	54.75	35.26	7.89	1.05	1.05
Do you agree to the fact that the ability of your organization to have and maintain good knowledge management capability will enhance the quality of customers services	50.54	33.33	12.9	3.23	0
Do you agree to the fact that the ability of your organization to have and maintain good knowledge management capability will enhance employee attraction and retention in your organization?	44.44	31.22	17.46	6.88	0
Do you agree to the fact that the ability of your organization to have and maintain good knowledge management capability will enhance customer satisfaction of its services?	19.05	47.09	27.51	5.82	0.53

The study also confirms the work of Chiu and Chen (2016) who perceived KMC as the empowerment and development of both tacit and explicit knowledge assets of an organization to increase its performance and achieve it'd organizational goals. In their research it was further argued that KM should incorporate KM capabilities for the organization to increase and improve its performance and in the same vein gain a competitive advantage, and this will enhance organization performance, if firms manage their knowledge so that they can attain a competitive edge.

Furthermore, they buttressed the fact that organizations that are skilled in KM consider knowledge to be human capital and have developed organizational rules and values to support knowledge production and sharing (Chiu and Chen 2016; Barachini, 2009). These scholars are of the opinion that KMC is an organizational mechanism which continually and intentionally create knowledge in organizations. In addition, Gold et.al (2001) proposed KM infrastructural capabilities and processes as direct determinants of organizational effectiveness. They argued that an organization must leverage its existing KM capabilities to sustain competitiveness.

Discussion and conclusions

The study confirms the three hypotheses investigated in this research; namely: (a) there is a positive relationship between KMC and organizational performance (b) there is a positive relationship between KMC and customer satisfaction (c) there is a positive relationship between KMC and Employees Attraction and Retention. It was observed in the course of this research that the ability of the WUC to have and maintain good KMC and enhance the quality of service of the organization and promote organizational performance will happen mainly by creating knowledge which will make the organization more efficient; effecting customer self-service and management of customers contacts, customers being able to access organizational information on products and services easily; employees being aware of their shortfalls and capabilities with respect to knowledge; and all employees being involved in any KM strategies taking place in the organization even if they are implemented at different levels. All these will result in KMC promoting performance at the WUC.

Furthermore, the different ways in which KMC can influence organizational performance of the WUC in respect of quality of service, customer satisfaction and employee retention and attraction is to include: creativity and innovation which would help to improve effective organization capabilities, and a more effective workforce; building timely organizational capabilities which can be achieved by training and work shopping staff or induction where ideas can be shared; sharing information and transparency as

soon as changes are implemented; giving feedback and allowing initiatives from all staff and assessing them to avoid mistakes; keeping up with the ever-changing business environment, customers' needs, and changing technology; and embracing cultural and human knowledge capabilities.

Conclusively, for the WUC of Botswana to enhance customer satisfaction, the following are to be considered. In the first place, there is a need for sharing knowledge across the organization so as to increase its performance and achieve the goals and objectives of the organization. Secondly, there is a need for learning new technologies and quicker problem-solving strategies to enhance customer trust. Thirdly, there is need for keeping records of customers and replying to their comments and update them on their issues timely. Coupled with this, is the need for more training of employees to give customers an efficient service. Finally, the WUC should be more innovative and develop dynamic capabilities by allowing for definitive customer change management, render satisfaction of needs and wants; encourage time management; minimise business processes by developing adequate an efficient skilled manpower programmes for the employees.

Limitations and direction of future research

The main limitation of this study is that it only considered Botswana's WUC and that only five variables were used in the analysis. A need exists to extend this study to other water departments in the SADC region so as to generalise results to other developing countries. Further research in the field of KM in Botswana, SADC or in other developing countries should also consider the use of more or different independent, dependent and mediating variables so as to get more insights on the significance of KM in the water sector. As past empirical studies showed, there are many variables that can be used to study KM in the water sector such as business intelligence, information technology, knowledge transfer, organizational commitment and organizational effectiveness, among others.

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Evolving human resource management processes and interventions as the new paradigms shaped by entrepreneurship, knowledge management, social network analysis'

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Abstract
At the core of human resource management (HRM) is the way ''inter-relationship among the stakeholders in an organisation is managed'', ''objective criteria are applied to goal-setting processes'' and how ''HRM contributes to the creation of tangible value in the form of knowledge-based outputs.'' Hence, the process of knowledge management of storing and sharing in regard to its processes, techniques and operations is linked to HRM practices of effective management of this inter-relationship. The research enquires into how human resource development focuses on building the entrepreneurial resilience, a key ability of entrepreneurs to overcome challenges and adapt to uncertainties, particularly during this era of Covid-19 pandemic. The efforts of organisational leadership, which needs to appropriate these inter-relationships to a social context either India or Bangladesh, always can be aided by a host of social network theories. Within remit of this discourse, the research would like to pursue the questions such as how the role of gender in the economic development process has been increasingly recognized as crucial, both in terms of potential for success and in the nature of the impact of particular development strategies and programs. Addressing these questions, thus, can help us to arrive at the possible HR interventions in this regard. The direction of the current research emerges from the interpretation of the variants such as knowledge workers, knowledge management templates and tools, expected gender roles of social actors, resource allocation, etc. The research proceeds to enquire how these variants are explained by these social network theories, their limitations and if some of these need to be repurposed in the view of emerging challenges posed by knowledge workers and their belonging industries.

Research Assumption

The proposed research thesis is ridden with a score of interrelated assumptions such as the exploitation of labour capital enhancing shareholder value, the symbiotic relationship between HRD and unitarism, and HRD and learning cultures in varied organisational settings. How these assumptions reflect in India and Bangladesh context, such as capital–labour relation in time, place and space, and as such how these assumptions play out in the continuous state of dialectical tension between capital and labour, all the research expect to grapple with as it progresses. The research assumes that as various organizational factors and their influence on knowledge management effectiveness have been accounted for, summarising existing knowledge from HRD perspective can be a lot easier in terms of dentifying gaps, and providing a definite agenda.

Research Question

How Human resource management (HRM) is mediated through various interventions such as 1) "applying objective criteria to goal-setting processes", 2) ''effective management inter-relationship'', 3) "performance appraisal and reward system" aligning to social network analysis (SNA) perspective and 4) Knowledge Management (KM) context towards the creation and sharing of knowledge linking various forms of stakeholder ownership, such as entrepreneurial, intrapreneurial, etc?

Originality/Value of (Significance of Current Research & How it adds to existing body of Knowledge)

The research keeps its attention on the way knowledge management shapes up in organizations with HRM interventions, and the way the focus is increasingly shifted from technology solutions to social dimensions. The research adds to the repertoire of existing knowledge on how the focus on people and the management of knowledge-sharing processes owes to the role social structures comprising individuals, teams and work-related communities that has proven to be critical to knowledge management. The research particularly aims to explore types of archetype social structures in organizations and the knowledge shared within these social groups, both in hierarchical and non-hierarchical social structures.

The research proceeds to the deeper realm of knowledge management systems, as a functional outcropping of systems theory, and evaluates the questions that are so far considered "systems theory" as invincible along with the use of logic models to develop and evaluate organization and program effectiveness.

Introduction

A significant contributor to human resource management always would be the way the employees' inter-relationship is managed under a particular leadership in a social context. The above proposition traces its origin back to Hawthorne Works in Cicero Illinois on lighting changes and work structure changes pertaining to employees' productivity gain occurred due to the motivational effect on the workers. The experiment gave rise to Elton Mayo's human relationship approach which always underpins the leadership taking interest in employees to make them feel that they are valued and empowered. Particularly the relay assembly experiments component of the studies at Hawthorne Works posit that choosing one's own co-workers, working as a group, being treated as special, and having a benevolent manager are the real explanations for increase in productivity. The current research, which concerns itself with human resource management in India and Bangladesh context, would engage with Mayo and all his revisionists that followed him.

As market mechanisms provide a host of options to price knowledge-outputs this keeps up with firms their own way of re-organising themselves through downsizing, rightsizing, outsourcing and mergers and acquisitions. As knowledge management of an organisation mediated through HRM -- documents, agreements, policies, information, technical know-how, patent, etc. -- the storing, access, update and dissemination of this knowledge task the human resource personnel implement authorisations/permissions and role-based access controls situated within a framework of organisation's code of conduct and local laws and regulations.

The knowledge assets of organisation need to be managed and mediated through amenable units of the organisations co-opted by HRM, as there will be fierce demand placed on the organisation to continuously innovate and monitor the market, product life cycle, production turnaround time, optimal utilisation of resources, improve CRM and relationship with stakeholders, empower employees, most efficient ways of creating and sharing knowledge, etc.

Collaborative software and instant messaging platforms make it easy for people to share information in real time, and by gathering, organizing, and sharing tacit knowledge with the right tools at work, HRM can create an enabling environment where employees can establish more meaningful relationships, ultimately contributing to high production yield.

Classified as a Next Eleven emerging market according to Goldman Sachs report, Bangladesh's textile and agro-based industries including jute and seafood are extremely labour intensive pose a particular interest to the current research engagement. As there is a growing participation of women in the labour force[1] (possible due to the July 2013 Labour Act amendment creating provisions for workplace safety), there is a perceptive change in the gender role. How the demographic changes of the labour force bear out on the dynamics of inter-relationship of various workgroups in Bangladesh can be one of the key pursuits of the current research.

India's current unemployment rate seems to be highest in the last many decades, which partly can be attributed to India's economic slow-down and low women labour force participation rate (schooling and

higher education can be the cause). Hence, the proportion of working-age people looking for jobs or working stands at its lowest in two decades, at 54%, compared to 62% in the late 1990s (it is currently around 70% in Brazil, China and Indonesia[2]). The gross mismatch in the proportional representation in the labour force participation has created its own dynamics in the inter-relationship between men and women.

Further, as India is shifting towards self-employment, particularly among women workforce, something started 2004-05 (according to ILO[3]), partly due to late 1990s increase in casualization of the workforce, the women appear to have established themselves in a better power-relationship with men.

The decline in casual workers in the recent years, along with the increase in self-employment, puts forward the point whether the shift towards self-employment is for better wage or whether this workforce is coerced to engage itself in any kind of economic activity in the absence of wage work. The labour force deprived of work in the space of wage labour seems to be less assertive than those who chose to become entrepreneurs as a choice. Yet, this cannot be conclusively said as it is a very subjective opinion.

Methodology

The research adopts a social network analysis (SNP) perspective to map on the inter-relationship among stakeholders, intrapreneurship, social entrepreneurship, and knowledge management (including knowledge-sharing and knowledge transfer), and thus, progress to find out the HR interventions each of the above key areas would require.

The SNA - network centrality measures and visualization tools - is put to explore and appraise the structural position of individuals (employees within workflow, communication, and friendship networks), within relational networks for creating and sharing knowledge and to explore implications for designing and implementing HR practices in knowledge-intensive firms (KIF). The methodology draws upon Daniel Brass (1984)[4] measures that include criticality, transaction alternatives, and centrality (access and control) in networks and in such reference groups as the dominant coalition.

Through SNP, the current research targets a work design, along with developing ''befitting'' training and development HR practices, that can shape this interpersonal relationship. Since the nature of the work relationship is constrained by both network and hierarchical forms of organization it is to be found by the current research whether the nature of the work relationship is constrained by both network and hierarchical forms of organization. If such an exercise suggests that policy is predicated in the hierarchical organisation and innovation is embedded in former, the answer needs to be found Karen Stephenson and David Lewin (1996)[5] how the networks in organisations can augment existing programmes in achieving "non-partisan" or "uptight" employment practices.

The research will employ both closed- and open-ended questionnaires interviewing people and conducting participant-observation in their natural settings. The task over the years will involve a range of well-structured, although variable, methods such as both formal and informal interviews, direct and indirect observation of subjects, participation in the life of the group, collective discussions, analyses of personal documents produced within these social groups, self-analysis, results from activities undertaken off- or on-line, and life-histories in various community and work settings.

Field Study

An extensive cross-country field research will be carried out in multiple locations in India and Bangladesh -- Mumbai, Delhi, Bangalore, Hyderabad, Ahmedabad, Kolkata, Dhaka, Chattogram, Khulna, Sylhet, -- involving the collection of field data outside, secondary research in local libraries and other repositories , and workplace settings.

Discourse (includes Literature Review)

On the ground, the leadership largely relies on managing human resources that supports long-term business goals and outcomes with a strategic framework. As the deployment of human resources is

critical to the business these resources necessarily need to match to future needs, and macro-concerns about structure, quality, culture, values and commitment. The execution of those activities affecting the behaviour of stakeholders in their efforts to formulate and implement the strategic needs of business in an organisation and the pattern of planned human resource deployment and activities intended to help the enterprise to achieve its goals can be effectively interpreted through social network theory (SNT). Since organisational units as social networks are self-organizing, emergent, and complex[6], particularly in the era of rapid globalisation where complex coherent pattern emerges from interaction of the elements that make up the organisational system at the local level, the leadership must decide the contours of scope of a social network analysis. Hence, it is up to a particular leadership to assign a discrete level of analysis vis-à-vis to strategic human resource management, this is not to say that levels of analysis are not necessarily mutually exclusive: micro-, meso-, or macro-level.

In the strategic human resource management, where an individual member is at the core of discourse, the micro-level perspective of social network analysis (SNA) can reveal the relationship between individuals in multiple levels such as dyadic, triadic or subset level that could progress to a meso-level analysis.

Since meso-level networks of organisations are supposedly of the low density and may exhibit causal processes distinct from interpersonal (dyadic or triadic) micro-level networks it will have a particular bearing on strategic human resource management.

Meso-level must be understood from the meso-economic discipline and so as its extension of meso-level networks of organisations that distribute tasks for a collective goal, thus forcing the organisations to either focus on intra-organizational or inter-organizational ties in respect to formal or informal relationships. Intra-organizational networks themselves often contain multiple levels of analysis, especially in larger organizations with multiple units and sub-units, hence, the current research must be directed towards conducting its empirical study at a sub-unit level of organisation and highest level, focusing on the interplay between the two organisation structures. (Riketta and Nienber 2007). [7]

Continuing the discourse on the meso-level the other way to look at the inter-relationship of labour workgroups would be through the prism of randomly distributed networks that leverage on the models of exponential random graph models. This framework of randomly distributed networks has the capacity to represent social-structural effects commonly witnessed in many human social networks adducing to the fact that human resources has these layers of networks within themselves, including general degree-based structural effects commonly witnessed in many human social networks as well as reciprocity and transitivity, and at the node-level, homophily and attribute-based activity and popularity effects, as derived from explicit hypotheses about dependencies among network ties. (Skyler and Desmarais (2011).

Parameters are provided in terms of the prevalence of small subgraph configurations in the network and can be construed as articulating the combinations of local social processes (organisational sub-groups or sub-systems) from which a given network takes birth. These probability models for networks (organisational systems) on a given set of social actors (organisational stakeholders) permit generalization beyond the restrictive dyadic independence assumption of micro-networks (organisational sub-groups or sub-systems), allowing models to be built from theoretical structural foundations of social behaviour. (Skyler and Demarrias2011)

At a meso-level the human resource management too can relate to a scale-free network whose degree distribution follows a power law[8], at least asymptotically. Moreiraet al (2006)'s [9]suggested scale-free network theory lays emphasis on a random network with a degree distribution that unravels the size distribution of social groups, hence, it would have a particular bearing on the way the work groups are formed in a social space.

The diversity of Bangladesh labour market – from Sylhet to Khulna or Rangpur to Barisal – the specific characteristics of scale-free networks will vary with analytical tools that would be deployed to create them. Similar trends can be found in the Indian labour market. The research must anticipate how to know in a scale-free network the relative commonness of vertices with a degree that greatly exceeds the average bears out in the Bangladesh or India case. Further, the research needs to find out what specific purposes in their social networks the highest-degree nodes (hubs) may serve, although this contingents on the social context. Also, it is to be seen how the 'clustering co-efficient distribution' characteristic of scale-free networks decreases as the node degree increases following a power law. The Barabasi model[10] of network evolution can certainly be re-examined in Bangladesh labour market context bearing upon a particular relevance on strategic human resource management with relation to scale-free network.[11]

The human resource management at some point of time does realise that rather than tracing interpersonal interactions using SNA model is not as important as the necessity at the macro-level analyses to trace the outcomes of such interactions, for example, economic or other resource transfer interactions methods used as tools of consumerism by large corporates or even public distribution systems.

The study of large-scale networks together with complex networks is a legitimate undertaking of the current research. These social networks likely display features of social complexity involving substantial non-trivial features of network topology, with patterns of complex connections between elements that are neither downright regular nor random. At this point of inquiry of the research an appropriate reference can be made to chaos theory. It would be interesting to see how these complex networks feature a high clustering coefficient, assortativity or disassortativity among vertices, community structure, and hierarchical structure as the current research would study work groups and labour market spreading a huge geographical expanse from Chattogram to Rajshahi in Bangladesh or from Kashmir to Kerala in India. As in certain cases such as the agency-directed networks it would be interesting to record how features such as reciprocity or triad significance profile emerge (triad significance profile in network motif).

SNT, when applied in an organisational context, implies a social structure made up of a combination of social actors (shareholders, regulators, employees, buyers and suppliers, local communities, etc). From the viewpoint of the societal structure is comprised of a complex set of the dyadic ties between these various actors, which always need to be studied from a perspective providing for a host of methods for analysing the structure of whole social entities, subsuming all kind of organisations within this, as well as a slew of theories explaining the patterns observed in these emerging structures. The current research must aim at a theoretical construct underpinning social networks inherent in various organisational structures establishing the relationships between individuals, groups, organizations, and various other social units.

The research proposes to engage with these structures from the viewpoint of SNA to identify local and global patterns and how these come to bear on a local context such as Bangladesh or India, locate influential entities, and examine network dynamics.

SNT's interpretation certainly can enable the current research undertaking to create a model for the human resource management strategies to be put into use in a particular manner. Baird and Meshoulam (1988) suggestion for incorporating both an external fit (human resource management fits the developmental stage of the organization) and an internal fit (the components of human resource management complement and support each other) can prove to be relevant to the current discourse. As human resource management is witnessed to have multiple developmental stages and possesses several strategic components in order to form Human Resource Strategic Matrix (Baird and Meshoulam 1988) the implications of these ideas for SNT and leadership roles seem to be one of key emphasis of the current research.

Since the current research seems to be inherently interdisciplinary, hence, it relates to a cross-section of disciplines such as social psychology, sociology, and statistics. The interdisciplinary nature of the study calls upon a slew of analysis tools as following:

Graph theory (social structures employed to model pairwise relations between objects)[12] [One of the key areas of HRM is to understand relationships between the social actors (knowledge workers) and model them into graph theory (model pairwise relations between social actors -- "influence graphs" model whether certain people can influence the behavior of others to "collaboration graphs" model whether two people work together in a particular way as the task will demand].

Balance theory[13] (It is a motivational theory positing attitude change that conceptualizes the cognitive consistency motive as a drive toward psychological balance. The consistency motive is the urge to sustain one's values and beliefs over a period of time. Heider purports that "sentiment" or liking relationships are balanced if the affect valence in a system multiplies out to a positive result in a situation).

Social comparison theory[14] (It focuses on the belief that there is a drive within individuals to obtain correct self-evaluations. It leads to a discourse how people assess their own opinions and abilities by comparing themselves to others in order to lessen uncertainty and apprehend how to define the 'self 'calling for social comparison as a way of self-enhancement, thus allowing for 'downward' and 'upward' comparisons and expanding the motivations of social comparisons).

Social identity approach[15] (an approach intertwining social identity theory and self-categorization theory which considers leadership as a function of the group instead of the individual); and

Social role theory[16] (considers most of everyday activity to be the acting out of socially defined categories, thus, making reference to gender performativity and a set of rights, duties, expectations, norms and behaviours that a social actor has to confront and fulfil).

Simmel's[17] dynamics of triads and 'web of group affiliations and Moreno's sociogram[18](systematic recording and analysis of social interaction in small work groups) to analysing the interpersonal relationships together with relevant insights lent by the behavioural sciences the SNA certainly can serve the current purpose of the research. Also, Malinowski's[19] ethnographic model establishing each community/work group must be understood in its social context together with revisionists of SNT such as Radcliffe-Brown[20] and Levi-Strauss[21] can value-add to current research.

The current research's empirical study in the form an ethnography fieldwork focussing on the way the network analyses need to be conducted that can be benchmarked to the ethnographic fieldwork performed by Gluckman[22], Barnes[23], Mitchell[24] and Spillius[25], either in a team or independently of each other.

The making personnel management a more integral, strategy-driven activity in organizations seems to have brought about a case study for SNT, as the trend is the personnel activities are often understood as constrained, convoluted, and separate from the management process.[26]

The social structure of an organisation determined by dyadic interactions engender multiple ties through which any given social unit (a team or team member of an organisation) connects. Thus, the emerging social structure represents the convergence of the multiple social contacts of that unit. The societal structure is comprised of a complex set of the dyadic ties between these various actors, which always need to be studied from a perspective providing for a host of methods for analysing the structure of whole social entities, subsuming all kind of organisations within this, as well as a slew of theories explaining the patterns observed in these emerging structures.

The social network's axiom, or so called the starting point of reasoning, adopts a particular approach to social interaction that is construed or investigated through the properties of relations between and within units of organisation (social system), instead of the properties of these units of organisation themselves. Since such an approach is relational, Parsons[27] and later Blau's[28] model can offer a robust impulse for analysing the relational ties of organisational units with their work on social exchange theory.

As the current research intend to look at more revealing perspectives the work of Nadel (network analysis through codification of social structure)[29], Tilly's[30] emphasis on networks in political and community sociology and social movements, and Milgram's[31] path-breaking 'six degrees of separation' always would have a particular relevance for the current research undertaking.

Approach to Research Sampling

The approach to research would be to create clusters for ethnographic studies based on consumer groups as defined by brands and companies, and also to combine these clusters with a respondent driven sampling allowing a network-based sampling technique which relies on respondents to a survey recommending further respondents.

Organisations representation through social networks will direct the current research to examine how organizations in Bangladesh or India interact with each other, characterizing the many informal connections that link stakeholders[32] of the above identified clusters together. A particular adopted to research sampling in this context will come to bear upon the intra-organizational networks that have been found to affect organizational commitment, organizational identification, interpersonal citizenship behaviour in Bangladesh and India context.

Problem areas

The discourse on organisational commitment (Meyer and Allen 1991)[33]which affirms finding means and ways to improve how members of an organisation feel about their jobs so that these workers would become more committed to their organizations through indicators such as turnover, organizational citizenship behaviour, and job performance.

Meyer and Allen (1991)'s[34] model of three-component commitment involving affective commitment, continuance commitment and normative commitment or their subsequent critics and revisionists such as Solinger et al who use an Attitude-behaviour Model[35] to gauge the how employees are predisposed to either leaving or staying with the company somehow failed to incorporate how the relationship among the stakeholders would emerge.

Even the Meyer and Allen (1991)'s model claims to have transcended the existing distinction between attitudinal and behavioural commitment in order to argue that a psychological state, it has at least three separable components reflecting (a) a desire (affective commitment), (b) a need (continuance commitment), and (c) an obligation (normative commitment) to maintain employment in an organization, but none of these components come to bear the element of employee inter-relationship (which certainly an employee) that is considered to develop as a function of different antecedents and to have different implications for on-the-job behaviour. The incorporation of the 'inter-relationship' element can further reconceptualise Meyer and Allen's suggested framework.

The confusion always may arise as the agent-based modelling is always invariably to multi-agent systems, whereas in reality it is different from the explanatory insight into the collective behaviour of agents adhering to simple rules. The agent-based model will look at inter-relationship in an organisation through its perspective of actions and interactions of autonomous agents (both individual and collective entities such as organizations or groups) with a view to assess their effects on the system as a whole.

Knippenberg and Sleebos (2006)'s[36] who intend to establish the psychological relationship between individual and organization through a process of conceptualization in terms of identification and (affective) commitment manage to have a cursory look at 'inter-relationship' of employees. Building on the proposition that identification is different from commitment in that identification reflects the self-definitional aspect of organizational membership whereas commitment does not, the research proposes that commitment is more contingent on social exchange processes that presume that individual and organization are separate entities psychologically, and more closely aligned with (other) job attitudes. In the face of the complexities of SNT discussed above the Knippenberg and Sleebos's (2006)[37]identified core difference between 'identification' and 'commitment', which they conclude to have lying in the implied relationship between individual and organization,[38]can have different interpretation, and thus may serve as the direction of the current research.

The knowledge management, explained through SNA, highlights trade-offs between strength of ties and bridging ties between varied organizational groups, particularly evident in the case of open-source software (OSS). The OSS groups are more networked than other organizational communities; the cooperation and collaboration among the members, which will cause various social networks to emerge.

The research will deliberate on an analysis of cluster or group structure as an input and cluster or group innovation as an output, where the focus is on "impact of network cluster structure on cluster innovation and growth"[39], that is, how intra- and inter-cluster coupling, structural holes and tie strength impact cluster innovation and growth, and "knowledge management in OSS communities: relationship between dense and sparse network structures"[40], that is, knowledge transfer in dense network (inside groups) impacts on knowledge transfer in sparse network (between groups).

Implications, Limitation and Future Direction of Research

The research tries to find its way around the discourse keeping in view that the SNT's omission of individual agency is not always a plausible explanation for gaining grounds of social networks in the study of organisations.

The organizational citizenship behaviour, known as one form of interpersonal citizenship behaviour, can appropriately serve the current pursuit of the research as different hypothesized relationships in social networks can be conceived based on social exchange theory. Bowler and Brass's (2006)'s[41] study on interpersonal citizenship behaviour in regard to social network can serve as a good template for the current research as the authors conclude the relationships are significant when controlling for job satisfaction, commitment, procedural justice, hierarchical level, demographic similarity, and job similarity.

It is plausible to follow Behfar, Turkina and Burger-Helmchen (2017)[42] through their propounded hypothesis to see how this hold in the context of India and Bangladesh: 1) Intra-group coupling has a positive impact on group growth; 2) Inter-group coupling has a positive impact on group innovation; 3) Inter-group structural hole has a positive impact on group innovation; and 4) There is a trade-off between the effects of inter-group structural hole and inter-group coupling on group innovation. Can other knowledge workers like developers contributing to project tasks in groups other than their own can explore novel ideas for new project creation? Can all sub-groups of knowledge workers benefit from sharing knowledge as much as OSS group members, particularly developers? Are other knowledge worker sub-groups as well networked as the developers, so that like the latter they contribute to project tasks inside their own group exploiting ideas to improve those existing projects with better inside-group search possibility?

Ethical Consideration

The HRM processes and interventions are always riddled with ethical problems involving researchers with regard to the "distribution fairness" of the knowledge of social science, for implicit choices that are made as an integral part and parcel of research and implementation. The conception of fundamental human problems underpinning work organizations as "managing human resources" behoves the researcher to examine the implicit assumptions, values and goals. The conception is a socially constructed reality with "real" consequences and not a reflection of "objective" states of human and social nature with which the all the stakeholders of the organisations and researcher have to live.(Dachler and Enderle 1989)[43] Further, to the extent that these implicit assumptions are in part based upon conceptual choices that are made by individuals or as a collective act of a discipline or work organization, the development of an ethical framework that could guide such choices becomes a crucial challenge for business ethics. [44]A score of questions related to ethics can pervade almost everything -- selection and staffing, performance appraisal, compensation, retention decisions, and how companies compete for competitive advantage. The issues related to organizational politics, which HRM particularly concerns itself as it engenders certain political behaviour at the workplace, provides a context of re-evaluating the normative foundations of organizational politics. The interaction between ethics and political behavior calls for a Kantian deontological framework (Gotsis and Kortezi 2010)[45] to foster a desirable political behaviour and create a virtue-ethics context.

Conclusion

As 21ST century organisations, with a preponderance of knowledge workers, apply social network-based systems to support interactive collaboration in knowledge sharing over peer-to-peer networks, it is intriguing to notice how SNT is repurposed or reoriented to evolving organisational context in India and Bangladesh. SNT, that implies a social structure made up of a combination of social actors such as shareholders, regulators, employees, buyers and suppliers, local communities, etc, will make way for these evolving ways of knowledge sharing -- OSS communities serve as an example. Thus, there will be an emerging understanding of social capital in organizational-knowledge-sharing. In this newly gained insight, it is to be seen how social capital factors (social network, social trust, and shared goals) combine with the theory of reasoned action fulfil organisational goals and establish social trust.

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How Anheuser-Busch InBev is tackling the top challenges of Category Management for modern offline retail channel

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Abstract
In this paper we present a practical approach that AB InBev's Global Capabilities Centre ("GCC or ABI or Ab InBev") has developed to solve the challenges of Category Management for Retailers. The approach brings technical rigor from the areas of data science, econometrics, and measurement methodologies very close to business context. This has allowed us to create a solution which is highly contextual and relatable to our business stakeholders. The strength of the presented solution lies in it being a semi-automated framework that allows a wide array of disparate data to be modelled and captures the nuances of different markets - such as socio-demographic profiles, consumption behaviours, local preferences towards beer styles. We also present the ABI created 4C framework to arrive at the optimal assortment recommendation for a Retailer.

Introduction

Category Management is a purchasing and retailing concept in which the range of products purchased and sold by a Retailer is broken down into discrete groups of similar or related products; these groups are known as product categories (examples of grocery categories could be beer, washing detergent, toothpastes, etc.). This paper talks about the challenge of Category Management, that in recent years has climbed up the ladder in terms of priority for all the large companies in the Consumer-packaged goods ("CPG"), Fast moving consumer goods ("FMCG") and the retail space due to the opportunity size it brings with it and the gateway it provides to optimize the end consumer's experience today.

Retailers and suppliers have their own Category Managers who lead the Category Management function. Category Managers need to put the shopper and the consumer at the center of their category plan by answering the following questions:
How does the shopper shop?
When and where do they make their purchase decisions? What portion of choices is pre-determined and how much of it is impulsive?
What factors influence their decision? Price, Occasion, Packaging style, Brand Loyalty, etc.?
Who makes the decision to purchase?
Who is the purchase for?

What is the purchase used for? Occasion – is it for outdoor consumption or indoors, for special events or for daily consumption?

How much is bought?

What else did they buy or consider buying?

What type of consumer are they based on demographic, consumption analysis?

How did they feel about the purchase experience?

With the help of the answers to these questions, the focus of Category Management needs to be on a) Assortment Optimization, b) Shelf Segmentation & Navigation c) Omni-channel Optimization, d) Price and Promotion Optimization.

In the scope of this paper, we will focus more on the first three areas. The question of which products to feature in an Assortment comes from the point of view of what the consumer wants.

If the Retailer understands their consumer well, they will not overwhelm them with hundreds of choices for something like soy milk. The presence of umpteen alternatives creates a situation of "brand fatigue" among consumers, wherein decision making of what to buy and finding the right products becomes increasingly tough, and they walk away without making a purchase. Meanwhile, the store also loses out on the opportunity to optimize space usage for products with better sell-through. While on the other hand, limiting the assortment only to those brands which contribute high revenue could lead to losing customers with niche preferences looking for a particular category of product, even though the sales from that category may be less. Hence, it's extremely critical to optimize the assortment that can maximize the revenue and enhance customer experience.

This Paper talks about how the Category Management team at AB InBev is tackling this problem of assortment optimization to enhance consumer experience and achieve a gain in revenue for the retailer. This Paper goes into details of sources of data, significance of collaboration with stakeholders, importance of clustering, pillars of ABI's Assortment Methodology, and an end-to-end description of the framework that we have followed. Even though the presented solution has been created using our experience in the beer market, the parameters that we have used, and the literature referred to could be used for any FMCG industry and could also be extended to other business verticals that require optimization.

The need for Assortment OPTIMIZATION

The problem of what to keep on the shelf, or having an optimized assortment, has for long been a matter of contemplation for retailers and manufacturers alike. Industries with low innovation and seasonality in consumption of products, i.e., industries which sell the same set of products throughout the year (such as hardware, automobile parts, etc.) do not have to undergo a change in assortment every six months, or even a year. But companies in fashion, food and beverage industries are constantly refreshing their assortments based on time of the year and ever-changing consumer preferences.

An optimized assortment goes beyond just optimization of space in stores for revenue maximization. It also helps shoppers in finding their products easier, which can potentially increase their chance of browsing the store and buying more. By enabling an easy decision-making for the shopper, the overall customer satisfaction improves.

Industry Landscape

The way assortment has traditionally been approached was to always keep the top selling SKUs and removing everything else. As per the M L Fisher and R Vaidyanathan (2012) in their HBR article:

Following a survey in which customers said they would like less cluttered stores, Walmart introduced Project Impact, in 2008, removing 15% of the SKUs it carried. Sales declined significantly, and it was forced to roll back most of the changes.

Super Fresh, owned by the grocery retailer A&P, stopped carrying many of its low-selling dry grocery items to allow for an expansion of fresh offerings. But the eliminated products turned out to be essential to customers; when they could not find them, they shifted their business elsewhere, and the retailer entered bankruptcy.

A retailer of home goods used demographic data to localize its assortments to better cater to customers' tastes. It started with fashion bedding and was thrilled to see an 18% revenue lift. But when it

applied the data to the fashion bath category, revenues didn't improve. Discouraged, the retailer abandoned the effort.

When the new CEO of a tire retailer shifted its assortment from low-priced tires to more-expensive ones, he learned the hard way that price mattered to his customers. The CEO was replaced after two years, and his successor restored most of the products that had been eliminated.

Fisher also adds "Like so many assortment-strategy shifts, these moves were largely acts of faith. It is easy to spot the dogs in your assortment, of course—sales data will tell you that—but it is far from obvious what slow sellers should be replaced with. And there is always the nagging concern that a slow seller you delete might be an important product to some of your best customers, prompting them to defect to competitors. As all retailers know, picking the best assortment is a balancing act; any one change can have ripple effects". Summarizing the negative impacts of assortment being done the wrong way –

Keeping myriad of SKUs & brands and overwhelming the consumer with choice (a phenomenon called brand fatigue)

Removing the dog-line products but introducing new products purely based on faith

Removing products without measuring their impact or co-dependence on other products

Not accurately measuring the opportunity associated with the instance of "consumer walking away with no purchase"

Retaining top-selling products but losing the richness in diversity of portfolio

The examples mentioned above give us a glimpse of how the problem of assortment and shelf space optimization was handled by organizations, not so long ago. Even today with the influx of analytics and data science tools, and the econometrics models to give a structure to the concepts of consumer decision process, the solutions implemented are far from being perfect primarily due to limitations of data not being available at a granular level across different channels. Some of the other reasons include - models still do not mimic possible human response to the shelf, business acumen needs deeper integration with analytical models, and customization is needed in the outcome as per the nuances of different population clusters.

To understand the kind of limitations posed due to the data, we need to gain some understanding of the different ways in which we can get access to sell-out data and any other data pertinent to store performance and consumer preferences in today's world, e.g., inventory data, promotions data, loyalty, etc.

Talking about sell-out data, it can usually be accessed in two ways:

Licensed data from a third-party market measurement enterprise like Nielsen, IRI, etc.

Retailer (or Key Account as ABI calls them) directly sharing it at a level compliant with government regulations and masking sensitive data about consumers & products

The granularity at which the data can be licensed from the third-party depends on the guidelines laid down by the retailer.

Let us try to understand the commonly available levels of data from leading industry data source providers, which have a significant coverage of retail stores across the world-

Syndicated data: This data is useful when we want to gain an insight into the entire market and not just a Key Account or demography or sales channel (online, offline or omni-channel). The real value of data at this level lies in highlighting trends of how the market is evolving.

Point of Sales (POS) data: Sales based on purchases from stores, sourced from retailers' electronic point of sales through checkout scanners. On a lot of occasions, stores do not have an electronic POS, which is where Nielsen uses Field Agents to connect with the store owners and report on sales. The way this is done is by doing a sales audit wherein the difference in the amount of stock on hand for a product in a store at two different points in time becomes the amount of product sold. Based on the guidelines set by the Key Account, Nielsen can then license the data to CPG, FMCG clients at either a store level or an aggregated level such as Region, Channel, ZIP Code, etc. or combinations thereof. In certain cases, the retailers only provide Nielsen with data from a representative sample of stores. Nielsen statistically expands this data to provide a projection of sales in all the retailer's stores.

Panel data: A panel is a sample of shoppers recruited to be representative of a universe. Shopper purchases are recorded by a variety of means such as collecting information from purchased packaging,

having the shopper scan their purchases, performing optical character recognition on receipts, etc. The result of panel data capture is an inventory of purchases by store, week, demographics. Like POS data, this must be statistically expanded to represent the universe of stores.

The great strength of Panel data is that it tells the analyst who bought a product, and a lot about the buyer's profile. The drawback is that panel data has a much lower coverage as compared to POS data.

Additionally, Nielsen captures store observations such as Displays, Features, In-store promotions, and Inventory/Stock levels.

In past couple of years, government bodies across the world have also become increasingly conscious and stringent about data sharing and protection policies to maintain the privacy of individuals.

As a result of the way in which licensing and sharing of data takes place, some of the more advanced solutions for assortment and shelf optimization lie with few companies which have access to POS data with an approval from the retailers to use it; and additionally, have a holistic view of other in-store events such as displays and promotions.

AB InBev Landscape

Offline retail chains (Key Accounts) are the most important channel for AB InBev's sales. In many of these retailers, AB InBev holds the position of being the "Category Captain". A Category Captain is a Supplier (manufacturer) nominated by the Retailer and is expected to have the closest and most regular contact with the Retailer. This Supplier will also shoulder the responsibility to invest time, effort, and often financial assets into the strategic development of the category within the Retailer. The Category Captain is often the Supplier with the largest turnover in the category. Being the Category Captain also brings the responsibility of "growing the category", in this case grow beer as a category for the Retailer without any bias for own products. Successful captaincy entails rationalization of SKUs along with efficient shopper solutions that help the Retailer maximize their volume and revenue from the category.

AB InBev, till end of 2019, focused on Assortment in the following ways -

In markets with lesser maturity and complexity, where ABI played the role of Category Captain, proceedings were driven more by business knowledge. SKU rationalization was the primary focus - the lower volume SKUs were axed and the higher were retained. However, the business teams continued to explore to understand what value analytics could bring to the table.

In the more mature markets, ABI would partner with the Retailer's Category Management team and involve either the local analytics team of the Retailer or leverage ABI's Analytics COE to come up with recommendations on what to keep on the shelf. In case ABI was not the Category Captain in some of these markets, the execution of recommendations would solely depend on the Retailer's discretion as they might be working with other manufacturers and vendors providing Assortment solution as well.

For few markets, ABI would also partner with industry leaders to deliver assortment for certain key accounts. In such engagements, they would deliver the finalized set of assortment recommendations.

Gap that our Solution filled

Considering the challenges that each market posed to adequately address the needs of shelf optimization, the Global Category Management team at AB InBev realized it was important to build an in-house assortment optimization capability that could be fully customized, intake business inputs, offer total transparency into the underlying models and win greater trust from the retailers while executing the solution. Through our long engagements with different vendors, we also identified that most solutions offered in the market were more of black boxes with a very limited view of what went on inside and could not be customized for different market needs. None of the available solutions we examined could cluster the stores based on the store consumption patterns and the demographics of the surrounding areas. From our experience we realized that it's important to provide assortment recommendations at the store cluster level as a single assortment for the entire chain of stores may not do justice to many stores. Also having a separate assortment plan for all the individual stores would be impractical as it would be a logistical challenge for the retailer to implement.

Realizing this gap, we embarked on the journey of building an assortment and shelf space optimization capability at AB InBev's Growth Analytics Center (GAC), a unit of GCC – its global COE for

analytics and data science programs - with an aim to create a solution that could be used across different markets and retailers.

Literature Review

The business problem of smarter assortment and shelf space planning that we are addressing through this paper can be considered as lying at the intersection of marketing interventions, operations, and economics. So, for our given scenario, we had to adopt a hybrid approach that encompassed a repertoire of techniques and analytical ingenuity to come up with a solution that could work consistently well for different markets. Below are the details of the subject areas that we delved deep into.

Random Utility-Based Discrete Choice Models

Assortment optimization is the problem of deciding which subset of products to offer to customers to maximize the retailer's revenue. Utility-based discrete choice models have been used to understand how customers select from among a group of products that vary in terms of price and quality for a long time. These models assume that every customer associates a utility with each product and chooses the option giving her the highest utility. One of the most popular and widely used discrete choice models is the Multinomial Logit Model ("MNL"). MNL model was presented in McFadden, Train, Tye (1978). The approach of using the multinomial logit model in understanding the customers purchase decision was also studied in detail in Guadagni PM, Little JDC (1983) and Wierenga B (2008). Talluri, K. and van Ryzin, G. (2004), used the MNL to optimize the assortment to maximize the revenue.

The MNL model assumes that the utilities can be decomposed into a deterministic component that represents the average utility derived by the population of customers, and a random component that represents idiosyncrasies across customers. The random component is assumed to be identical and independent Gumbel random variables with mean zero. Under these assumptions, as per ML Fisher and R Vaidyanathan (2009), the utility of each product can be derived from its market share.

Shortcoming of and Alternatives to Multinomial Logit Model (MNL)

A shortcoming of the multinomial logit model is that if a product is added to the offered assortment, then the MNL model predicts that the market share of each product in the new assortment decreases as per the products' proportion in the older assortment. This is because one of the major assumptions of the MNL is that the utilities of products are independent of each other. This phenomenon is referred to as the independence of irrelevant alternatives (IIA), and in real-world conditions might often be violated. To remedy this potential shortcoming of MNL, researchers developed other utility-maximizing models such as the Nested Logit model and Mixed Logit model.

Nested Logit Model

Under the nested logit model which was introduced by Williams (1977), customers first select a nest, and then products within the selected nest. The nested logit model was developed primarily to avoid the independence of irrelevant alternatives property suffered by the multinomial logit model. Davis, Gallego and Topaloglu (2014) discuss how to classify the complexity of the assortment problem for nested attraction models.

Assortment Optimizations at Store Cluster level

Once we calculate the utility of each of the products using MNL, the next step is to maximize an objective function such as revenue. The goal here is to recommend an assortment of products to maximize the expected revenue for the retailer. For coming up with highly contextual recommendations, we relied on first clustering the retailer stores and then proceeding ahead with optimizing the product mix within these clusters.

The optimization of products within each nest to maximize the revenue could be done for individual stores or for a cluster of similar stores. The literature by ML Fisher, R Vaidyanathan (2009) and F Bernstein, S Modaresi, D Sauré (2019) for approaching assortment optimization for the store clusters.

Optimization techniques like linear programming and genetic algorithm are used to identify the optimum assortment for each nest that would maximize the revenue.

Constrained Optimization Techniques
Linear Programming

Gallego and Topaloglu (2014) proposed a linear programming-based method to obtain the optimal solution to both assortment and price optimization problem. We also referred to Feldman, A Paul, H Topaloglu (2019) for the linear programming-based approaches for assortment optimization. In our solution approach, however, we could not use linear programming-based optimization due to difficulties in adding constraints. The unconstrained LP approach was recommending very few products which was not making a lot of business sense.

Genetic Algorithm

Genetic algorithm is one of the commonly used optimization algorithms along with linear programming in the context of assortment optimization. We referred to TL Urban (1998) for product assortment optimization making use of genetic algorithm. H Hwang, B Choi, and G Lee (2009) also developed an integrated mathematical model for the assortment optimization problem with the objective of maximizing the retailer's profit.

Stakeholders and Decision makers in the Category Management process

Ensuring a successful Category Management process required deep interaction between the AB InBev and the retailers. Since the Category Management and assortment optimization is extremely critical to the revenue of the retailer, it is important to have the senior management of the retailer onboarded to process. Below is the list of people that generally gets involved in the assortment optimization process for a retailer.

Retailer
Head of Category Management or Senior Category Manager
Store Owners or Store Managers
Supplier (AB InBev)
Global Category Management business team
Head of Category Management for the market (country where solution was to be implemented)
Key Account Manager, a person on the supplier side responsible for conversations with the Key Account
Business & Sales teams from the market - who ensure execution of assortment recommendations
Analytics Teams (GAC)
Consumer

Initial steps of Category Management Transformation at AB InBev

When we decided to embark on the journey of Category Management transformation, we wanted to start with one geography, take the learnings from there and apply it to the next and do this a couple of times till we reached a point where we had a good business understanding, knew the right questions to ask to understand a market's complexity, learnt the challenges with implementation; before we could rapidly scale up. The parameters to decide the first geography for pilot were – availability of data, relationship with retailers, market share of ABI (where we were category captains), complexity and maturity of the market.

When we started with our first market, the first step was to understand and know our shoppers.

In a three-month long Shopper Insights project, we mined massive data sets to deliver insights to the business. During the journey, we realized how consumer segments are extremely diverse in terms of their profiles, product preferences and this is when we decided that to have a good understanding of who our consumers are, we need to segment the consumers based on different cuts such as demographic, region, consumption patterns, shopping channels, etc. While we wanted to break down the consumer base, like many real-world analytics challenges, we did not have enough information about the consumers to begin with and hence instead of consumers, we went on to segment the stores so that the impact of neighborhood, occasions, etc. could be captured. We realized that not all these variables added the same kind of value in creating homogenous groups of consumers. After some back and forth, we ended up with 4 segments driven by income and lifestyle index. The number of clusters was decided based on doing a trade-off between the increasing homogeneity of clusters and reducing the complexity of the clusters.

When we profiled the clusters and juxtaposed them with information about sales and product preferences, we realized the actual value the clusters added was a lot more than we anticipated. This exercise helped us to have clustering as a pre-requisite to understand how consumption patterns varied across demographics, regions, stores of different channels and sizes and whether segmenting the store base made sense and added value; and only then we would move on to the next set of tasks such as insights generation, assortment optimization and so on.

How we laid the building blocks for our Assortment and Shelf Optimization

As the first step, we liaised with multiple internal teams from AB InBev that had worked on the problem of assortment optimization or on a similar technical problem in the past. Through this exercise, we brought under one roof, all the learnings, best practices, and existing frameworks to form a knowledge repository. Using this as a foundation, the team researched white papers and journals to understand how we could leverage and mold the existing or proposed solutions for our own use case and bring forth an industry grade solution into action.

While researching on the technical aspects, we were also working closely with the business team and the National Category Manager from our pilot market to gain business context and understand the different aspects and challenges associated with implementation such as -

What role does beer as a category play in the retailer's entire portfolio of products?

How often does re-ranging (change in assortment) occur? How much of a role does seasonality play in this?

What is the current granularity at which assortment optimization is done? That is, is there one assortment for the retailer or is it broken down by clusters, regions or in some cases stores? Where do they want to move from here?

What are the cost and effort implications of making assortment recommendations at a highly granular level? Who creates the planograms – is it a vendor or someone from AB InBev's or retailer's team? Which tool is licensed for this? What is the level of manual intervention needed?

What are the different priorities retailers have? How do these priorities vary depending on the type of retail outlet, i.e., in a grocery vs convenience stores vs liquor stores vs mass merchandiser?

What is the expected outcome from an assortment and shelf optimization exercise? Is it to focus on premiumization, or is it to reduce stock-outs and increase sell-through, etc.?

What is defined as success in this exercise? What are the different KPIs that matter the most for different parties?

How do different markets and retailers track adherence of planograms? What are the complexities associated with tracking adherence and measurement of recommendations?

AB InBev's 4C Framework

Through our work with multiple countries and retailers from different geographies, we have developed what we call as the 4C Framework. The process was built after a lot of back and forth, inputs and suggestions from the business teams, collaboration with other teams that had previously approached or worked on assortment and partnering with MIT. Along the entire journey, the emphasis always was to make the process robust but never complicated. We are immensely proud of the fact that we have simplified the process and made it transparent to an extent where all teams (as mentioned in section 4) come together as owners and contribute to make the solution better every day. The 4C framework is a process that helps us classify the SKUs or Parent SKUs (a level less granular than SKU) in a retailer's portfolio into 4 buckets:

Conserve: This is basically the list of SKUs that should not be discontinued or de-listed at any cost. They are the most significant SKUs and majority volume drivers for the store. The list also includes products which have a relatively lower volume but a sizeable incremental volume. We keep these SKUs under the 'Green List', discussed in detail shortly.

Consult: These are the SKUs that cater to a niche, e.g., craft beer offered in a can, chocolate flavored beer. They do not deliver a lot of revenue or volume but ensure a diverse range of products for the retailer. We keep these SKUs under the 'Amber List'.

Cultivate: These are the SKUs that where we see a potential and want to place our bets on, i.e., we want to increase their distribution (presence) in more stores or increase their shelf space in stores. This is also the list where we add the new SKUs that we want to introduce into the stores.

Cull: These are the SKUs that have a low incremental volume, and in their absence their demand can be substituted by other products. We keep these SKUs under the 'Red List'.
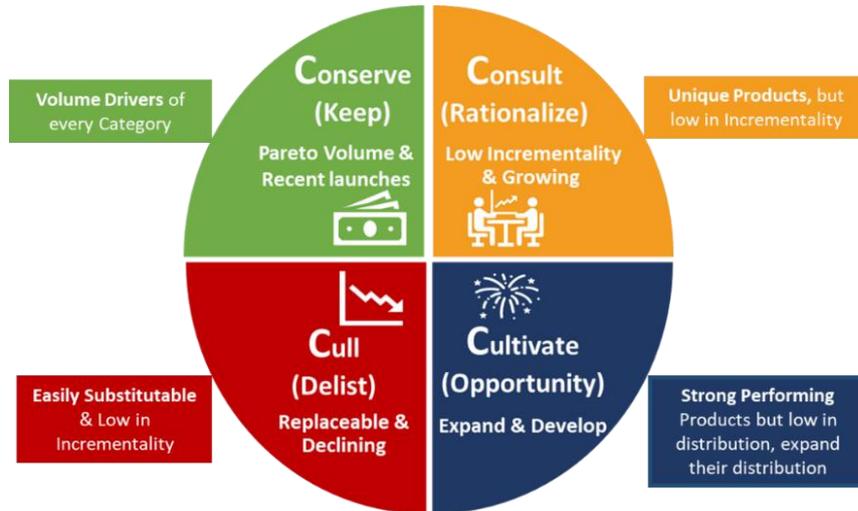
Figure 1: The 4 C Framework

The success of the 4C framework lies in the deep collaboration between business teams (who represent the exact needs and priorities of the retailer) and GAC team (who are responsible for development of the custom-made solution for the retailer.

Overall Process Flow for SKU Optimization
Below (Figure 2) is a high-level overview of the different steps that we follow while performing SKU optimization for retailers. Each of these areas has been in detail in the subsequent sections.
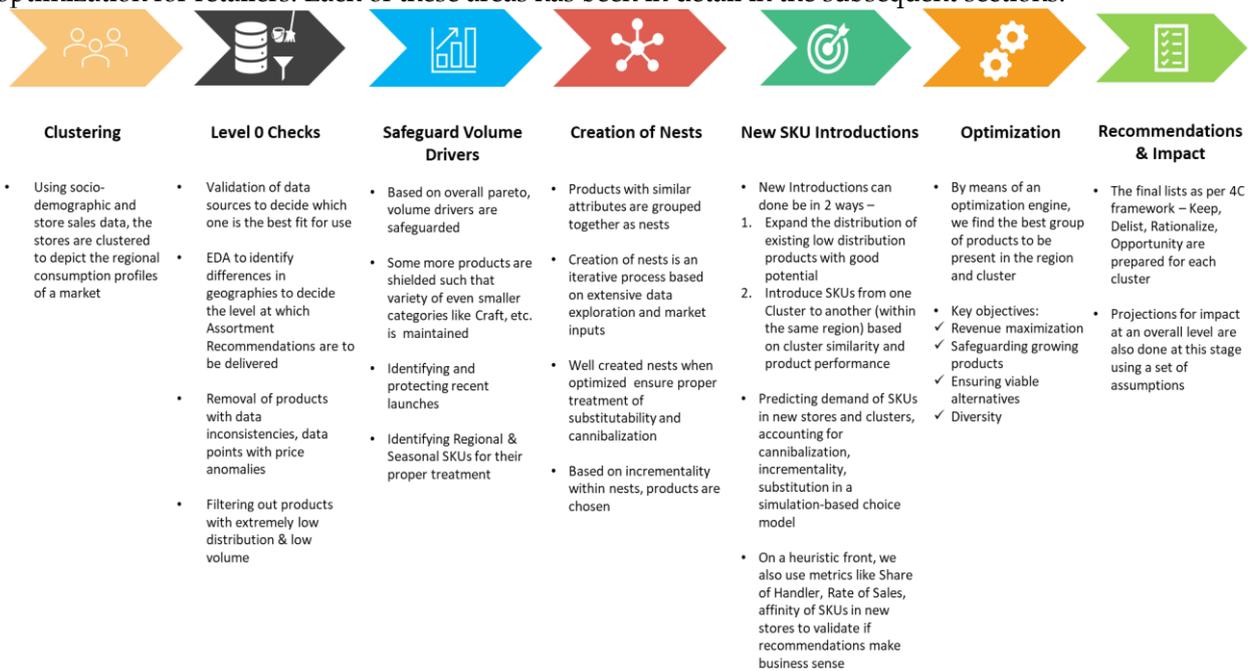

Figure 2: Figure 2: The process flow

Detailed Steps

Let us look at how we approach a new market when we start our Category Management journey. No matter the region, country, type of market, retailer we work with, the first leg of the project always starts with gathering information about the retailer and what they want to achieve from this range review - do they want to focus more on premiumization, do they want to optimize inventory levels and reduce stockouts, do they want to increase profits, do they want to focus on new introductions, etc. This stage of the project makes sure everyone aligns on the objective and shapes the days to come in terms of planning, milestones, etc. Then we get into the nuances of deciding, what should be the level of execution and how frequently a range-reset should take place.

Once we get a certain level of clarity regarding the questions listed above, only then we move on to the analytical steps of the process.

Here is how we go about our process:

Clustering

Our assortment optimization solution is designed to provide optimized SKU assortment for individual stores of the retailer. But since it can be practically difficult to design and roll out separate assortments for individual stores, many retailers that we worked with opted for assortment solutions at a higher granular level - at a Store Group level. For the optimization to be effective, these groups of stores must be similar in terms of their beer consumption and demographics that they serve. We made use of clustering algorithms to come up with these Store Groups.

Data Sources for Clustering

To effectively group the stores into meaningful clusters, we used data related to the stores and the data about the area where the stores were located. Some of the major data sources that we used in the clustering of stores are:

Demographic data- Demographic information of the location where the stores are located, like average age of the residents, average income, car ownership, language spoken, gender ratio, etc. In many geographies, we used census data available at Postal Code/Postal District level for clustering of stores.

Consumption data – Consumption information is one of the major data sources used for clustering stores. Details on the proportion of volume sold by pack size (6 packs, 12 packs, 18 packs, etc.), pack type (bottle, can, keg, etc.), container volume (500 ML, 2L, etc.) help in grouping the stores into meaningful clusters.

Point of Interest data – Points of interest like the number of restaurants, bars, beaches, etc. in the vicinity of each of the retailer outlets can be a useful data point in clustering. We generally retrieve the point of interest data from sources like OpenStreetMap (OSM).

Clustering Methods

To come up with the group of stores which are similar in characteristics, we experimented with both un-supervised clustering techniques like K Means and Hierarchical clustering and semi-supervised clustering techniques like metric learning. K Means clustering turned out to be the most effective algorithm in our case, especially since the business also had an input on the desired number of clusters for their markets. Explaining the clustering techniques in detail is beyond the scope of this paper.

Layers of Clustering

Our experience, working in different markets, suggests that the consumption behaviour of consumers varies drastically across the expanse of any country. For example: in some of the Western European countries, there are regions with a strong preference towards craft beer as compared to a different part of the country which has a strong liking toward stout. To capture these variations existing in the same market, a top-down clustering approach would not have sufficed. This prompted us to perform clustering at multiple levels. While the Demographic Data would help us with market level understanding of the population; Consumption Data from the retailer outlets would tell us which exact brands or styles or price segments were preferred by consumers in different regions of the country. These two levels of consideration would help us build a robust clustering model that would accurately capture the nuances of different regions in any market, without having a uniform model for the entire country.

While markets such as South Africa had distinct demographic patterns and subsequent consumption patterns in different regions which allowed us to create a decently uniform segmentation; in other countries such as the UK, consumption varied drastically across the country. The practical challenge of having two-tier clustering was that it resulted in many clusters specially in countries with huge variations in consumption pattern (such as the UK). This was where we had to sit with the business teams and try to aggregate some of these micro-clusters under a larger umbrella so that the subsequent steps of Category Management analytics such as assortment recommendations, etc. could be carried out in a less complex fashion.

Level Zero Checks

After we had aligned on the clusters with the business, and before subjecting the SKUs to go through the SKU optimization & 4C funnels, it was important to make sure that the data was clean and usable. Below are some of the checks that we do to ensure this:

Erroneous data points are removed or dealt with prior to the analysis

Products that are niche or recently launched or seasonal are retained for 'further consultations with the business' rather than leaving them to the risk of getting removed (as per the 4C framework mentioned above)

Some of the basic checks that we perform are listed below. Many of these are optional and need to be finalized after discussing with the business:

Recency Check – The SKUs which were launched in the last 2- 6 months prior to the assortment exercise could take some time for their sales to pick up and we believe it is not right to compare their sales with the rest of the well-established SKUs. So, we retained these SKUs in the optimized assortment unless asked by the business. Doing this ensures that the recently launched SKUs get more runway to prove their potential.

Price Anomaly Check – Within a category of products, in our case beers, we generally assume that the prices would be in a stipulated range and any product whose price falls outside this range could be flagged as an anomaly. The authenticity of prices of these products would be checked and corrected if necessary.

Seasonality check: For most of the retailers, there could be a considerable proportion of SKUs which would sell predominantly during a particular season. We do not include these SKUs in the assortment optimization as the annual sales revenue or volume of these SKUs could be deceivingly low and could get removed from the assortment. We flag products with exceptionally high sales during some seasons and add these SKUs to the final assortment only during the months when they are in demand.

Absolute Volume Check – We do not include SKUs which sell in extremely low volumes in the optimization step unless specifically asked by the business. This is done under the assumption that there could be erroneous barcodes that might have led to wrong purchase entry, or these SKUs were already in the process of delisting.

Discontinuity check: Discontinued SKUs are identified by checking the quarter-over-quarter change in revenue. SKUs showing decline above a cut-off are assumed discontinued and hence de-listed in our process. We do this under the assumption that these SKUs are being sold to sell off the existing stock and would not be resupplied. This list gets vetted by the business.

Identifying and Safeguarding Top Performing SKUs

While doing the SKU rationalization, we do not want to include the SKUs which are major volume drivers in the optimization process. The reason for this is, historically when we ran optimization iterations with the top-performing SKUs, a few of them got delisted. In such a scenario where a top-selling SKU gets de-listed, it would take a while before the lower selling SKUs would organically capture the lost volume. To avoid this, we keep the top performing SKUs out of the optimization process. The fact that all the major volume drivers are retained in the new assortment also helps in building the confidence of the retailers in the solution delivered.

Generally, in each category, there are around 20% SKUs which contribute to 80% of the sales volume. So, we protect those ~20% SKUs from optimization exercise and we call them Pareto SKUs.

Segmenting Products into Consideration Sets (Nests)

Nests are logical groupings of products with similar attributes – like beer style, price segment, pack size, etc. The underlying assumption of our approach is that a consumer would consider the products in a nest as alternatives while making a purchase. Nests are created after the above-mentioned Level Zero Checks and safeguarding the top performing SKUs. We run our SKU optimization codes on these Nests. This ensures that the optimization funnel is applied on comparable products.

To create nests, we group products that are similar in their attributes. Each nest carries products that belong to the same beer categories (lager, craft or domestic, etc.), same pack type (can, bottle, etc.), same price range (say $5-$10), and the same range of Rate of Sale (ROS) (say 20-30L per week). We perform binning using attributes such as price or ROS, and then different bins become part of various nests. The entire nest creation process goes through discussions with business teams to agree on which parameters should be fixed and where we can have some flexibility.

Below are few illustrative nests. As can be seen, the objective is to ensure full coverage of all attributes so that the end consumers' choices do not get limited.


Figure 3: Pictorial representation of a Nest
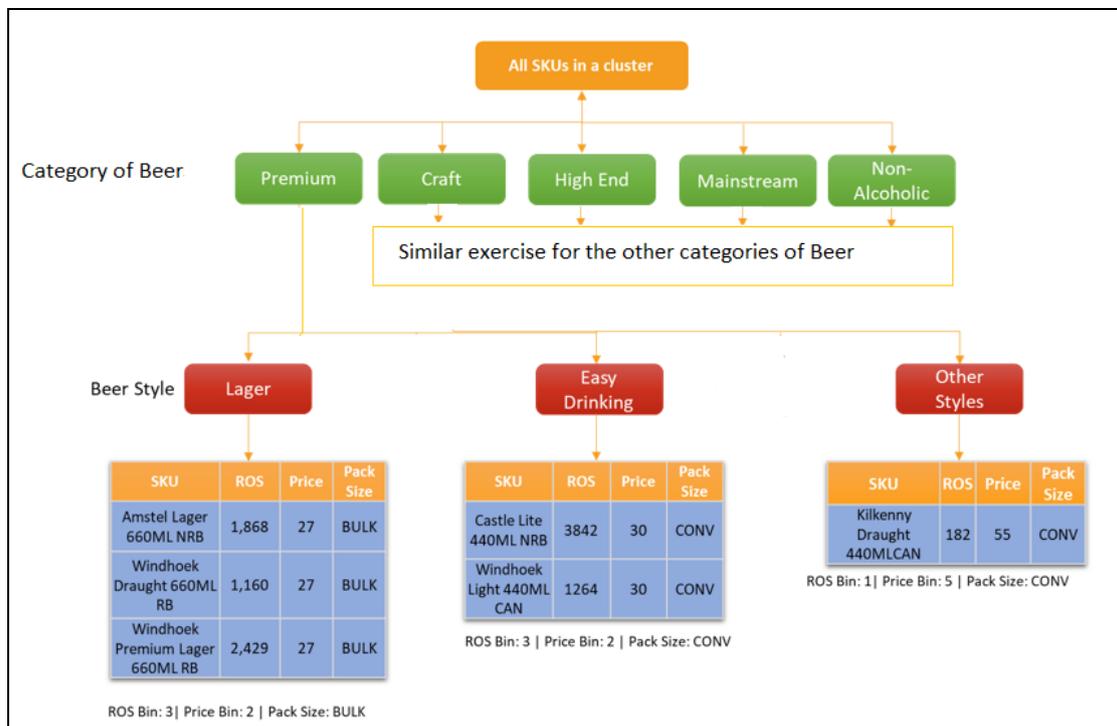
Figure 4: Example of a nest creation

Finding the Optimal Assortment by Maximizing Utility
Utility

The word Utility comes from Economics, and it means "usefulness" or "value", the value a product or service holds for the end consumer. Based on this we can see that the perceived value of a product could be different for different types of consumers. It is important to note that this utility of a product is determined by the attributes of the product and whether those attributes are relevant to the consumer or not (Fishburn, Peter C. (1970), McFadden, Train, Tye (1978).).

Random Utility Theory

Our solution for finding the optimum assortment comes from the source of Random Utility Models and these models aim at modeling the choices of individuals among discrete sets of alternatives. It is assumed in these models that the preferences of an individual among the available alternatives can be described by a utility function. The individual chooses the alternative with the highest utility (McFadden, Train, Tye (1978)).

According to Random Utility Theory, the utility (U) for an individual i making a choice j is a function of one or more observed features of the choice (V_{ij}), and an error term representing unobserved attributes (ε_{ij})

$$U_{ij} = V_{ij} + \varepsilon_{ij}$$

Here V_{ij} is the Systematic utility which is a function of observable variables and ε_{ij} is the Random utility.

Utility is being looked at as a product's importance for an individual; but for our use case where most of the times the data is not available at a consumer level (i.e., transaction-level data or loyalty data) and we do not know the attributes of the end consumer and the choices they make, we must settle with syndicated data at store-product-week/month level. We have come up with a way to work around this shortcoming. Since we cluster stores based on demographics, we go with the assumption that most of the consumers walking into a store in this demographic region would have similar attributes (ex: income, age, occupation, etc.). Based on this approach, we try to arrive at the list of products that would optimize the value/utility delivered by the entire store at an aggregate level.

Option of No Purchase and Purchasing Outside the Category

Our choice model is based on the Random Utility theory which says that people generally choose what they prefer, and where they do not, this can be explained by random factors. There is criticism associated with random utility theory which says that people are not always rational and most of the decisions are impulsive and made on the shelf. The way we look at this is that while the stated preference might differ from the final action of the consumer on the shelf, nevertheless sales truly reflect the revealed preference.

We have leveraged Multinomial Logit (MNL) which comes from the class of Generalized Extreme Value models. For example, a person may choose her preferred ice cream 9 out of 10 times and on the 10th occasion she chooses something else due to some random factor. To model the decision-making process mathematically, we need to make sure that the choices are exhaustive in nature. For example, if a store offers 10 products such that their selection is mutually exclusive, the consumer will have a probability associated with the purchase of each of these products and the sum of probabilities must add up to 1. Further, we would need to have a sample outcome set that shows all the possible choices, one of which being the option to not purchase anything. The utility associated with this no-purchase option governs the volume that would be lost because of changes made such as de-listing or a price change.

In our case, we consider the no purchase utility as the least useful choice for a consumer, because the assumption is that when a consumer walks into the store, she walks with the intent of purchasing something and only if she does not find any value in purchasing the offered items, she walks away with a no-purchase.

Thinking of this mathematically, we use sales as a proxy to identify the utility of a product. We call this a proxy because actual utility would come from a conjoint survey exercise where people provide their stated preferences of what they would choose when provided with n alternatives. Any product that got sold in a store, has a volume greater than zero, and hence will have some utility associated to it. Another assumption here is that no-purchase option/outcome is the least popular outcome in the universe of

possibilities, i.e., the probabilities of products getting bought are a function of their utilities, higher the utility, higher the probability of a consumer buying it. Keeping this in mind, we assign the no-purchase option a nominal utility value which is lower than the least popular choice in the nest, i.e., the product with the lowest utility.

Specifically speaking, the outside options are assigned a utility which is lesser than the utility of the smallest selling SKU in the nest, which then makes the no purchase scenario the least taken option or least popular choice.

Outside option is pretty similar to no-purchase situation except that here the consumer, in the event of not finding a product on the shelf, shifts to a different category (ex: shifting away from Lager beer to Flavored Alcoholic Beverage or Soda).

Optimizing the Assortment using Genetic Algorithm

As mentioned before, we run the optimization within each of the nests to maximize the value of the objective function.

Objective Function

The objective function calculates the revenue from the exponential of utility and the market share of the product and the original volume. Please see the formula below for the objective function

$$\text{Revenue} = \sum_{i=1}^{n} \frac{p_i * \exp v_i}{\sum_{i=1}^{n} \exp(v_i) + \exp v_{no\ purchase}} * original\ volume$$

Here p_i denotes the market share of the product,

$\exp v_i$ denotes the exponential of utility of the product,

$\sum_{i=1}^{n} \exp(v_i)$ denotes the sum of the exponential of utilities of all the products in the nest, and

$\exp v_{no\ purchase}$ denotes the exponential of utility of the outside option

The objective is to arrive at the list of SKUs within each nest that would maximize the retailer's revenue at the cluster level. To identify the top-performing SKUs which have a meaningful contribution to the cluster revenue, we experimented with different optimization techniques like differential evolution optimization (using the DEoptim package), linear programming (using lpsolve) and genetic algorithm (using genoud package). We did not get the best results with either DEoptim (as it was taking extremely long to converge and also had output in decimal values between 0 and 1 making it difficult to identify the cut off values for recommending the SKUs) or lpsolve (this linear programming based algorithm was recommending very few products per nest in an unconstrained approach and it was practically very difficult to add constraints to make sure more products which would maximize the revenue got recommended). We therefore decided to use genetic algorithm using the genoud package for identifying the optimized assortment. The convergence time for the genetic algorithm was much lower than DEoptim and the algorithm also provided the option of receiving the outputs as integers (1 or 0 which implies whether we are recommending a product or not).

Genetic Algorithm

Genetic algorithm is a search-based optimization algorithm based on Darwin's theory of natural evolution (TL Urban (1998)). It works on the basic principle of Darwin's theory that the fittest would survive, and they would be selected for reproducing the next generation. It works on a random selection process and can solve complex and non-linear problems. Details of genetic algorithms are beyond the scope of this paper.

We run genetic algorithm for each cluster at the level of different constituent nests. Here we maximize the revenue and from the algorithm, we identify the best combination of SKUs that get selected and directly go to "Green" list, while the remaining SKUs go to "Amber" list for further investigation.

Identifying High Growth SKUs and SKUs with Close Substitutes

After completing the optimization, the SKUs recommended to be delisted would further go through a few more rounds of checks to make sure that the SKUs without close substitutes and SKUs with high growth are preserved.

Identifying High Growth SKUs

There could be SKUs which may not be selling in great volumes currently, but their market share shows a consistent quarter on quarter increase. In this step, we protect those SKUs with a QoQ growth

above a certain threshold. SKUs above a particular cut off are marked as growing SKUs and they would be removed from the list of SKUs marked for delisting. Further, we consult with the business team on how the retailer would like to deal with these high growth SKUs. The threshold growth rate for determining the 'growing SKUs' depend on the overall growth of the SKUs across segments and generally falls between 5% to 10%.

Checking for Close Substitutes

Before delisting an SKU from the shelf, we need to make sure that there are substitutable products available so that a customer walking in for a particular type of product would not be disappointed. This is necessary because there could be customers with niche preferences looking for a particular category of product and even though the sales from that category may be less, delisting the category completely could have negative halo effect on the sales of other brands which are often picked within this category.

Checking for substitutes is done both within and outside of nests. This is because SKUs from different bins could be alternatives and they could have got separated into different nests due to marginal differences in attributes such as price or Rate of Sale.

Identifying Potential Super Performers with Low Distribution – for 'Cultivate' list

The Cultivate List in the 4C Framework focuses and brings forth products that have the potential to grow and generate more revenue for the retailer but got overshadowed and neglected in our analysis due to their low utility which in turn is dependent on their volume. This could be due to reasons such as low numeric distribution (not being present in enough number of stores) or low weighted distribution (not being present in the right set of stores, i.e., the product not being present in stores where that particular beer type is in demand), etc. We try to look at these products more deeply to eliminate the inherent disadvantages associated with them.

We do this by identifying SKUs which have performed well with respect to their distribution by making use of a metric *Over performance index* which is calculated by dividing the volume percentile of a SKU by the distribution percentile.

Over performance index = **Volume percentile/ Distribution percentile**

An *over performance index of greater than one* indicates that the SKU is performing better than the similarly distributed SKUs and may have a potential to do even better if the distribution is improved. These SKUs could be considered as candidates for cultivate.

Demand Model – Introducing SKUs Across Clusters

There could be products that are performing well in some of the clusters or regions and can potentially add value if introduced to other clusters as well. To identify SKUs that could do well when introduced to a new cluster, we have developed a machine learning model which uses algorithms like Random Forest and XGBoost to predict the volumes that an SKU can generate when added to a new cluster.

To predict the volumes of potential SKUs, the model uses three sets of variables

SKU related variables like product description, brand, pack size, etc.

Store related variables like Regional Sales Division, Strategic Business Unit, number of bars in the area, number of hotels in the area, store parking space, etc.

Sales related variables like net revenue, base sales, price, number of orders for the SKU in the week, etc.

The predicted volume of these new SKUs would be compared with the volumes of existing SKUs in each segment and the SKUs that do well compared to the existing SKUs can be considered for recommendation. Generally, for introduction, we consider those SKUs whose predicted volumes exceed the top ten percentile of each segment.

Financial Impact Calculation

Once we complete the assortment optimization process and make the SKU recommendations, it is important to understand the financial implications of the new assortment. We calculate the financial impact at the store level, and they are later rolled up to the retailer level to understand the overall impact. To calculate financial impact, we assume that:

The space emptied by the 'delisted SKUs' is distributed among the SKUs that we are retaining (Keep) and to the new SKU introductions, in proportions of their expected Rate of Sale (ROS)

Share of the shelf cleared due to SKUs getting removed (Delist SKUs) is equivalent to the volume share of those SKUs

The ROS of SKUs which are being newly introduced in a store is approximated from the 'similar' stores in the neighborhood. The definition of 'similarity' can vary across retailers and needs to be finalized after discussions with the retailer and business teams. We generally consider stores with same store format (Supermarkets, Convenience stores, etc.) Cluster, Region, etc. as similar. A store can be considered to be in the neighborhood' of another store if the geographically distance between them is within a threshold. This threshold could be 0-3 kilometers or more and to be decided after understanding the geographical realities of the market. Once the 'similar' stores in the neighborhood are identified, the ROS for the new SKUs are calculated as the mean ROS, and the number of weeks the SKU was sold is calculated as the median of the number of weeks it was sold in the similar stores in the neighborhood. Once we have the ROS and the number of weeks the SKU was sold, the revenue from the product is calculated by multiplying the ROS, price, with the number of weeks the SKU was sold.

Manufacturer	Recommendation	SKU	Original ROS (Volume/ week in L)	Price	Total Revenue (Volume*Price* Weeks)	MS (Pre-Assortment)	Weights (based on original ROS)	Distribution in New Portfolio	New Shares (Post Assortment)	New Volumes	New Revenue (Volume * Price)	Total New Revenue (Revenue*Weeks)	Overall Impact
ABI	Keep	Budweiser	500	4	130,000	42%	0.4	10%	52%	624	2,496	129,792	
HK	Keep	Amstel	400	5	64,000	33%	0.32	8%	41%	492	2,460	98,400	
HK	Delist	Kronenbourg	300	3	42,000	25%	-	-	-	-	-	-	3%
ABI	Introduce	Budlight	350	5			0.28	7%	7%	584	420	14,700	

For SKUs which are getting introduced in the store, their ROS & Price get approximated from the nearby "Similar" stores in the same Cluster Region & belonging to the same store format.

We distribute the delisted SKU's share into the existing and new introductions based on their weights.

Total 25%

Table 1: Illustration the Revenue Impact of De-listing & Introducing SKUs

Collating Recommendations

Classifying Products under the 4 Cs

After performing all the above-mentioned steps, we finally classify the SKUs under the 4C Lists (Conserve, Consult, Cultivate and Cull). These lists help us in highlighting the reason due to which a certain recommendation was made for a SKU.

Conserve list captures SKUs that are volume drivers i.e., Pareto SKUs or SKUs that have a high incremental volume.

Consult list captures the SKUs which are either not easily substitutable or grew in market share in the last quarter. Even though these SKUs do not add a high incremental volume to the category, they nevertheless cater to a niche and hence add to the diversity of the product portfolio. **Cull list** highlights the SKUs that are low on incremental volume, do not have growth in market share and can be easily substituted by the other products retained in the portfolio of SKUs. **Cultivate list** includes SKUs that have shown promising sales in the limited avenues they were present in. The reach of these SKUs can hence be expanded to a larger number of stores.

Here's a flowchart which shows the process in a nutshell –
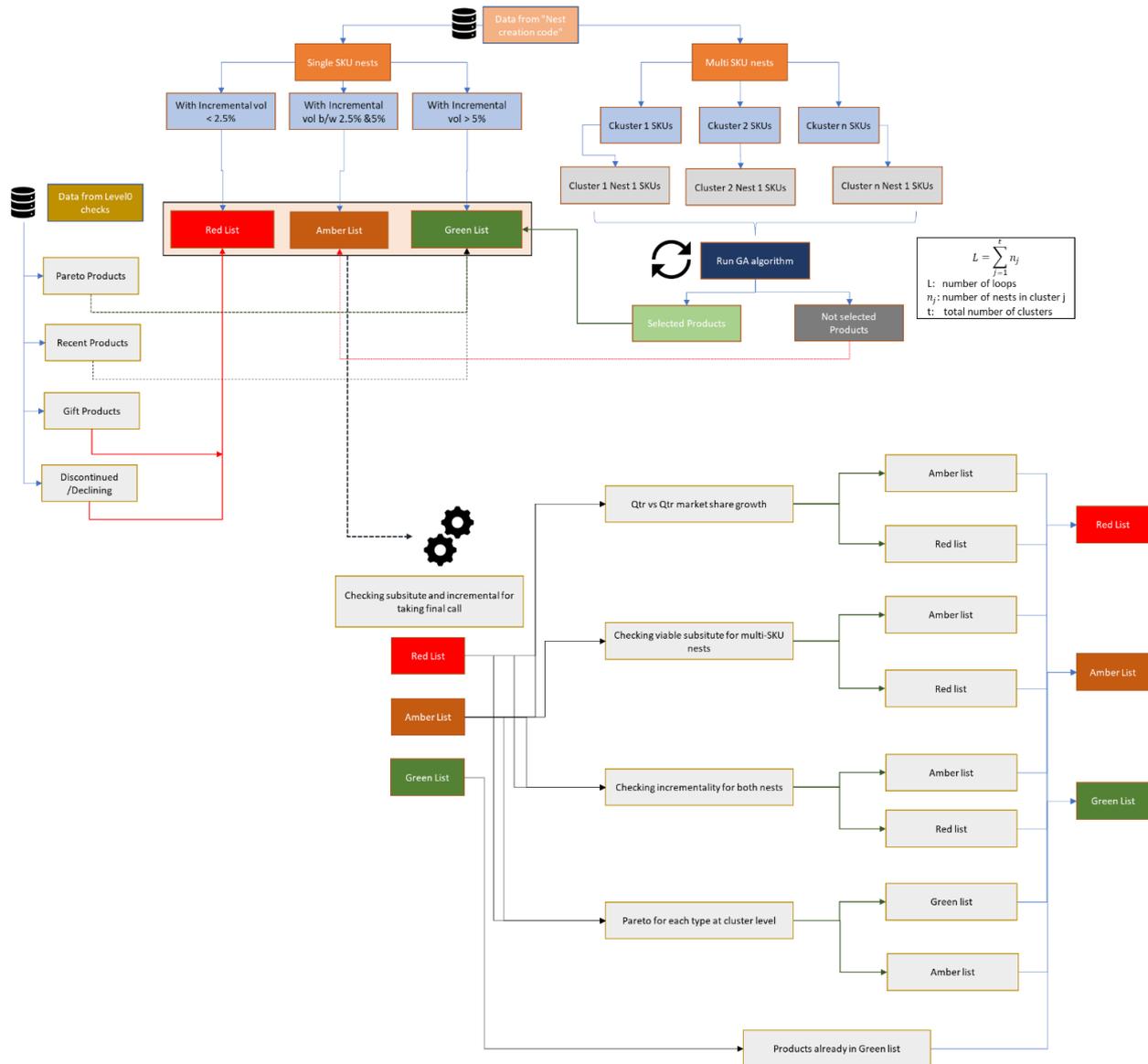
Figure 5: The Process Flowchart

Recommending Quantities of Products

Along with recommending SKUs for a store or a cluster, we also keep in consideration their quantities because that is how we would ultimately convert these recommendations into shelf space and put them out on planograms.

While we perform the SKU optimization exercise using genoud, we run simulations to find the predicted volume for each SKU and the volume that would be lost to another store due to a no-purchase situation. Using these predicted volumes, we can estimate the recommended shelf space for products.

But often volume is not the only parameter to consider when assigning space to a product. Hence, we create a rank of SKUs based on a composite score of predicted volume, ROS, and recency of a product.

Once we finalize on the shelf space to be allocated to each product, we then use this as an input to create planograms using any planograming tool.

The final leg of implementation requires deep collaboration with the retailer and the business teams to ensure the strategic priorities for the retailer are fully taken care of.

Measurement of results

The last step of the process is to measure the effectiveness of the recommendations. For this we need to measure the lift in sales which can be statistically attributed to the change of assortment and planogram.

Below we are elaborating the results from a retailer from Mexico that we will be referring to as Retailer X

Identifying the test and control stores

For measuring the lift in implemented stores, we follow a test-control approach. In a design of experiment, a test group is a sample or a group that receives an experimental procedure or a treatment. A control group is a group separated from the rest of the experiment such they are shielded from the independent variable that is being tested (new assortment).

The implemented stores in our case become the test stores and the new assortment is the treatment. To find a set of control stores, we performed few high-level checks:

Control stores should correspond to each test store and should be from the same cluster

Control stores should be from a similar area such that the socio-demographic and consumption profile of the customers served is consistent. This is done by taking the zip of a test store, then using cosine similarity on zip level demographic data to find the top 2 most similar zip codes to get our control stores. We identify our control stores use the following store characteristics to identify the similarity-

Average sales of the stores should be similar (within a defined variance limit)

Test and control stores should have similar SKU lists (within a defined variance limit)

For this pilot Retailer X, we identified 14 Test and 17 Control stores from the same cluster.

Checks on data consistency and selection bias

Once matchable test-control pairs of stores are arrived at, we first check the robustness of test and control groups to make sure there is no selection bias present in the selection of control stores. We generally use Propensity Score Matching (using K Nearest Neighbor algorithm) to make sure the test and control stores were similar before the experiment. The results we have from the Retailer X is shown below.
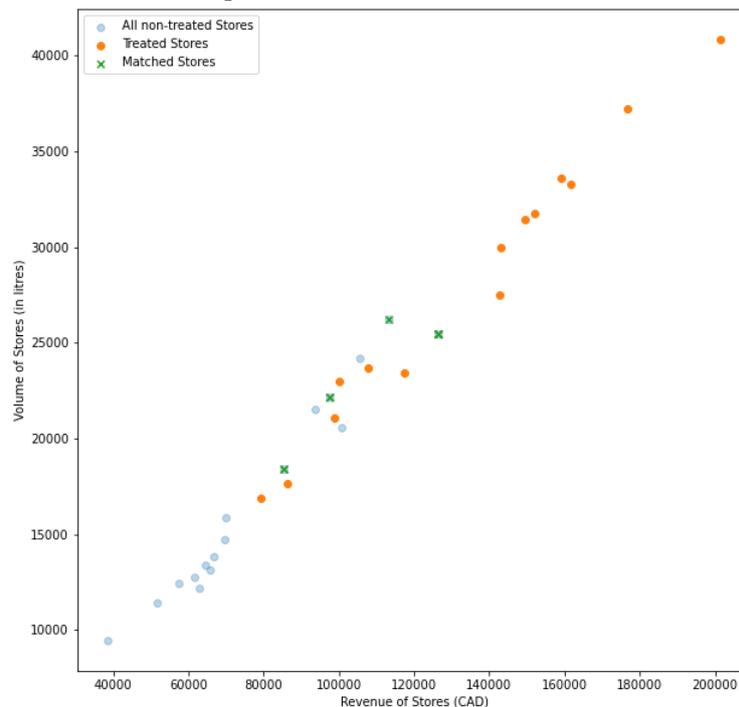

Figure 6: Propensity Score Matching for the stores

Here the treated stores are the ones where our assortment optimization solution got implemented and the matched stores are the ones identified as control stores. From the graph it's identifiable that they are similar.

Check for statistically significant difference in revenue between Test and Control stores

Once we have the test and control sets of stores finalized, we conduct hypothesis testing to identify if there is any statistically significant difference between the average sales of Test and Control stores in the treatment period. We use Difference in Difference (DiD) method to check and validate if the impact of treatment exists. In the below chart we have the results of the DiD estimate between the test and control stores of the pilot Retailer. And a positive sign of the time*treatment variable(did), indicates that treatment has a positive impact on the stores.

Coefficients:	Estimate	Std Error	t value	Pr(>|t|)	Significance level
(Intercept)	8022	432.4	18.552	< 2e-16	***
treated	4521.4	643.4	7.027	6.23E-12	***
time	677.7	611.5	1.108	0.2682	
did	1662.5	910	1.827	0.0682	.

Table 2: Results of Difference in Difference Estimation

Further details of the measurement strategy are beyond the scope of this paper.

Financial Impact Assessment

The financial impact attributed to the impact of assortment optimization is calculated by comparing the revenues of test stores vs. the control stores as below.

	Test	Control
No. of stores	14	17
Average Sales Revenue 2021	133,953	78,298
Average Sales Revenue 2020	112,891	72,198
Aggregated Sales Revenue 2021	1,875,339	1,331,060
Aggregated Sales Revenue 2020	1,580,468	1,227,372
% Revenue Lift in Test (14) Vs Control (17)*		10.2%
% Revenue Lift=Change in revenue % in test data-Change in revenue % in control data		

Table 3: Comparison of test and control store revenues

As shown in Table 3, there was a revenue lift of 10% in the stores where the assortment optimization was applied compared to the store where it was not implemented.

Conclusion

Ensuring efficient Category Management is important to any Retailer. A Retailer cannot carry the same assortment forever and needs to refresh it based on the market trends and changing customer tastes, to maximize their revenue and customer satisfaction.

As discussed in detail in our paper, we referred to the leading approaches being adopted in the industry to address the challenge of assortment optimization. We spent a great amount of time researching the best-in-class academic approaches to solve this very important and long existing industry challenge. Not only did we incorporate the most suitable econometric models together with cutting edge genetic algorithms, but we also gave an equal amount of importance to heuristics. This hybrid approach enabled us to come up with a robust mathematical approach which is overlaid by a strong layer of business acumen as well.

We believe one of the most significant enhancements that our approach brings forward is the flexibility of its framework which very well captures the nuances of different markets. It also provides a great deal of control to business practitioners who can tweak the knobs for certain group of products which they feel are important to be continued in the recommended assortment. Although it may be difficult to take care of these borderline products which would otherwise not find a place in any standard assortment optimization exercise, our approach provides just enough space to accommodate these products as well so that at the end of an assortment refresh exercise, the final consumer is able to find what she was interested in.

For an organization like AB InBev which has markets across the globe and caters to a wide range of consumer tastes and preferences, it is extremely important to empower its Retailer partners with a highly customised approach to serve the end consumers in a holistic way.

We have formulated a process for finding optimal assortments, comprised of an optimization model and heuristics-based interventions for choosing the right assortment.

Limitations and directions for future research

Although the study results create a comprehensive framework for finding the right assortment, there are some limitations that should be mentioned and noted.

Impact of promotional pricing - The purchase decision of a consumer can get heavily impacted by the promotions being run by the retail at various points in time. However, in this study, we have assumed that there are no promotions at any point in time as the promotional data was not available.

Use of Transactional and loyalty card data – Transactional data combined with the demographic information of the consumer can provide useful insights about shopping behavior. But this study was limited to the store level sales data and demographics data.

To further enhance this approach, a similar study should be carried out with more data sources like transactional data, loyalty card data, and data on promotional pricing.

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The unexpected business case of answering a questionnaire on organizational transformation

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Abstract

The input from managers and employees is vital for strategic decision-making. Yet, these people already have enough on their plates if not overwhelmed by their daily to-do lists. We measured how employees in an organizational transformation could save time by stopping to work on non-priorities and stopping to reinvent the wheel by sharing knowledge. First, we designed a new survey scale replacing a Likert survey to ask people for input objectively, reducing interpretation bias. Next, we analyzed survey input from over 32,000 respondents in more than 900 teams in 150 different organization transformations. To free up time, we compared were respondents' planned improvement deviated from their management priorities. To work smarter, we focused on knowledge sharing: how could one employee that already had improved on a specific topic help a colleague that still had to improve? On average, we found a productivity increase of 75 hours, or €2,500.- per respondent. This productivity increase of 75 hours required two things: an average time investment per respondent of max. 15 minutes to answer a questionnaire and an algorithm to indicate 1.) what priorities to focus on and 2.) which colleagues could help with each of these.

Introduction

Managers and employees need some relief

With new technology and increased global competition, it has become customary to be on the clock 24/7. However, this has created more stressful employees who are more prone to burnout. In Kelly and Moen's book, *Overload*, this phenomenon is explored, along with ways to redesign and adopt ways to resolve the issue (Kelly and Moen, 2020). Hodson et al. (2014) argue that today's 24/7 work environment and the resulting overwhelmed employees are "undermining productivity and contributing to low employee engagement." Companies must realize that overwhelmed employees are detrimental to business practice. Not only are people all over the world working longer hours in toxic work environments, but these practices also do not even correlate to higher productivity or company performance (Pfeffer, 2018). A Kronos and Future Workplace study (2016) shows that employee burnout directly affects employee retention, with many companies still failing to address the issue before it is too late. A Gallup study found that every two out of three full-time employees experience burnout from work. A burnout directly affects the workplace environment; those who experience burnout are more than twice as likely to seek other jobs (Robinson, 2019) actively. Executives today are spending more than twice as much time in meetings compared to executives in the 1960s - about 23 hours, compared to less than 10 hours. Perlow et al. (2017) maintain that these meetings eat up more time than they are worth, harming an organization's performance, innovation, and employee retention.

Their input is needed, yet employees also seem reluctant to give it

In a study by Rose et al. (2007), receiving monetary incentives for completing an employee survey led to increased response rates from the group. A follow-up study found that neither the novelty nor incentive size had significant consequences, rather than the incentive itself. Fauth et al. (2013) assert that "Workgroup variables may play an important role in explaining non-response in employee attitude surveys." For example, they found that higher response rates were tied to groups with higher aggregate job satisfaction when analyzing group-level responses. A study done by Rogelberg et al. (2000) indicated that those who did not respond to employee surveys were more likely to leave their job, have lower job satisfaction, and less commitment to their organization, as well as "negative beliefs regarding how their organization handles employee survey data." A study of military and civilian workers found that employees are more likely to be discouraged from completing an employee survey if hosted online. Additionally, the top reasons given for non-response were that employees were too busy, they didn't see the need to respond since they are satisfied with the workplace, or employees saw it as a waste of time due to the belief that management wouldn't do anything with the results (Foster & Surface, 2007). Barr et al. (2008) observed that employees who experience work overload and generally higher stress levels are less likely to respond to employee surveys. Surveys done for academic purposes also suffer the problem of non-response.

A study about testing paper vs. electronic employee surveys showed that while paper surveys resulted in a higher response rate, the attitude toward electronic surveys was that these were easier to use. Overall, neither survey outweighed the other in data quality (Croteau et al., 2010). Saleh and Bista (2017) observed that response rates were "highly influenced by interests of participants, survey structure, communication methods, and assurance of privacy and confidentiality, and older participants were more likely to respond if they were promised a reward." Among executives in various Australian businesses, non-respondents listed a lack of time as the rationale for not completing the survey given to them (Falconer & Hodgett, 1999).

Employees can help each other

Oye et al. (2011) conclude that motivators and demotivators influence knowledge sharing in the workplace. More specifically, employees are motivated to share knowledge due to job security, obtaining a mutual benefit, and performance reviews. They are demotivated by job security, the need to protect "one's edge," and wanting others to ascertain the knowledge themselves. The results of a knowledge-sharing study in various workplaces in South Korea showed that factors like reward systems, open communication, and workplace support from leaders had a positive impact on knowledge sharing among employees (Kang et al., 2008). Haas and Hansen (2007) concluded that different types of knowledge had additional benefits in knowledge sharing. For example, sharing codified knowledge was timesaving but had no impact on the quality of work. On the other hand, sharing personal knowledge improved work quality but had no time-saving effects. Research done by Poleacovschi et al. (2017) suggests that when it comes to knowledge sharing, those closer in terms of their networks benefitted more from time savings after sharing their knowledge compared to those with weak connections. Wolfe and Loraas (2008) assert that an incentive must be offered to promote full knowledge sharing, whether monetary or non-monetary. That incentive must be deemed sufficient by the participants. Additionally, where there was individual competition in the workplace, there was less knowledge sharing. Wang and Noe (2010) discuss their knowledge-sharing framework, which includes five areas of emphasis: "organizational context, interpersonal and team characteristics, cultural characteristics, individual characteristics, and motivational factors."

Objective

It's beneficial to ask managers' and employees' input for the sake of strategic decision-making. Yet, they have enough on their plates if not overwhelmed by their to-do lists. So, is there a way to free up time? To work smarter. The purpose of this paper is to calculate the business case for answering a questionnaire along these two axes: do less and work smarter.

Method

Procedure and participants

We focused on working less by comparing employee ambition with management priorities. Any employee effort not directed at management's priorities is considered wasted time. We defined how to work smarter by stopping to reinvent the wheel: who could help whom to improve with what?

Hence, we needed to objectively compare employees' actual situation, ambition, and management target within one survey format. We first designed an alternative scale based on the Guttman scale (Guttman, 1950), specifically designed for employee polling ("Guttman-Poll," van de Poll, 2018).

Next, we researched 154 strategic assessments (questionnaires) that required managers and employees to focus on (top-) management's attention. These assessments included topics on - among others - employee engagement, innovation, work processes, competencies, digital transformation, work pressure, technology adoption, team effectiveness, and IT security. These assessments involved 928 teams from various industries (both profit and non-profit) in 18 countries. These teams were home to 32,772 employees giving approximately 2.9 million answers.

Measures

We tallied teams on their progress towards a management target. That requires asking for verifiable facts or behavior, not opinions or agreements with statements. We needed 'numerical or categorical representations' for our intended calculations (Plewis & Mason, 2007). Therefore, we replaced the traditional Likert survey format for employee polls in favor of a Guttman scale survey, optimized for employee polling (van de Poll, 2018 and 2021). A Guttman survey scale shows the actual situation in a progressive format ("current status data" according to Diamond, McDonald, and Shah, 1986): a scale from not so good to better to even better ("breaking points" according to Uhlaner, 2002). For example:

Q. How do you celebrate successes?

We don't

When there is a reason to do so, with whoever is involved

We make it a habit to celebrate successes with the entire team

Such answers can be considered 'objectively real' or 'a testable proposition' (Ahrens & Chapman, 2006). We eliminated adjectives and adverbs that cannot be verified (e.g., "good"). And we added "proof-words" like, e.g., 'periodically,' 'formally,' 'measurable,' 'documented,' and 'described' to reduce self-reporting bias by the respondent (discussed by Donaldson and Grans-Vallone, 2002). Additionally, such "proof-words" help with verification and prevent employees from adding cognitive or emotional meaning (Frese & Zapf, 1988).

Data analysis

Each of our Guttman-Poll survey questions had three answers. We assigned a score of 0 (zero) to the 'worst' answer (or most employees: the current situation). The 'middle' answer (the intermediate step) had a 5. The 'best' answer (often reflecting the content of the strategy that needed to be achieved) had a score of 10. We did not apply any weights among questions and answers. Each question of each questionnaire got, in the end, three scores. The respondent indicated the actual situation and their ambition in 6 months (so, giving two answers to each question). The third score was the management target (The method with which the management target had been calculated is out of scope for this article). Any improvement planned by respondents beyond the management target is considered a non-priority. We demonstrate our calculation method with a few examples in Table 1.

Table 1
How we calculated

	Answer 1	Answer 2	Answer 3	→	Result
Non-priorities					
Respondent 1 scores on:					
Question 1	Actual/Target		Ambition		2 steps waste
Question 2	Actual	Target	Ambition		1 step waste
Question 3	Actual/Ambition		Target		2 steps short
Knowledge sharing					
Two respondents score on Question 4:					
Respondent 1			Actual/Target		
Respondent 2	Actual		Target		R2 can ask R1

We used the actual and target scores to calculate who could help whom. Someone who already had achieved the management target (or better) could help a colleague who still had to improve. Logically, a 'donor' on one question could be the 'recipient' with another question. This sharing is also briefly explained in Table 1. Working with such a questionnaire and calculating who can help can create an organizational knowledge-sharing network. Figure 1 shows a simplified version of such a network.
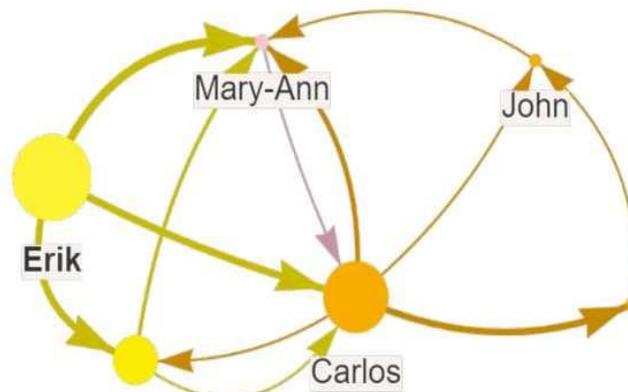

Figure 1. Knowledge sharing network

Results

Table 2 summarizes the circumference of the database available to us. It shows how we calculated the time saved (in money and hours) for not spending time on planned improvements that were not a management priority. We calculated the average number of questions per team member, where the ambition score was higher than the improvement target set by management. Next, we assumed the number of hours that would otherwise be spent on these non-priorities and settled for a - in our minds very conservative - three hours' timesaving. We then assumed an average day salary per person of €275.- This salary includes, for example, taxes, laptop, and staff overhead. The productivity gained amounts to the number of non-priority questions per person × the net hours saved per question × day salary ./. 8. We refer to "net hours" as some (minor) time investment needed to communicate the need for a respondent to stop working on the non-priorities. The division by eight is to align with the net hours saved. We similarly calculated the time saved by sharing knowledge (rather than reinventing the wheel). The number of questions to share per person × the net hours saved per question × day salary ./. 8.

Table 2
Sample size and projected time saving

	N	Min	Max	Avg.	StDev.	→	Result	Share%
Sample size								
Number of questionnaires	154							
Number of teams	982							
Number of employees	32,772							
Teams per questionnaire		1	43	6.4	9.5			
Number of employees per team		5	677	33.4	59.4			
Number of questions per questionnaire		8	234	46.0	24.1			
Non-priorities								
Number of non-priority questions per person		0.0	101	20.9	17.1			
Nett hours saved per question*							3	
Day salary*							€275	
Average savings per person in €							€2,155	
Average savings per person in hours							63	84%
Knowledge sharing								
Questions to share per person		0.4	20	6.0	3.3			
Nett hours saved per question*							2	
Day salary*							€275	
Average savings per person in €							€414	
Average savings per person in hours							12	16%
Total average savings per person in €							**€2,569**	
Total average savings per person in hours							**75**	

Min.: lowest number. Max: highest number. Avg: average number.
*StDev: standard deviation. Items with an * are our assumptions*

We have expressed the productivity gain in both hours and money: on average, 75 hours or €2,500.- per respondent. The right-most column ("Share%") shows that the average contribution of stopping work on non-priorities is 84% of those 75 hours. Knowledge sharing covers the remaining 16%. Summarized as a rule-of-thumb: 15 minutes answering a questionnaire result on average in 75 hours productivity gain, of which 5/6 through working less and 1/6 by working smarter.

Figure 2 shows the combination of the monetary effects of working less (X-axis) and working smarter (Y-axis). Each dot represents the average productivity increase (in euros) per employee in that team.
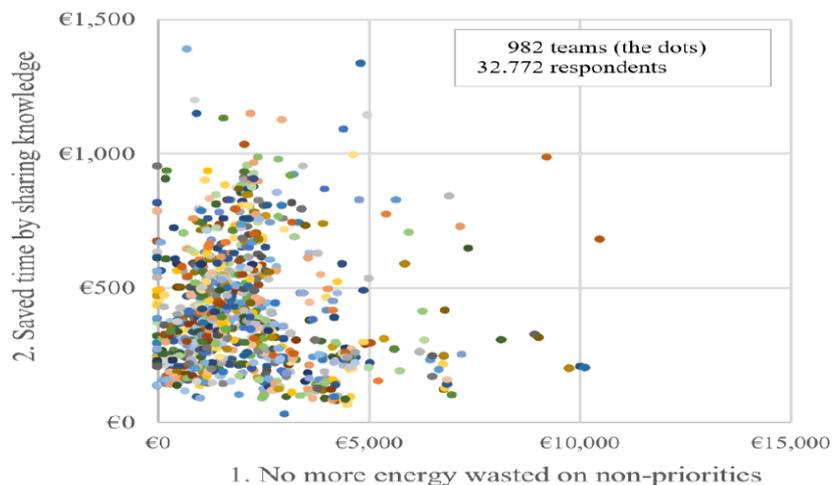

Figure 2. Improved productivity

Discussion

The monetary amounts in extra productivity that we have calculated explain why employees need to answer a questionnaire. They contribute to a more efficient workforce: focus only on the priorities and stop reinventing the wheel. We deem our assumptions of time saved per non-priority question (3 hours) very conservative. Additionally, we haven't calculated other benefits of a more focused workforce. For example, a shorter time-to-value, more efficient spending of capital, fewer over-demanded employees resulting in less absence, to name a few. Our business case ("invest 15 minutes and get 75 hours back") would be even more positive in that light. Scholars could research whether employees regard this support (with fewer priorities and smarter working) as an incentive to participate in a questionnaire and, thus, organizational transformation. In other words, employees' reluctance to participate, as mentioned in the literature, now decreases. In the same token, by introducing an easy way to share knowledge among employees, additional benefits (other than productivity) can be unlocked. Our literature review mentioned a sense of belonging and work pride ("Other people need my expertise") and a lower chance of employee burnouts. On the other hand, there is the investment of setting up a questionnaire and the software's rental cost to calculate smart targets for everyone plus the organizational networks (who can help whom with what). Yet, where the benefits are in the range of a few thousand euros, the software cost is between 50 and 100 euros per person.

Theoretically, one could say that answering questionnaires for a few days in a row would mean that an employee is off for the rest of the year. Seventy-five hours equals two workweeks. So, it would only take 20 questionnaires to get a person's year of productivity in return? Of course not. Answering the questionnaire helps to guide employees to do their work. And obviously, there also will be diminishing returns. The first round of a questionnaire may, on average, yield 75 hours. The next iteration of that same questionnaire will undoubtedly yield much less. The 'low hanging fruit' in improvements will be captured by then. On the other hand, to counter this argument, management can upgrade the questionnaire by replacing high-scoring questions with new topics. Then the cycle starts anew.

Limitations and future research

There are several cautionary remarks to be made about our research. Although we have worked with a relatively objective survey scale, there is always some subjectivity in the choice of questions and the composition of answers. We had access to a database of rather strategic assessments. The impact of such assessments on an organization is much more profound than answering a questionnaire about, say, where the next management team offsite will be. In that sense, the returns can still deviate significantly from the 75 hours we found.

We also had some debate about the calculation of the non-priorities. Logically, we could not measure whether employees would have begun implementing their planned improvements. No management team decided to have half of their teams improve as we suggested (do less, share knowledge) and leave the other half muddle through, just to hand us an A/B test in the name of science. More research is needed to calculate when and how much returns will deviate from our average. There are more aspects of the business case that we have not included. On the other hand, we focused on more strategic assessments. Different types of questionnaires will yield much less. Finally, the business case will be better when longitudinal effects are factored in (e.g., how much returns will diminish over time).

Conclusions

In this study, we describe knowledge sharing as to how one employee who already had improved on a specific aspect could help a colleague who still had to improve. Towards this aim, we researched 154 relatively strategic assessments that include topics from employee engagement to IT security. These assessments involved 928 teams from various industries (both profit and non-profit) in 18 countries. These teams were home to 32,772 employees giving approximately 2.9 million answers. Each questionnaire question has three scores: one score for the actual situation, the other two scores for ambition in 6 months, and the management target. We used the actual and target scores to calculate who can help whom. Algorithms that give employees something back (less work, not reinventing the wheel) make good business sense. On average, we found a productivity increase of 75 hours, or €2,500.- per respondent. Of his productivity, 85% was due to stopping to work on non-priorities and 15% due to sharing knowledge.

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Do the organizational proficiencies dominate in innovation and can manage the major factors of innovation?
A Systematic Literature Review of Last 5 Decades

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Abstract

Purpose of the research: Innovation is the key to organizational success in the present complex and competitive business environment. Numerous factors are continuously affecting the innovative performances of the organizations. researchers across the globe, have pointed out different factors and, often, several thematic factors that have been proven with strong positive effect on the innovation activities and innovation outcomes. The research attempted to find out the most dominating factors of innovations in the organizations through an extensive systematic literature review that ranges from 1973 to 2021.

Methodology: Resulting on the 102 individual influencing factors of innovation through the literature review, the researchers classified those factors into 10 thematic groups, e.g., culture, HRM functions, top management orientation, external environment, organizational proficiencies, leadership, knowledge management, market pressure and competition, technology adaptation and research and development. Besides, the researchers endeavoured to figure out the interrelationships among the identified dominating factors.

Findings: Finally, through couple of propositions, the research successfully identified 5 dominating factors of innovation, e.g., organizational proficiencies, external environment, culture, market pressure and competition, and HRM functions. Among 5, the factors of organizational proficiencies noticed the most dominating. The interrelationships between organizational proficiencies and external environment, culture, market pressure and competition, and HRM functions examined and delivered through an easy-to-understand diagram.

Originality and implications: This robust research is very valuable, firstly, it has accumulated the factors of innovation from the studies of last 50 years, secondly, it has established 10 thematic factors of innovation, and thirdly, the research has figured out the most crucial thematic factor of innovation which accelerates innovation and can control the threats of other relevant factors of innovation.

1.0 Introduction

The current business environment is extremely dynamic. It is worryingly complex for all industries across the globe due to environmental (Osiyevskyy et al., 2020) and climate changes (Mercereau et al., 2020) along with increased demand (Wang et al., 2020a) and shifts in taste of customers (Jaworski et al., 2020).

Almost every day, new problems are arising, which are pushing the organizations to maximize their capacities. Organizations are continuously struggling to be prominent with new tactics/strategies for their optimum and viable professional activities. The two universal unique proficiencies are differentiating the products and lowering the cost (Hill et al., 2015) which are attainable; either by superior efficacy in innovations (differentiations) or by inventions. Hence, the significance of innovation is of paramount importance. Worthy approaches in innovation, be in products or processes, or services, can offer competitive superiorities to the organizations. There are numerous forces that affect organizations when it comes to innovations, and these factors are both external and internal (Antonelli et al., 2013). This study is aimed at finding the most dominant factors of innovation, as well as to explore the interrelation among them. Various studies have revealed that factors of organizational proficiencies, culture, external environment, and HRM functions are very dominant in influencing the innovation in the organizations.

Organizational proficiencies (or the capabilities) are the factors relating to the organizations' abilities towards all activities, particularly in innovation endeavour (da Cunha Bezerra et al., 2020), (Kabrilyants et al., 2021), (Zhang and Merchant, 2020). Researchers have argued that organizations may be successful in handling their external environmental threats through maximizing the capabilities of the organizations (Haarhaus and Liening, 2020), (Lin et al., 2020a). Numerous cultural factors contribute towards the innovativeness (Buccieri et al., 2020), (Sánchez-Báez et al., 2020), which has been established through innovation literature. Concurrently, factors relating to HRM functions have been recognized as highly influencing in innovation (del Mar Ramos-González et al., 2021), (Lei et al., 2021), (Rondi et al., 2021). Researchers in various studies have pointed out different factors of HRM functions that have very strong impact on innovation outcomes.

So, it will be very interesting to investigate which factors are dominating the innovation in the organization, as well as to examine the interrelationships among the most dominating factors. It will not be very surprising that if any other factors are found more dominating in associating to factors of organizational proficiencies, culture, external environment, and HRM Functions.

2.0 Brief literature review
2.01 Innovation

The concept of innovation is indeed not at all a new, rather it is a very ancient and well-practised idea. In his book, titled "The theory of economic development", Joseph A. Schumpeter, father of innovation theory, structurally and evidentially established the concepts of innovation (Schumpeter, 1934a).

According to Schumpeter, the changes towards the restoration or implementation of something novel and beneficial in the practical life, which include new product/service adoption, and/or introducing new production methodology, and/or new market identification, and/or employing such sources of materials for production which are new, and/or creating new institutional working relationships across different companies within an industry (Schumpeter, 1934b). In this way, innovation had been defined and categorized in early days which in turn triggered many researches that have been carried out on innovation, its theory and, also on its practices (Wolfe, 1994).

2.02 Factors of Innovation

It has been mentioned that organizations are affected by numerous factors which help them to practice innovation activities, and also a couple of factors restricting them from performing innovations. This study aims to identify the factors of innovation and then to find the most dominating factors and their interrelationships.

In general the terms "factors of innovativeness" or "factors of organizational innovativeness" refer to those issues that have very direct impact on the organizational innovation performance (Lynch et al., 2010). They are those factors that enables organizations to be creative (Wolniak and Grebski, 2018) and these factors must be cultivated properly through the organizational strategies, culture, structure, and different operations to ensure the innovative capabilities (Szczepańska-Woszczyna, 2018). When these factors are nourished appropriately within the organizations, the organizations enjoy the competitive advantages (Celtekligil and Adiguzel, 2019) and growth in market share.

While studying the innovation literature and trying to accumulate the factors of innovativeness, it has been noticed that terms like 'factors', 'drivers' have been used by the scholars simultaneously. Moreover, while it becomes to identify the factors, scholars have used such phrases like 'factors of innovativeness', 'factors of innovation', 'factors of innovation capability', 'drivers of innovativeness', 'drivers of innovation' etc. for the same purpose, i.e., to discover the factors that influence innovation.

Culture

Culture of an organization is highly affected by the national culture (Szydło and Grześ-Bukłaho, 2020), and the culture refers to the organization's internal norms and practices (Roscoe et al., 2019) that has a crucial impact on organizational performance.

HRM Functions

Human resources management (HRM) is an organizational function that encompasses challenges and strategies regarding proper management of human resources employed in the organization (Stewart and Brown, 2019). Proper HRM should be aligned with the organizational strategies for improving the innovative performance in the organizations (Delery and Roumpi, 2017). For innovation purpose, the main and first criterion is human knowledge (Kianto et al., 2017), and nourishing such knowledge increases organizational innovative capabilities.

Top Management Orientation

The behaviour of the top managers in the organizations in transmitted and influence the working patterns and teams outcomes to attain organizational goals (Jahanshahi and Brem, 2017). Thus, the decisions from the top level impact on organizational strategies and working procedure (Wang et al., 2020b), and their orientations directly blow the barriers of innovation (Szambelan et al., 2020).

External Environment

External environmental issues, such as university education, health, religious affiliation, affect the organizational development and performance (Munro and Belanger, 2017), which are essential to consider for innovation strategies (Ivančić et al., 2017). Furthermore, since external environment is considered as the traditional and one of the primary forces to influence organizational activities (Chang et al., 2019), therefore, when the organizations think about the innovative activities, they must concentrate of the external environment as it is highly linked and related with the organization and its culture (Wu and Ding, 2020), (Hameed et al., 2021).

Organizational Proficiencies

Organizational proficiencies refer to the capabilities of the organizations that enable organizations in performing (Rehman et al., 2019) which often play the mediating roles organizational goals and performances. Organizational proficiencies offer the solutions through proper knowledge management for better performance (Serrat, 2017). organizational proficiencies i.e., numerous organizational abilities empower organizations towards innovativeness (Zhang and Merchant, 2020). This is because such capabilities allow organizations to agility and in facilitating learning which in turn accelerate the organizational innovation capabilities for the competitiveness (Saha et al., 2020).

Leadership

Different leadership styles have strong positive relationships with innovation and innovative performance in shaping the organizational culture and behaviour of employees and leaders (Alblooshi et al., 2020). Therefore, while developing organizational strategies towards improving organizational innovativeness, leadership must be shaped accordingly within the innovation framework (Cortes and Herrmann, 2021) for the best innovative outcomes.

Knowledge Management

The literature has established a direct linkage between knowledge management and organizational innovative performance; because knowledge management has a very strong mediating role organizational practices and innovation (Ode and Ayavoo, 2020). Furthermore, knowledge management process develops organizations operations which impact on increasing innovation capacity (Migdadi, 2020).

Market Pressure and Competition

In responding to changing customers' requirements, market competition and uncertainty, the organizations are compelled to improve and innovate their service, and thereto, force the employees towards innovative activities (Senbeto and Hon, 2020). Due to such market turbulence, organizations have to be innovative both in product and service delivery for their sustainability (Qiu et al., 2020). Thus, through service innovation and service excellence, organization can improve their image and as a consequence, share in the market (Aladwan and Alshami, 2021).

Technology Adaptation

Since in the era of technological advancements, numerous and quick new technologies have been emerging continuously and it has become a must for the organizations to cope with these technological parasites in designing proper innovation management (Coccia and Watts, 2020). It is also important to note that the high migration is always pushing the developed countries in solving relevant problems, such as housing, utilities etc., through innovative ways and to solve these, there is no alternative but adaption of the technologies and implement these in innovative performances (Mazzucco et al., 2020). In addition, to mitigate the threats of climate change, the organizations needs to be innovative through effective technological adaptation and responding to the change very quickly (Nwankwo et al., 2020).

Research and Development

Scholars have established that research and development is the key indicator for organizational innovations (Heij et al., 2020) as a result of increasing the knowledge and learning within the organizational settings. Innovation and sustainability, both are dependent on research and development because of adaptation of new technologies (Johannes et al., 2020); and it is stated that research and development strongly affect the organizational comparative advantages (Kim and Choi, 2020). Particularly in service industry, the product-service integration is highly benefited through research and development of information technologies (Vendrell-Herrero et al., 2021).

2.03 Systematic Literature Review

As both in concepts and practices, desire to innovate is ubiquitous across all business activities. Researchers identified numerous factors of innovativeness/innovation. Therefore, a structured, systematic literature review (SLR) requires conducting with specific intention to identify factors of innovativeness applicable to organizations in any discipline or economic sector across the globe.

The early scholars have identified the systematic literature review (SLR) is the science of reviewing the existing literature for summarizing the key factors and findings (Mulrow, 1994) and ensuring the best synthesisation (Cook et al., 1997). The SLR is an effective tool to find out the most relevant literature for a specific study from millions of scholarly publications (Nightingale, 2009) that stands as a guide for the researchers (Okoli and Schabram, 2010). The SLR has the capability to deal with large and big data sets (Mikalef et al., 2018) and offers analyses also. Inclusion and exclusion of articles are easily and scientifically managed through the systematic literature review (Xiao and Watson, 2019) through establishing research protocols, and therefore, the systematic literature review has been increasingly used widely for synthesizing the literature and the body of knowledge (Kraus et al., 2020).

3.0 Methodology and propositions

In fulfilling the objectives of the study, the study is going to examine the innovation literature. Hence, it is using qualitative research approach (Alvino et al., 2020), (Kyngäs, 2020). Systematic literature review is the method for accumulating the factors of innovation which has been narrated in earlier section. Researchers have claimed the for gathering information through literature analyses, the SLR is the best qualitative research method (Karimi and Iordanova, 2021), (Psomas, 2021). Before conducting the systematic literature review, it is a must to set the review protocols for effective review of literature and body of knowledge as well as to extract accurate and as much as possible the factors of innovation (Krüger et al., 2020), (Mengist et al., 2020).

3.01 Review Protocol

A systematic, structured search of published literature has been carried out with the SCOPUS, Google Scholar and Web of Science databases, because these three databases contain the most recent and related

research. A review protocol (Tranfield et al., 2003) has been settled for finding and exploring relevant articles/scholarly papers that describe/detail out factors, influencing innovativeness (product/process) in all industries across the world. The protocol includes following criteria:

the studies, carried/written/described/pointed/measured/concluded/focussed on different factors/drivers/elements/measures/determinants, affecting/influencing innovativeness/organizational innovativeness/innovation/innovation capabilities or developing new idea/knowledge/concepts as in titles.

the studies must be undertaken in specific industry to address the innovativeness and its influencing factors, and preferably there should be defined research methodology with sample size and region/country.

the studies carried out through quantitative/qualitative analyses, detailing measuring instruments, i.e., questionnaires, interviews, survey, literature and cases studies.

the studies preferably include scholarly articles and conference proceedings/papers, books, as reports with the high relevancy to this research.

the papers/articles/reports are published in English only.

3.02 PRISMA Model

Adapting the PRISMA (Preferred Reporting Items for Systematic-Reviews and Meta-Analyses) recommendations (Moher et al., 2009), following figure demonstrates the way of gathering researches, which have been incorporated in the SLR.

Identification

Studies **identified** through databases **searching** (**n=1,517**)

Removing **Duplicates** (n=178)

Studies **Primarily Match** with **Titles** (**n=1339**)

Screening

Studies rejected, as **Not Matching** with **Titles** (**n=496**)

Studies **Accepted** for **Reading Abstract** (**n=843**)

Studies **rejected** after reviewing **abstract**, because of not satisfying research design criteria (**n=516**)

Studies **Accepted** for **Full Text** (**n=327**)

Eligibility

Studies rejected because study design could not match with review protocol (**n=224**)

Included

Studies incorporated in the Systematic Literature Review (n=103)

Figure –01 : *Selection process for studies included in systematic literature review.*

3.03 Developing Propositions

Testing or examining propositions is more effective for the qualitative research (Skarbek, 2020), (Bouncken et al., 2021). Therefore, this study is dealing with the following propositions:

Are the organizational proficiencies the most dominating factors in innovation?

Do the organizational proficiencies affect the factors of external environment, culture and HRM functions toward innovation?

The factors in propositions will be measured in terms of citations by the different researchers. The proposition will be checked through an extensive review of the innovation literature to be examined for justification.

4.0 Findings

After reviewing the selected 103 scholarly papers and analysing, the researchers have identified a total of 102 factors that contributes to increasing or developing innovation capabilities of the organizations in different industries. 102 factors of innovation are a very big number and for further research and discussions, these factors have been classified into 10 groups or clusters using the research synthesis (Marshall and Wallace, 2019).

Such synthesisation allows the researcher with freedom to express own contribution in a scientific manner through describing the each group with the support of literature (Gurevitch et al., 2018). In addition, the Research synthesis has been accompanied with a 'Realist Synthesis' (Pawson, 2002) encompassing a tally of vibrant elements or instruments (either positively or negatively) that reinforce each single research (through open coding).

Through thematic coding (Tranfield et al., 2003), the groups have been termed as culture, HRM functions, top management orientation, external environment, organizational proficiencies, leadership, knowledge management, market pressure and competition, technology adaptation and research and development.

These thematic coded groups reflect the major factors described under the factors of innovation in the literature review. The following table illustrate the summary of the systematic literature review

Serial	Researcher(s) & Year	Culture	HRM Functions	Top Management Orientation	Organizational Proficiencies	Leadership	External Environment	Market Pressure and Competition	Knowledge Management	Research and Development	Technology Adaptation
1	Locke, 1973	-	-	Y	Y	Y	-	-	-	-	-
2	Falus, 1982	-	Y	-	-	-	-	-	-	-	-
3	Tatum, 1989	Y	-	Y	Y	Y	-	-	-	-	Y
4	Nam and Tatum, 1997	-	Y	-	Y	Y	-	-	-	-	Y
5	Nijkamp & Reggiani, 2000	-	Y	Y	Y	-	Y	Y	-	Y	-
6	Prajogo and Sohal, 2001	-	Y	-	Y	-	-	-	-	-	-
7	Storey et al., 2002	-	Y	-	-	-	-	-	-	-	-
8	Dulaimi et al., 2002	Y	Y	-	Y	Y	Y	-	-	Y	-
9	Cormican & O'Sullivan, 2003	-	-	-	-	-	-	-	Y	-	-
10	Sundström and Zika-Viktorsson,	Y	-	-	Y	-	-	Y	-	-	-

	2003									
11	Seaden et al., 2003	-	Y	Y	-	Y	Y	Y	-	-	Y
12	Prajogo and Sohal, 2003	-	-	-	Y	-	-	-	-	-	-
13	Bossink, 2004	-	-	-	Y	-	Y	-	Y	-	Y
14	Giardini and Kyllönen, 2004	Y	Y	-	Y	-	-	-	-	-	-
15	Pu et al., 2004	Y	-	-	Y	Y	-	Y	-	-	-
16	Sexton & Barrett, 2004	-	Y	Y	-	Y	-	Y	-	-	Y
17	Blayse and Manley, 2004	Y	Y	-	Y	-	Y	Y	Y	-	-
18	Korsvold and Sletbakk Ramstad, 2004	-	-	-	-	-	-	-	Y	-	-
19	Singh and Smith, 2004	-	-	-	Y	-	-	-	-	-	-
20	Funk & Plünnecke, 2005	-	Y	-	Y	-	Y	-	-	-	Y
21	Conceição et al., 2006	-	-	-	Y	-	Y	-	-	Y	Y
22	Cropley, 2006	Y	-	Y	-	-	-	-	-	-	-

(Table – 01 : Summary of Systematic Literature Review)

Serial	Researcher(s) & Year	Culture	HRM Functions	Top Management Orientation	Organizational Proficiencies	Leadership	External Environment	Market Pressure and Competition	Knowledge Management	Research and Development	Technology Adaptation
23	Manley & Mcfallan, 2006	-	Y	-	-	-	Y	-	-	-	Y
24	Shyu et al., 2006	Y	Y	-	Y	Y	-	-	Y	-	-
25	Abbot et al., 2006	Y	-	Y	-	-	-	Y	-	Y	-
26	Hartmann, 2006	Y	Y	-	-	-	-	-	-	-	-
27	Fortuin et al., 2007	Y	Y	-	Y	-	-	Y	-	-	-
28	Koc and Ceylan, 2007	Y	Y	Y	-	Y	-	-	-	-	Y
29	Paladino, 2007	Y	-	-	Y	-	-	Y	-	-	-

30	Van Moorsel et al., 2007	-	-	Y	Y	Y	-	Y	Y	Y	-
31	Ilter et al., 2008	Y	Y	-	Y	-	Y	Y	-	-	Y
32	Panuwatwanich et al., 2008	Y	-	-	Y	Y	-	-	-	-	-
33	Capitanio et al., 2009	-	Y	-	Y	-	Y	-	-	Y	-
34	Chang and Yeh, 2009	Y	Y	-	-	-	-	-	-	-	-
35	Fortuin and Omta, 2009	-	-	-	Y	-	-	Y	-	Y	-
36	Kamath et al., 2009	-	Y	-	-	-	-	-	Y	-	-
37	Nidumolu et al., 2009	-	-	-	Y	-	-	-	-	-	-
38	Zhang et al., 2009	-	Y	Y	Y	-	Y	Y	-	-	-
39	Bel, 2010	Y	-	Y	Y	Y	-	-	Y	-	-
40	Chen et al., 2010	Y	Y	-	Y	-	Y	Y	-	-	-
41	Kinkel and Som, 2010	-	-	-	-	-	Y	Y	-	Y	-
42	Liddle and El-Kafafi, 2010	-	-	Y	Y	-	Y	Y	-	-	Y
43	Drnevich et al., 2011	-	-	-	-	-	Y	Y	-	-	Y
44	Engström and Levander, 2011	-	-	-	-	-	-	Y	-	-	-
45	Kask, 2011	-	-	Y	Y	Y	Y	-	-	-	-

(Table –01 : Summary of Systematic Literature Review, *cont.*)

Serial	Researcher(s) & Year	Culture	HRM Functions	Top Management Orientation	Organizational Proficiencies	Leadership	External Environment	Market Pressure and Competition	Knowledge Management	Research and Development	Technology Adaptation
46	Kramer et al., 2011	-	-	Y	-	-	Y	-	Y	Y	-
47	Ropret et al., 2011	Y	-	-	Y	-	-	Y	-	-	-
48	Zhang, 2011	-	-	-	-	-	Y	Y	-	Y	Y
49	Zizlavsky, 2011	-	-	Y	Y	-	Y	Y	-	-	-
50	Gambatese and Hallowell, 2011a	Y	Y	-	Y	Y	Y	-	-	Y	-

51	Gambatese and Hallowell, 2011b	Y	Y	Y	Y	-	-	Y	-	-	-
52	Chaminade and De Fuentes, 2012	-	Y	-	-	-	-	-	-	Y	Y
53	Chang and Hughes, 2012	-	-	-	Y	Y	Y	Y	-	-	-
54	Von Treuer and McMurray, 2012	Y	Y	-	Y	-	-	-	-	-	-
55	Chan and Liu, 2012	Y	-	-	Y	-	-	-	-	-	-
56	Asgari et al., 2013	Y	Y	Y	-	Y	-	-	-	-	-
57	Boso et al., 2013	Y	-	Y	-	-	-	Y	-	-	-
58	Dachyar et al., 2013	-	Y	-	Y	-	Y	Y	-	-	Y
59	Abdul Hamid and Abd. Rahman, 2014	-	-	Y	Y	Y	Y	-	Y	-	-
60	Liu et al., 2014	-	-	-	Y	-	-	Y	-	-	-
61	Narayanan and Parvin Hosseini, 2014	-	-	-	Y	-	Y	Y	-	Y	Y
62	Chan et al., 2014	Y	-	-	-	Y	-	-	-	-	-
63	Ozorhon et al., 2014	-	Y	-	Y	Y	-	-	-	-	-
64	Xue et al., 2014	Y	Y	-	-	Y	Y	Y	Y	Y	Y
65	Bourke and Crowley, 2015	-	Y	-	Y	-	-	-	-	-	-

(Table –01 : Summary of Systematic Literature Review, *cont.*)

Serial	Researcher(s) & Year	Culture	HRM Functions	Top Management Orientation	Organizational Proficiencies	Leadership	External Environment	Market Pressure and Competition	Knowledge Management	Research and Development	Technology Adaptation
66	Ciliberti et al., 2015	-	-	-	Y	-	-	-	-	Y	-
67	Joppe et al., 2015	Y	Y	-	Y	-	-	Y	-	Y	-
68	O'Brien, 2015	-	-	Y	-	-	-	-	-	-	-
69	Ribarić, 2015	-	Y	-	Y	-	-	Y	-	-	Y
70	Zuñiga-Collazos et al., 2015	-	-	-	-	-	-	-	-	Y	-

71	Ozorhon and Oral, 2016	Y	Y	Y	Y	Y	Y	Y	Y	-	Y
72	Bhuiyan et al., 2017	-	-	Y	Y	-	Y	Y	-	-	-
73	Fellnhofer, 2017	Y	Y	Y	Y	Y	-	-	-	-	-
74	Lašáková et al., 2017	Y	-	-	Y	-	-	-	-	-	-
75	Liu and Chan, 2017	Y	-	-	-	Y	-	-	-	-	-
76	Zhu and Cheung, 2017	Y	Y	Y	-	-	-	-	Y	-	-
77	Antunes et al., 2017	-	-	-	Y	-	-	-	-	-	-
78	Taddese, 2017	-	-	-	Y	-	-	-	-	-	-
79	Kallmuenzer, 2018	-	Y	Y	-	-	-	Y	-	-	-
80	Albors-Garrigós, et al., 2018	Y	-	-	-	-	-	-	Y	-	-
81	Divisekera and Nguyen, 2018	-	Y	-	Y	-	Y	Y	-	-	Y
82	Meng and Brown, 2018	-	-	-	Y	-	Y	Y	-	-	Y
83	Nordli, 2018	-	Y	-	-	-	-	-	Y	-	-
84	Pikkemaat, et al., 2018	Y	Y	-	-	Y	Y	Y	-	-	-
85	Quirapas, et al., 2018	-	-	-	Y	-	Y	-	-	-	Y
86	Revilla and Rodríguez-Prado, 2018	Y	Y	-	-	-	-	-	-	-	-
87	Soto-Acosta, et al., 2018	-	-	-	-	-	Y	-	Y	-	Y

(Table –01 : Summary of Systematic Literature Review, *cont.*)

Serial	Researcher(s) & Year	Culture	HRM Functions	Top Management Orientation	Organizational Proficiencies	Leadership	External Environment	Market Pressure and Competition	Knowledge Management	Research and Development	Technology Adaptation
88	Tutusaus, et al., 2018	-	-	-	-	-	-	-	-	-	Y
89	Argothy and Álvarez, 2019	-	Y	-	Y	-	Y	-	-	-	Y
90	Arzhantsev and Bondarenko, 2019	-	-	-	Y	-	Y	-	-	-	Y
91	Beyina, 2019	-	-	-	-	-	-	Y	-	-	Y

92	Diaz-Delgado, et al., 2019	Y	Y	-	Y	-	-	-	-	-	-
93	Hanifah, et al., 2019	Y	-	-	Y	-	Y	-	-	-	-
94	Kafetzopoulos and Skalkos, 2019	-	-	-	Y	-	Y	-	Y	-	-
95	Owolabi, et al., 2019	-	-	Y	Y	-	Y	Y	-	-	Y
96	Velev and Veleva, 2019	Y	Y	Y	Y	Y	Y	-	-	-	Y
97	Atiase and Dzansi, 2020	-	Y	-	-	-	Y	Y	-	-	-
98	Nevzorova and Karakaya, 2020	-	-	Y	-	-	-	-	Y	-	Y
99	Tajeddini and Martin, 2020	Y	Y	-	-	Y	-	-	Y	-	-
100	Hayuningtyas, et al. 2020	-	-	Y	-	Y	-	Y	-	-	-
101	Feng, 2021	-	-	Y	-	-	-	-	-	-	-
102	Mousavi, et al., 2021	-	Y	-	Y	Y	Y	Y	-	-	Y
103	Ding, and Wang, 2021	-	-	-	-	-	Y	-	-	Y	-

(Table –01 : Summary of Systematic Literature Review, *cont.*)

The 10 thematic groups, i.e., culture, HRM functions, top management orientation, external environment, organizational proficiencies, leadership, knowledge management, market pressure and competition, technology adaptation and research and development are now being presented with their individual factors identified.

Cultural Factors

Innovation Culture (Dulaimi et al., 2002), (Blayse and Manley, 2004), (Shyu et al., 2006), (Chan and Liu, 2012), (Chan et al., 2014), (Xue et al., 2014), (Liu and Chan, 2017), (Zhu and Cheung, 2017), (Hanifah et al., 2019); Building Cultural Infrastructure (Asgari et al., 2013).; Strategic Culture (Asgari et al., 2013); Culture for Creativity (Sundström and Zika-Viktorsson, 2003), (Pu et al., 2004), (Cropley, 2006), (Albors-Garrigós et al., 2018), (Revilla and Rodríguez-Prado, 2018), (Hanifah et al., 2019), (Tajeddini and Martin, 2020); Entrepreneurial Culture (Fellnhofer, 2017), (Pikkemaat et al., 2018); Organizational Climate (Giardini and Kyllönen, 2004), (Cropley, 2006), (Abbot et al., 2006), (Koc and Ceylan, 2007), (Ilter et al., 2008), (Panuwatwanich et al., 2008), (Bel, 2010), (Chen et al., 2010), (Gambatese and Hallowell, 2011a), (Gambatese and Hallowell, 2011b), (Diaz-Delgado et al., 2019), (Velev and Veleva, 2019); Risk/Risk Taking (Tatum, 1989), (Bel, 2010), (Boso et al., 2013); Freedom/Autonomy (Hartmann, 2006), (Fortuin et al., 2007), (Chang and Yeh, 2009), (Ropret et al., 2011), (Von Treuer and McMurray, 2012), (Asgari et al., 2013), (Boso et al., 2013), (Lašáková et al., 2017); Tolerate Failure (Fortuin et al., 2007), (Bel, 2010) (Chan and Liu, 2012); Governance (Joppe et al., 2015); Education/Learning Transfer Climate (Asgari et al., 2013), (Liu and Chan, 2017); Approach of the Project Team (Chen et al., 2010), (Ozorhon and Oral, 2016); Diffusion of innovation (Gambatese and Hallowell, 2011a), (Gambatese and Hallowell, 2011b); Organizational Learning and Capacity (Koc and Ceylan, 2007), (Paladino, 2007), (Chang and Yeh, 2009).

Factors of HRM Functions

Human Resources (Seaden et al., 2003), (Sexton and Barrett, 2004), (Funk and Plünnecke, 2005), (Capitanio et al., 2009), (Zhang et al., 2009), (Dachyar et al., 2013), (Ozorhon et al., 2014), (Xue et al., 2014), (Joppe et al., 2015), (Ozorhon and Oral, 2016), (Kallmuenzer, 2018), (Divisekera and Nguyen, 2018),

(Pikkemaat et al., 2018), (Revilla and Rodríguez-Prado, 2018), (Atiase and Dzansi, 2020); Human Resource Management Practices (Kamath et al., 2009), (Bourke and Crowley, 2015), (Tajeddini and Martin, 2020), (Mousavi et al., 2021); Competent Technical Staff (Nijkamp and Reggiani, 2000), (Chen et al., 2010), (Chaminade and De Fuentes, 2012), (Velev and Veleva, 2019); Motivation (Giardini and Kyllönen, 2004), (Kamath et al., 2009); Teamwork/Coordination (Prajogo and Sohal, 2003), (Fortuin et al., 2007), (Koc and Ceylan, 2007), (Chang and Yeh, 2009), (Joppe et al., 2015), (Nordli, 2018); Selective Recruitment (Manley and Mcfallan, 2006), (Diaz-Delgado et al., 2019), (Atiase and Dzansi, 2020); Employee participation/Engagement (Ribarić, 2015); Innovation Champions (Nam and Tatum, 1997), (Blayse and Manley, 2004), (Gambatese and Hallowell, 2011b), (Xue et al., 2014); Available Skill Levels (Ilter et al., 2008); Organization Career Management (Zhu and Cheung, 2017); Good Internal Communication Systems (Shyu et al., 2006), (Fortuin et al., 2007), (Gambatese and Hallowell, 2011a), (Gambatese and Hallowell, 2011b), (Xue et al., 2014), (Joppe et al., 2015), (Zhu and Cheung, 2017), (Diaz-Delgado et al., 2019), , (Mousavi et al., 2021); Reward/Incentive Schemes/Systems (Falus, 1982), (Dulaimi et al., 2002), (Funk and Plünnecke, 2005), (Shyu et al., 2006), (Hartmann, 2006), (Chen et al., 2010), (Von Treuer and McMurray, 2012), (Ozorhon and Oral, 2016), (Fellnhofer, 2017), (Revilla and Rodríguez-Prado, 2018), (Diaz-Delgado et al., 2019); Training and Development (Nijkamp and Reggiani, 2000), (Dulaimi et al., 2002), (Shyu et al., 2006), (Revilla and Rodríguez-Prado, 2018), (Argothy and Álvarez, 2019), (Diaz-Delgado et al., 2019), (Atiase and Dzansi, 2020); Human/Employees' Potentials/Interests (Falus, 1982), (Fortuin et al., 2007), (Asgari et al., 2013); Flexible Working Contracts (Storey et al., 2002).

Top Management Orientation

Strategic Vision (Locke, 1973), (Tatum, 1989), (Seaden et al., 2003), (Sexton and Barrett, 2004), (Van Moorsel et al., 2007), (Bel, 2010), (Kask, 2011), (Asgari et al., 2013), (Abdul Hamid and Abd. Rahman, 2014), (Cote, 2017) (Fellnhofer, 2017), (Velev and Veleva, 2019), (Madsen and Ulhøi, 2021); Decision Making (Kask, 2011); Entrepreneurship (Nijkamp and Reggiani, 2000), (Cropley, 2006), (Zhang et al., 2009), (Boso et al., 2013), (O'Brien, 2015), (Fellnhofer, 2017), (Zhu and Cheung, 2017), (Kallmuenzer, 2018), (Velev and Veleva, 2019), (Nevzorova and Karakaya, 2020), (Wadhwani et al., 2020), (Feng, 2021); Management Priority (Tatum, 1989), (Liddle and El-Kafafi, 2010), (Kramer et al., 2011), (Zizlavsky, 2011), (Gambatese and Hallowell, 2011b), (Fellnhofer, 2017), (Hayuningtyas et al., 2020); Profit/Economic Motivation (Abbot et al., 2006), (Bhuiyan et al., 2017); Improving Firm Performance (Ozorhon and Oral, 2016), (Owolabi et al., 2019); Improving Project Performance (Ozorhon and Oral, 2016); Corporate Social Responsibility (Ozorhon and Oral, 2016); Delegation (Koc and Ceylan, 2007); Proactiveness (Boso et al., 2013), (Nevzorova and Karakaya, 2020).

External Environment

Factors of External Environment (Seaden et al., 2003), (Bossink, 2004), (Conceição et al., 2006), (Capitanio et al., 2009), (Zhang et al., 2009), (Kask, 2011), (Zizlavsky, 2011), (Xue et al., 2014), (Meng and Brown, 2018), (Quirapas et al., 2018), (Soto-Acosta et al., 2018), (Kafetzopoulos and Skalkos, 2019); Environmental Sustainability (Chang and Hughes, 2012), (Ozorhon and Oral, 2016), (Argothy and Álvarez, 2019), (Owolabi et al., 2019); Collaborative Relationship Network (Nijkamp and Reggiani, 2000), (Abdul Hamid and Abd. Rahman, 2014), (Divisekera and Nguyen, 2018), (Pikkemaat et al., 2018), (Kafetzopoulos and Skalkos, 2019), (Atiase and Dzansi, 2020); Social Network (Nijkamp and Reggiani, 2000), (Conceição et al., 2006); Partnering/Networking with Specialist Experts (Nijkamp and Reggiani, 2000), (Ilter et al., 2008), (Chen et al., 2010), (Kinkel and Som, 2010), (Liddle and El-Kafafi, 2010), (Kramer et al., 2011), (Narayanan and Parvin Hosseini, 2014); Industry Relationships (Nijkamp and Reggiani, 2000), (Blayse and Manley, 2004); Opportunity (Gambatese and Hallowell, 2011a), (Bhuiyan et al., 2017), (Velev and Veleva, 2019), , (Mousavi et al., 2021); New Technology (Manley and Mcfallan, 2006), (Liddle and El-Kafafi, 2010), (Drnevich et al., 2011), (Dachyar et al., 2013), (Narayanan and Parvin Hosseini, 2014), (Xue et al., 2014); Government/Regulatory Role (Dulaimi et al., 2002), (Blayse and Manley, 2004), (Chen et al., 2010), (Zhang, 2011), (Argothy and Álvarez, 2019), (Arzhantsev and Bondarenko, 2019), (Hanifah et al., 2019), (Owolabi et al., 2019), (Ding and Wang, 2021); Regulations and Legislations (Liddle and El-Kafafi, 2010), (Ozorhon and Oral, 2016), (Bhuiyan et al., 2017); Labour Market (Funk and Plünnecke, 2005).

Organizational Proficiencies

Organizational Resources (Locke, 1973), (Nam and Tatum, 1997), (Dulaimi et al., 2002), (Blayse and Manley, 2004), (Fortuin et al., 2007), (Paladino, 2007), (Fortuin and Omta, 2009), (Chang and Hughes, 2012), (Abdul Hamid and Abd. Rahman, 2014), (Fellnhofer, 2017), (Diaz-Delgado et al., 2019); Organizational Support for Innovation (Nijkamp and Reggiani, 2000), (Pu et al., 2004), (Chen et al., 2010), (Kask, 2011), (Zizlavsky, 2011), (Gambatese and Hallowell, 2011a), (Gambatese and Hallowell, 2011b), (Von Treuer and McMurray, 2012), (Chan and Liu, 2012), (Abdul Hamid and Abd. Rahman, 2014), (Narayanan and Parvin Hosseini, 2014), (Velev and Veleva, 2019); Organizational Structure (Nijkamp and Reggiani, 2000), (Bel, 2010), (Chang and Hughes, 2012); Organizational Age (Sundström and Zika-Viktorsson, 2003), (Capitanio et al., 2009), (Chang and Hughes, 2012); Firm Size (Van Moorsel et al., 2007), (Zhang et al., 2009), (Liddle and El-Kafafi, 2010), (Chang and Hughes, 2012), (Divisekera and Nguyen, 2018), (Argothy and Álvarez, 2019); Capital Resources (Paladino, 2007), (Van Moorsel et al., 2007), (Liddle and El-Kafafi, 2010), (Kask, 2011), (Dachyar et al., 2013), (Joppe et al., 2015), (Ozorhon and Oral, 2016), (Arzhantsev and Bondarenko, 2019), (Velev and Veleva, 2019); Available Finance (Nijkamp and Reggiani, 2000), (Funk and Plünnecke, 2005); Productivity (Bhuiyan et al., 2017), (Meng and Brown, 2018), (Quirapas et al., 2018), (Owolabi et al., 2019); Safety and Working Condition (Bhuiyan et al., 2017), (Emuze and Mollo, 2021), (Semin et al., 2021); Information & Communication Resources (Nijkamp and Reggiani, 2000), (Funk and Plünnecke, 2005), (Dachyar et al., 2013), (Narayanan and Parvin Hosseini, 2014), (Bourke and Crowley, 2015); Project Management (Zizlavsky, 2011); Integration (Internal & External) (Tatum, 1989), (Dulaimi et al., 2002), (Bossink, 2004), (Zizlavsky, 2011), (Liu et al., 2014), (Ozorhon et al., 2014); Innovation Strategy/Policy (Giardini and Kyllönen, 2004), (Blayse and Manley, 2004), (Paladino, 2007), (Bel, 2010), (Liddle and El-Kafafi, 2010), (Antunes et al., 2017), (Hanifah et al., 2019), (Velev and Veleva, 2019); Process Management (Kafetzopoulos and Skalkos, 2019), (Mousavi et al., 2021); Innovation Management (Ribarić, 2015), (Lašáková et al., 2017); Organizational Innovation Capacity (OIC) (Shyu et al., 2006), (Panuwatwanich et al., 2008); Organizational Innovation Activity (Conceição et al., 2006); Structure of Production (Blayse and Manley, 2004); Procurement Systems (Dulaimi et al., 2002), (Blayse and Manley, 2004), (Ilter et al., 2008), (Ciliberti et al., 2015); Practicality (Locke, 1973); Project Complexity (Ozorhon and Oral, 2016); Total Quality Management (TQM) (Prajogo and Sohal, 2001), (Prajogo and Sohal, 2003), (Singh and Smith, 2004), (Antunes et al., 2017), (Taddese, 2017), (Kafetzopoulos and Skalkos, 2019); Continuous Improvement (Prajogo and Sohal, 2001); Intellectual Property Rights (Van Moorsel et al., 2007), (Chen et al., 2010), (Ropret et al., 2011), (Zizlavsky, 2011), , (Mousavi et al., 2021); Sustainability (Nidumolu et al., 2009), (Liddle and El-Kafafi, 2010).

Leadership

Leadership Style (Tatum, 1989), (Nam and Tatum, 1997), (Dulaimi et al., 2002), (Panuwatwanich et al., 2008), (Bel, 2010), (Chang and Hughes, 2012), (Chan et al., 2014), (Ozorhon et al., 2014), (Xue et al., 2014), (Ozorhon and Oral, 2016), (Liu and Chan, 2017), (Pikkemaat et al., 2018), (Tajeddini and Martin, 2020), (Hayuningtyas et al., 2020), , (Mousavi et al., 2021); Idea Generation (Pu et al., 2004), (Shyu et al., 2006), (Koc and Ceylan, 2007), (Bel, 2010), (Gambatese and Hallowell, 2011a); Vision (Locke, 1973), (Tatum, 1989), (Seaden et al., 2003), (Sexton and Barrett, 2004), (Van Moorsel et al., 2007), (Bel, 2010), (Kask, 2011), (Asgari et al., 2013), (Abdul Hamid and Abd. Rahman, 2014), (Fellnhofer, 2017), (Velev and Veleva, 2019).

Knowledge Management

External Knowledge Sources (Van Moorsel et al., 2007), (Nordli, 2018); Knowledge Management (Cormican and O'Sullivan, 2003), (Bossink, 2004), (Korsvold and Sletbakk Ramstad, 2004), (Shyu et al., 2006), (Kamath et al., 2009), (Kramer et al., 2011), (Abdul Hamid and Abd. Rahman, 2014), (Ozorhon and Oral, 2016), (Albors-Garrigós et al., 2018), (Soto-Acosta et al., 2018), (Kafetzopoulos and Skalkos, 2019), (Nevzorova and Karakaya, 2020), (Tajeddini and Martin, 2020); Knowledge Codification/Transfer (Blayse and Manley, 2004), (Kramer et al., 2011), (Xue et al., 2014); Process of Knowledge Codification (Ozorhon and Oral, 2016); Knowledge Development (Cormican and O'Sullivan, 2003), (Bossink, 2004), (Korsvold and Sletbakk Ramstad, 2004), (Shyu et al., 2006), (Kamath et al., 2009), (Kramer et al., 2011), (Abdul Hamid and Abd. Rahman, 2014), (Ozorhon and Oral, 2016), (Albors-Garrigós et al., 2018), (Soto-Acosta et al., 2018), (Kafetzopoulos and Skalkos, 2019), (Nevzorova and Karakaya, 2020), (Tajeddini and Martin, 2020); Learning/Action Learning (Bel, 2010), (Zhu and Cheung, 2017).

Market Pressure and Competition

Market (Structure) (Sexton and Barrett, 2004), (Paladino, 2007), (Van Moorsel et al., 2007), (Chen et al., 2010), (Ropret et al., 2011), (Zizlavsky, 2011), (Chang and Hughes, 2012), (Boso et al., 2013), (Dachyar et al., 2013), (Liu et al., 2014), (Bhuiyan et al., 2017); Marketing (Nijkamp and Reggiani, 2000), (Seaden et al., 2003), (Pu et al., 2004), (Zizlavsky, 2011), (Narayanan and Parvin Hosseini, 2014), (Joppe et al., 2015) ; Clients and Manufacturers Relationship (Blayse and Manley, 2004), (Zizlavsky, 2011); Clients' Requirements (Nijkamp and Reggiani, 2000), (Sundström and Zika-Viktorsson, 2003), (Fortuin et al., 2007), (Paladino, 2007), (Ilter et al., 2008), (Fortuin and Omta, 2009), (Engström and Levander, 2011), (Ropret et al., 2011), (Gambatese and Hallowell, 2011b), (Ribarić, 2015), (Ozorhon and Oral, 2016), (Bhuiyan et al., 2017), (Meng and Brown, 2018), (Pikkemaat et al., 2018), (Owolabi et al., 2019), , (Mousavi et al., 2021); Market Demands (Abbot et al., 2006), (Liddle and El-Kafafi, 2010), (Drnevich et al., 2011), (Boso et al., 2013), (Liu et al., 2014), (Xue et al., 2014), (Bhuiyan et al., 2017), (Meng and Brown, 2018), , (Mousavi et al., 2021); Competition Level (Paladino, 2007), (Kinkel and Som, 2010), (Ropret et al., 2011), (Zhang, 2011), (Zizlavsky, 2011), (Ozorhon and Oral, 2016), (Kallmuenzer, 2018), (Divisekera and Nguyen, 2018), (Meng and Brown, 2018), (Pikkemaat et al., 2018), (Beyina, 2019), (Atiase and Dzansi, 2020), (Hayuningtyas et al., 2020); Suppliers (Nijkamp and Reggiani, 2000); Brand Advertisement (Zhang et al., 2009), (Ropret et al., 2011), (Meng and Brown, 2018).

Technology Adaptation

Technological Competence (Tatum, 1989), (Nam and Tatum, 1997), (Seaden et al., 2003), (Bossink, 2004), (Conceição et al., 2006), (Manley and Mcfallan, 2006), (Chaminade and De Fuentes, 2012), (Dachyar et al., 2013), (Xue et al., 2014), (Meng and Brown, 2018), (Quirapas et al., 2018), (Argothy and Álvarez, 2019), (Arzhantsev and Bondarenko, 2019), (Nevzorova and Karakaya, 2020); Scientific and Technology Resources (Funk and Plünnecke, 2005), (Drnevich et al., 2011), (Zhang, 2011); Technology/Design Trends (Ozorhon and Oral, 2016), (Owolabi et al., 2019); Technology Transfer (Sexton and Barrett, 2004), (Koc and Ceylan, 2007), (Narayanan and Parvin Hosseini, 2014), (Beyina, 2019); Technology Strategy (Koc and Ceylan, 2007), (Liddle and El-Kafafi, 2010); Use of ICT/CAD (Ilter et al., 2008), (Ribarić, 2015), (Divisekera and Nguyen, 2018), (Soto-Acosta et al., 2018), (Tutusaus et al., 2018), (Owolabi et al., 2019), (Velev and Veleva, 2019), , (Mousavi et al., 2021).

Research and Development

Internal Research and Development (Dulaimi et al., 2002), (Conceição et al., 2006), (Van Moorsel et al., 2007), (Capitanio et al., 2009), (Fortuin and Omta, 2009), (Kinkel and Som, 2010), (Kramer et al., 2011), (Zhang, 2011), (Gambatese and Hallowell, 2011a), (Chaminade and De Fuentes, 2012), (Joppe et al., 2015), (Zuñiga-Collazos et al., 2015), (Ding and Wang, 2021); Research Capabilities for Innovation (Fortuin and Omta, 2009); Academia - Industry Collaboration (Nijkamp and Reggiani, 2000), (Abbot et al., 2006), (Kramer et al., 2011), (Xue et al., 2014), (Ciliberti et al., 2015); R&D Collaboration with Other R&D Institutions (Kinkel and Som, 2010), (Narayanan and Parvin Hosseini, 2014).

The following table illustrates the list of the thematic groups with the number of individual candidate factors influencing innovation.

Thematic Groups	Individual Factors
Culture	14
HRM Functions	15
Top Management Orientation	10
External Environment	11
Organizational Proficiencies	25
Leadership	3
Knowledge Management	6
Market Pressure and Competition	8
Technology Adaptation	6
Research and Development	4

(Table – 02 : Thematic Groups with number of individual factors)

5.0 Analyses and discussions

The identified factors and their grouping are the baseline for this study. The systematic literature review revealed 2 important findings. One finding is related to the thematic group and the another is related to the individual factors of innovation.

The first finding shows which thematic group has been cited by the researchers in how many studies among the 103 scholarly papers. The other finding shows that which individual factor of innovation has been cited how many times in the selected list of papers.

Since the study aimed at finding the most dominating factors and while analyzing the first finding, the number of citations of the thematic groups can be easily found. The following tables shows the result. Accordingly, the table also indicates that which thematic groups are very dominant.

Citations by Thematic Groups	
Thematic Groups	Studies
Organizational Proficiencies	62
HRM Functions	47
External Environment	41
Market Pressure and Competition	41
Culture	40
Technology Adaptation	31
Top Management Orientation	30
Leadership	28
Knowledge and Learning	19
Research and Development	18

(Table – 03 : Citations of the Thematic Groups in Different Studies)

As predicted in the proposition, the thematic group, Organizational Proficiencies is found as the most dominating in innovation. This group has been cited the most, in 72 studies. Hence, the proposition – 1 has been proven true in this study.

Table – 03 also represent that another thematic group, Market Pressure and Competition is dominant along with other 3 expected groups, e.g., external environment, culture and HRM functions. In relation to proposition 2, it now became essential to examine whether the organizational proficiencies affect the factors of external environment, market pressure and competition, culture and HRM functions toward innovation.

When focus shifted to the second finding, e.g., citation by the factors of innovation under the 10 thematic group, the following table accumulates the analysis.

Citations by Factors	
Factors under Thematic Groups	Citations
Organizational Proficiencies (25 factors)	99
HRM Functions (15 factors)	72
Market Pressure and Competition (8 factors)	61
Culture (14 factors)	56
External Environment (11 factors)	56
Top Management Orientation (10 factors)	39
Knowledge Management (6 factors)	34
Technology Adaptation (6 factors)	33
Leadership (3 factors)	31
Research and Development (4 factors)	21

(Table – 04 : Number of Citations of the Individual Factors under thematic groups)

25 factors of organizational proficiencies have been cited 99 times which strongly support the stand of this thematic group as the most dominating factor in innovation. Therefore, the justification of proposition – 1 is stronger and can be accepted.

Like the table – 3, factors of HRM functions, Market Pressure and Competition, Culture and External Environment are at the top dominating factors.

Hence, both tables (table – 3 and 4) indicated and established that organizational proficiencies, external environment, market pressure and competition, culture and HRM functions are the dominating factors of innovation where in both analyses, organizational proficiencies found as the most dominating.

Organizational Proficiencies and External Environment

The factors of organizational proficiencies can affect the factors of external environment and link those to the innovation performances of the organizations (da Cunha Bezerra et al., 2020), (Zhang and Merchant, 2020). Even it has been also sought that organizational abilities can manage the changes in the external environment (Koçyiğit and Akkaya, 2020), (Hameed et al., 2021), (Mikalef et al., 2021).

Researcher claim that the organizations can perform better in their innovation pursuits through adaptation of the changes in the external environment by connecting with their organizational proficiencies (da Cunha Bezerra et al., 2020), (Soomro et al., 2020). Such connectivity with external environment, organizational proficiencies allow more resilience and sustainability for innovation (da Cunha Bezerra et al., 2020), (Hillmann and Guenther, 2021). Hence, it can be claimed that organizational proficiencies can affect positively the factors of external environment toward innovation.

Organizational Proficiencies and Market Pressure and Competition

It is very natural that there will be increasing pressures in the market. To address these pressures, organizations can use and improve their proficiencies, e.g., abilities in innovation performances (Deslatte and Stokan, 2020), (Gupta et al., 2020), (Lin et al., 2020b). On the other hand, high competition compels organizations to go for innovation (Karakara and Osabuohien, 2020), (Katz, 2021). If the organizations focus on their capabilities, and if require, increase, they can gain the sustainable competitive advantages through innovation (Yang et al., 2020), (Hermundsdottir and Aspelund, 2021), (Wang and Gao, 2021).

Thus, organizational proficiencies positively affect market pressure and competition in the innovation performances of the organizations.

Organizational Proficiencies and Culture

The importance of culture in innovation has been already established in this study. The culture in the organizations is heavily affected by the organizational proficiencies, or capabilities (Li et al., 2020), (Zhang and Merchant, 2020). Organizations' capabilities in different points allow more room and flexibility to shape the organizational culture toward innovation (Asamoah et al., 2021), (Bahrami and Shokouhyar, 2021).

Alternatively, culture also has very strong mediating impact on the organizational proficiencies, or improving organizational capabilities in innovation activities (Harel et al., 2020), (Hosseini et al., 2020), (Upadhyay and Kumar, 2020).

Therefore, it can be claimed that organizational proficiencies and culture have mutual relationships between them, where both the factors have positive impact on each other.

Organizational Proficiencies and HRM Functions

Human, the employees, in the organizations are the key of innovation because they develop the potential idea for innovation (Kianto et al., 2017), (Atiase and Dzansi, 2020). Thereto, researcher have emphasized HRM functions (Tajeddini and Martin, 2020), (Mousavi et al., 2021) for better innovation performance.

Organizational proficiencies, or capabilities enable organizations to design their HRM functions in alignment with their innovation persuits (Sittisom, 2020), (Singh et al., 2021), (Than et al., 2021). On the other hand, it is found that well designed HRM functions help organization in improving their capabilities toward innovation (Alshammari, 2020), (Yasir and Majid, 2020), (Chadwick and Flinchbaugh, 2021).

So the interrelationships between organizational proficiencies and HRM Functions foster the organizations' performance toward innovation. Simultaneously, it has been proved that orgainizational

proficiencies affect and can control the factors of external environment, culture and HRM functions toward innovation, also market pressure and competition. Hence, the second proposition has been found satisfactorily true and acceptable.

The discussion so far, has clearly established that organizational proficiencies have positive influence on other dominating factors of innovation, e.g., external environment, culture, HRM functions, and market pressure and competition. It has also been recognized that culture and HRM functions also affect organizational proficiencies for innovation. The interrelationship among these 5 dominating factors of innovation can been demontrated through the following figure.
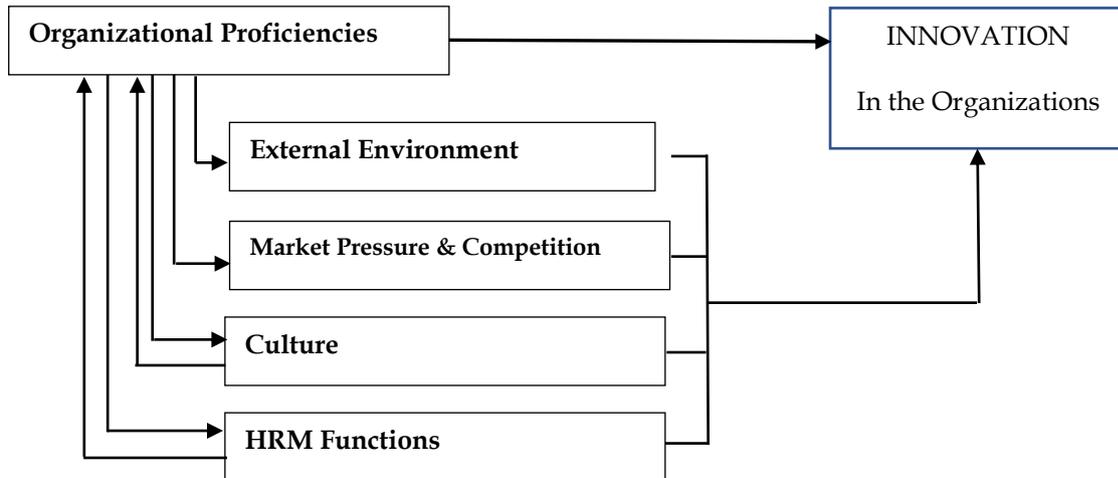
(Figure – 02 : Relationships among the Dominating Factors towards Innovation)

6.0: Study limitations
The key limitations are:
1. Papers were chosen from three databases: SCOPUS, Google Scholar, and Web of Science.
2. Only papers with the titles factors/drivers/forces of innovation/innovativeness were included in the study.
3. No papers that were not derived from a specific research methodology were included in the study.
4. The systematic literature review was used to select all of the factors.

7.0 Conclusion
This study was initiated with the objective of identifying the most important elements influencing innovation and examining their interrelationships. Two necessary and pertinent premises were constructed to serve as a foundation for and steer the study. In answer to the first proposition, the most important predictors of innovation are expected to be organisational capabilities. The innovation literature significantly substantiated this claim. Thus, organisational capabilities have been demonstrated to be the most important elements influencing organisational innovation.

There was some variation in the second proposition, such as the addition of a new factor, market pressure, and competition. Because these factors were discovered to be predominating in invention. The second premise was successfully completed by outlining the interrelationship between organisational capabilities and culture, external environment, human resource management functions, and market pressure and competition. Their interrelationships with regard to organisational innovation are clearly depicted in a diagram (Figure – 02).

The study adds to the corpus of knowledge as well as practises. The identification and accumulation of innovation factors are the means by which the innovation literature is updated. Additionally, the thematic grouping of these characteristics will assist future researchers in working comfortably in this

field. Simultaneously, the partitioners of innovation activities can leverage their understanding of the interrelationships between the most influential aspects to improve innovation outcomes.

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The Impact of Innovative Marketing on Competitive Advantage in Renewable Energy Companies in Jordan

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Abstract
This study is aimed to identify the impact of innovative marketing on competitive advantage in the renewable energy sector in Jordan. This study uses descriptive, analytical, and heuristic research methods. The target population consists of all employees in the renewable energy companies in Jordan, which includes 212 companies and 957 employees. A random sampling method was applied for the data collection representing 296 employees. Statistical Package for Social Sciences (SPSS) and several statistical methods were used – particularly multiple linear regression.
This study shows a statistically significant impact (a≤0.05) of innovative marketing on the competitive advantage of the renewable energy companies in Jordan. The result also indicates that the renewable energy companies in Jordan apply innovative marketing and competitive advantage at high levels.
Finally, this study recommends that these renewable energy companies in Jordan apply innovative marketing strategies, having innovation and creativity being one of the main focuses of these companies. These strategies of innovative marketing would be incredibly beneficial in the fields of production, pricing, distribution, and promotion. Furthermore, this study recommends that renewable energy companies in Jordan continue to develop these concepts. And do not stop at a specific degree of improvement as modern management concepts are continuously evolving and changing for the better. The failure to do so will lead to the companies' global competitive disadvantage while causing a localized ideological stagnation within the ever-changing field of marketing.

Introduction

Knowledge revolutions, technological revolutions, and the emergence of globalization have made multiple global markets one open market and have led to an expansion of competition. This continues to exponentially increase the number of challenges and difficulties for businesses. This causes these organizations to seek a competitive advantage through which they can guarantee more profits and protect against marketing strategies used by competing companies. These companies would naturally strive for development and continuation in the market and the competitive environment (Rumman et al., 2014, 274).

In light of these changes and challenges, organizations and companies must work within advanced plans and programs and use modern administrative concepts that enable them to compete, survive, and continue. For these organizations to be able to put forward programs and appropriate plans to meet the processes of change, they must rely on the innovation and creativity processes, which in turn yield results that are reflected in the performance of the organization and its reputation in the market.

The concepts of innovation and creativity that were later applied to all modern management concepts remained outside the interests of marketers and were restricted to production processes, provision, and development of services. Modern marketing theories have made the concept of innovation applicable in marketing operations (Kafi, 2018, 55).

Henceforth, innovative marketing began, which enhances marketing processes and creates added value for organizations in the marketing and promotion of their products. Innovative marketing is an ideology that capitalizes on renewal and changes in marketing strategies. Since the organization's objectives are to obtain the most significant possible amount of market share and marketing is a factor, innovative marketing is directly related to the growth and stability of the company while maintaining a competitive advantage over rivals in the market.

The renewable energy sector is considered one of the vital sectors worldwide due to the escalating demand to find alternative sources of sustainable energy. In Jordan, this sector is witnessing a state of continuous and rapid development, as well as the appearance of many modern technological advances and innovations.

The Importance of the Study

This study analyses the importance of the impact achieved by innovative marketing on competitive advantage through customer relationship management in renewable energy companies in Jordan.

Theoretical Importance

The theoretical importance arises from the overarching conceptual structure, namely the dimensions within innovative marketing and competitive advantage and customer relationship management. A theoretical framework will then be built using the ideologies and research amongst scholars in business management and administration and addressing concerns and application. This study would benefit researchers in these fields, along with the consultants and administrators working in the renewable energy sector in Jordan.

Practical Importance

The practical importance of the current study is shown through the results, recommendations, and proposals that will be presented on the concept of innovative marketing, competitive advantage, and concept of customer relationship management. Managers and owners of companies operating in the field of renewable energy in Jordan will be able to see firsthand the benefits of these recommendations. This results in improving innovative marketing processes, enhancing aspects of the management of customer relationships, and obtaining a competitive advantage through which companies can achieve more benefits and profits and ensure competition and continuity.

The surveyed sector has great importance in the field of study for several reasons. This includes the modernity of this sector in Jordan, as the companies operating in the renewable energy sector are at the forefront of global ideology, increasing competition among them. Additionally, the connections that this sector has with the world of technology and modern visionaries increase the pressure facing these companies due to the continuous technological and ideological revolutions. Finally, this study will bring to light the need for continued research and intellectual conversation that have been neglected in the sector of renewable energies in Jordan.

Key Problem and Related Questions

The changes that continuously occur in the business environment while obtaining a competitive advantage require companies to put a lot of effort into returning value for themselves compared to other environments (Daft, 2010, 61). The renewable energy sector in Jordan operates within a highly competitive situation that requires the continuous pursuit of competitive advantage through innovation in marketing hence the study aims to address the following key problem:

What is the impact of innovative marketing on the competitive advantage from the viewpoint of employees in renewable energy companies in Jordan?

It gives rise to the following sub-questions:

What is the level of the relative importance of adopting innovative marketing in renewable energy companies in Jordan?

What is the level of relative importance for renewable energy companies in Jordan to obtain a competitive advantage?

What is the effect of innovative marketing on the competitive advantage of renewable energy companies in Jordan?

Study Hypotheses
Main Hypothesis
H0: There is no statistically significant effect at ($\alpha \leq 0.05$) of innovative marketing on the competitive advantage of renewable energy companies in Jordan in the following dimensions: product innovation, pricing innovation, distribution innovation, and promoting innovation.

Sub-Hypotheses
H0.1: There is no statistically significant effect at ($\alpha \leq 0.05$) for product innovation on the competitive advantage of renewable energy companies in Jordan.

H0.2: There is no statistically significant impact at ($\alpha \leq 0.05$) for pricing innovation on the competitive advantage of renewable energy companies in Jordan.

H0.3: There is no statistically significant effect at ($\alpha \leq 0.05$) for distribution innovation on the competitive advantage of renewable energy companies in Jordan.

H0.4: There is no statistically significant effect at ($\alpha \leq 0.05$) for promoting innovation on the competitive advantage in renewable energy companies in Jordan.

Procedural Definitions
Innovative Marketing
The introduction of new and innovative methods that renewable energy companies follow in Jordan adds value to marketing operations and strategies. These methods can be applied to products, pricing, distribution, and promotion processes to obtain targetable objectives. The innovative marketing process will be measured through the following four dimensions, defined below.

1. Product Innovation: The ability of companies to offer advanced products distinguished by quality. These products are revolutionary and move away from traditional products in a way that attracts new customers and allows existing customers to seek the latest model or merchandise. This will be measured by the questions numbered 1 through 4 contained in the questionnaire.

2. Pricing Innovation: The ability for companies to seek and establish distinct pricing mechanisms through which they offer products and services. These pricing mechanisms within the competing market must suit customers' expectations and achieve their aspirations and goals. This will be measured by the questions numbered 5 through 8 contained in the questionnaire.

3. Distribution Innovation: The ability for companies to utilize new and advanced methods how to deliver products to their customers. These distribution methods aim to facilitate the process of obtaining access to the product, which in turn establishes a customer base centered on the method of distribution. This will be measured by the questions numbered 9 through 13 contained in the questionnaire.

4. Promotion Innovation: The ability of companies to promote in a distinct, trendy, or unconventional way to convey a descriptive message regarding the company and its products. This will be measured by the questions numbered 14 through 18 contained in the questionnaire.

Competitive Advantage
The ability to develop strategies, plans, and work programs that enable companies to distinguish themselves from others. Competitive advantage is a measure of Excellency for organizations and is the primary factor for continuity, survival, and expansion within the competitive environment. Competitive advantage will be measured through the following four dimensions, described below.

Cost: The ability to offer products or services at low prices, thereby creating value for the consumer. Products or services should not be adversely affected and should maintain a minimum standard. This will be measured by the questions numbered 19 through 23 contained in the questionnaire.

Quality: The ability to offer products and services that meet certain specifications or standards, in a way that strives to exceed consumer expectations. This will be measured by the questions numbered 24 through 28 contained in the questionnaire.

Flexibility: The ability for companies to change, adjust, and develop strategies to adapt and respond to environmental or situational changes. Companies should be able to design alternative strategies that

enable them to solve problems and achieve goals. This will be measured by the questions numbered 29 through 32 contained in the questionnaire.

Time: The time it takes for companies to introduce the products and to deliver them within the required specifications, allowing for feedback and service. This factor plays a major role in customer satisfaction, providing time-efficient companies with a significant marketable advantage. This will be measured by the questions numbered 33 through 36 contained in the questionnaire.

Previous Studies

The study by Al-Hunaiti and Al-Qa`id (2019) discussed both the concept of competitive advantage and its dimensions. In addition to organizational structures and measuring the effect of organizational structures in achieving competitive advantage in its dimensions (quality, cost, flexibility, creativity) within the industrial and service institutions in Jordan, the results of the study showed that the interest of the researched institutions in the advantage Competitiveness and its components had reached a high level as these institutions provide their products within the market with high quality and reasonable cost and are constantly working to stimulate their creativity in production processes and follow the strategy of flexibility to a great extent for continuous change and improvement on the products they offer, as the study showed that there is a statistically significant effect For organizational structures in achieving competitive advantage from the viewpoint of workers in these institutions.

Nuri and Al-Dulaimi study (2018) The study aimed to explain the role of innovative marketing and its impact on increasing marketing efficiency in organizations, researching and interpreting the dimensions of innovative marketing and focusing on the concept of marketing efficiency in the General Company for Cement Industry in the northern region of Mosul. The study adopted the dimensions of innovative marketing by (developing a strategy Marketing technology, resource optimization, sustainable innovation, calculated risk). The results of the study showed that the researched company has a great interest in improving its marketing efficiency according to the answers of the study sample individuals, and there is a close correlation and statistically significant effect of innovative marketing with its four dimensions in raising and improving marketing efficiency.

Abdelkader and Kashroud's study (2017) The study aimed to measure the role of innovative marketing in achieving the competitive advantage in the economic enterprise and to study the case of the telecommunications institution in Algeria, where the concept of innovative marketing was discussed through four main dimensions (Product Innovations, Pricing Innovation, Promotion Innovation, Distribution Innovation), and the study relied on The descriptive and analytical approach to achieve the desired goals and come up with a set of results, and the study found that there is a clear impact of innovative marketing on the competitive advantage of the telecommunications organization by developing innovative and different methods for all aspects of marketing innovation, which contributed to raising the quality of its services, improving its image and creating a competitive advantage for it, and the results showed Also, the researched institution achieves a competitive advantage through the optimal investment of its resources.

Kebab study (2017) The study aimed to assess the state of marketing innovation and competitiveness in telecommunications institutions in Algeria and the extent to which workers in these institutions perceive the importance of the concept of marketing innovation and competitive advantage and to show the effect of marketing innovation on the competitive advantage from the point of view of dealers with telecommunications institutions. The study adopted the approach Descriptive and analytical. The results of the study showed that the researched telecommunications institutions are keenly interested in achieving competitive advantages that enhance their competitiveness by improving the quality of services and achieving excellence in responding to customer requirements. The study also showed the presence of an impact of marketing innovation in enhancing competitiveness.

Nuryakin study (2018) The objectives of the study are to identify the impact of marketing capabilities in its dimensions (product, pricing, distribution, promotion) on competitive advantage in its dimensions (cost, quality, flexibility, creativity) and marketing performance and the relationship between the market orientation to product innovation and marketing performance, and the study approved On the descriptive-analytical approach, and the results of this study showed that the marketing capacity of the researched companies had a minimal impact on the marketing performance, and that the marketing

ability greatly affected the competitive advantage, and the study demonstrated a statistically significant impact of market trends on the marketing performance of companies operating in the manufacture of batik, The study also proved that the innovation aspect within the areas of marketing and the marketing plans, including the main dimensions they contain, have a clear and important impact on the marketing performance within the researched companies.

Ruaykijakarn, Suwanmaneepong & Kuhaswonvetch (2018) The study mainly aimed to identify the extent to which organic rice growers in Chachongsaw Province in Thailand are oriented towards marketing innovation and how to use their knowledge aspect and its impact on marketing innovation in the study community where marketing innovation is discussed through four main dimensions They are (Product Innovation, Pricing Innovation, Promotion Innovation, Distribution Innovation), and the study relied on the analytical descriptive approach and the use of it to collect study data, and As for the findings of the study, it showed that farmers have an average level of knowledge in the field of marketing innovation, and the results proved that the marketing innovation aspect is one of the most sensitive and main concepts in the field of marketing as the application of the standards of this concept is greatly reflected in the sales made by the owners of rice farms In Thailand.

Collazos and Palacio's (2016) study This study aimed to identify the extent of the influence of the organization's image and customer satisfaction on marketing innovation in tourism companies in Colombia, where marketing innovation was addressed from several aspects, namely (tourism product innovation, tourism product promotion innovation, product pricing innovation. Tourism, creating the status of the tourism product). The researchers used the descriptive-analytical method and developed a questionnaire to collect the necessary data. The results showed that there is an apparent discrepancy between companies in adopting a strategy for marketing innovation and working on improving and developing marketing aspects. The study showed that the level of marketing innovation in the researched companies is still within weak grades and that the aspect of marketing innovation is the main and influential factor in increasing customer satisfaction with the organization and improving its image, and that there are several companies making efforts to improve marketing performance in general because of their awareness of the importance of this aspect in improving the level of the company as a whole.

Ngamsutti's study (2016) The study aimed to identify the level of marketing innovation and marketing performance in the field of marketing electrical and electronic devices in Thailand. Marketing innovation has been discussed from several aspects including (innovation, ability to innovate, desire for change) and a set of factors have been included that Marketing innovation is linked to marketing performance as intermediate factors (new products, market conditions, entry of new competitors into the market, the customer side), and to achieve the objectives of the study, the descriptive analytical approach was used. A questionnaire was developed for data collection purposes; the results of the study showed that marketing innovation has a clear and significant impact on the marketing performance of the companies studied and that marketing innovation has affected these companies through their orientation in manufacturing and producing new and innovative products and in achieving high competitiveness in front of the competing companies.

Theoretical framework
Innovative Marketing

Defined as the organization's ability to develop new concepts and methods that transform the organization's policies toward developing performance in the marketing field (Khairy, 2012, 68-69). Through Innovative marketing, a radical change occurs in marketing strategies. Product innovation may cause new products not available within the competing market to be launched. Additionally, product innovation may cause changes to the features and specifications of existing products so that they become more desirable by the purchasing power (Jumaa, 2010, 4).

Pursuing marketing operations to reach a competitive advantage must be based on innovative marketing. The value that customers give to any organization should be preceded by an equal level of effort by the organization in marketing research that results in following new strategies. This determines the target market, which includes how to develop and change products, establish communication channels, promote the target market, and suggest appropriate distribution operations (Potocan, 2013).

Innovative marketing is a constantly changing and evolving process that occurs at both the internal and external levels of the organization. The process occurs through organizational trends, which propagate when professionals share knowledge. This propagation of knowledge will allow the organization to maintain a high level of modernity, which accelerates development, improvement, and innovation (Muangkhot, 2015).

Innovative marketing is a term given to the processes of development, change, modernization, ideology, and creative proposals for the marketing system in all its dimensions. Innovative marketing utilizes modern technological advances, which creates new marketing situations in the fields of innovative products, prices, promotion, and distribution that enable the organization to reach a high marketable value.

Dimensions of Innovative Marketing
Product Innovation

Product innovation introduces new and advanced products to the market, emphasizing product development. This will positively affect the company's total sales (Mirzaie, Micheels, &Boecker, 2016). Competitive companies no longer focus on the ability to provide similar or competitive products, which are based on offering customers better prices and quality than competitors. It has become increasingly imperative for tech companies to strive for innovation in their products to distinguish the company from other companies in the competitive environment. This in turn allows companies to gain a competitive advantage (Nuryakin, 2018).

The innovation in the product expresses the organization's willingness to introduce new products in the market with special features and features that meet the customers' desires and needs. This type of innovation considers the marketing environment and is compatible with the conditions of the target. The innovative products may provide opportunities for the company to expand its domain to different sectors, allowing adaptivity in newer markets.

Pricing Innovation

The process of innovation in product pricing is one of the most critical factors in marketing strategies. This factor manages to hold both the interests of the organization and its customers at the forefront. The innovation strategy considers pricing within the whole production process, from the raw materials, refining, and other production costs to distribution and promotion. Everything considered ultimately affects the product price (Yang, 2014).

Innovation in pricing is one of the most challenging areas of innovative marketing. The ability to control costs for products and services at every level of production suggests a way to maintain the efficiency of production. This efficiency must follow the standards of the company and its customers while also striving to be distinguished among established competitors. The pricing process thus greatly affects the competitive advantage of the organization.

Distribution Innovation

Innovation in the distribution activity can be done by considering the structure of the distribution process. Many companies are considering horizontal distribution, which means that selling and distribution centers are established in several regions with direct or proximal contact with merchants, retailers, or customers. In turn, this reduces the presence of middlemen in the distribution operations (Yang, 2014).

Strategic innovation in distribution focuses on optimizing the flow between the company and its customers. The introduction of advanced technologies in distribution aims to improve the speed or quality of the delivery process and is a necessary process for company expansion and marketability.

Promotion Innovation

Innovation in the product promotion process is to work to enhance the communication and communication mechanisms between the organization and the customers by exchanging information about the products that are put on the market to ensure that customers are directed towards these products (Ilic, Ostojic&Damnjanovic, 2014). Promotion Innovation is the improvement of product

promotion methods that ensure the delivery of product specifications, characteristics, and prices to customers in various modern and innovative ways (Musaed, 2016, 99).

Promotion Innovation is the ability to use modern and creative means methods and technological techniques to convey an idea about a specific product to customers while determining the characteristics and advantages of this product and its actual value to achieve a large part of the impact on the target customers to go towards the purchase of the product. Modern technologies have affected the promotion processes so that they become reaching customers in different ways and short cuts of time and effort.

Competitive advantage

Competitive advantage is a strategic concept that expresses the state of competition for a particular company against its competitors working in the same field (Kandoura, 2015, 71). The strategy of competitive advantage refers to the ability of the organization to outperform its peers in attracting the most significant number of customers while dealing with competition (Thompson, Peteraf, Gamble & Strickland, 2018, 4-5); Barney & Hesterly, 2018, 33)

Globalization has greatly affected corporate competition, and the concept of competition has become more complex than it was previously, hence the need for companies to produce something new or improve to increase competitiveness. What was distinctive yesterday has become something normal and widely adopted within the market (de Conto, Junior, & Vaccaro, 2016).

The concept of competitive advantage is a term that expresses the extent of the organization's ability to invest its various resources, activities, and processes to provide products with high efficiency and reasonable prices that distinguish them from other organizations. The concept of competitive advantage, if we analyze it in all its dimensions, is a complex concept that deals with several aspects such as product quality, cost, and the extent to which it has specific features that suit the needs of customers.

Dimensions of competitive advantage
Cost

Cost strategy is one of the significant advantages that an organization can use to attract customers in a way that cannot be imitated by other organizations (Gamble, Peteraf& Thompson, 2017, 6). The cost component is one of the foundations for the differentiation of the products offered in the market. The fundamental desires of the customers are primarily focused on obtaining quality products at the lowest possible prices. However, the company's ability to provide a product at a lower price than others require great capabilities to control the cost of production processes and technological development. The company's technology plays a major role in reducing costs, as it is limited by the time and effort spent on them that incur additional costs.

Quality

The design of products must consider the requirements, desires, and needs of customers, and therefore it must consider quality issues from the beginning. Quality standards are chosen and followed from the beginning of the design and implementation of products, and this is a primary measure of performance (Singh, 2013). Through this strategy, organizations are distinguished in providing products and services within specific basic specifications that correspond to the desires of customers in a way that competitors cannot achieve, which achieves the goals of the organization by reaching an advantage different from others that achieve great competitive advantage (Gamble, Peteraf & Thompson, 2017, 6).

The concept of quality ensures that all customers are satisfied with the company's products and services, and quality must meet or exceed customer expectations (Blocher, Stout, Juras & Cokins, 2013, 715). The quality factor is the main factor in obtaining a competitive advantage, and it is a set of standards and characteristics that must be available in a specific product.

Flexibility

The concept expresses the organization's ability to respond and adapt to changes and adjust products and processes according to turbulent circumstances to maintain its competitive advantage (Singh, Oberoi, & Ahuja, 2013). The dimensions of flexibility include the strategies, operations, products, resources, and response.

Time

The speed factor in delivering products to customers is critical in influencing purchasing decisions (Davis, Aquilano & Chase, 2003, 34). Companies have begun using modern technology methods to provide a product or service where the customer can receive the product in record times (Nicholas, 2010, 3).

The time factor is no less important than the cost factor and the quality to customers. The company's commitment to delivering the product within the time specified directly affects customer satisfaction and increases trust in the company.

Study Methodology
Study population and sample

The study mainly consisted of employees in renewable energy companies in Jordan; the number of companies, as the number employees in these companies reached 957 employees (Annual Report, Energy and Minerals Regulatory Authority, 2018).

The two researchers took a proportional random sample from all employees of renewable energy companies in Jordan, and to reach the appropriate sample size and to be representative of the study community, the sample table specified by Sekaran & Bougie (2012, p 296) was used, where it was found that the appropriate number of the study sample and a representative of the community must not be less than 275 employees. This results in 350 questionnaires distributed to 70 companies. Later, 303 questionnaires were retrieved, and seven questionnaires were excluded due to incomplete answers of the respondents, as the questionnaires subject to analysis reached 296.

Data collection sources:

In this study, the two researchers relied on collecting data from the following sources:

Secondary sources: The study used many secondary sources such as books, literature, scientific periodicals, and specialized publications related to innovative marketing and competitive advantage as well as customer relationship management, and the study relied on documenting data, information, and various references on the method of documenting the American Psychological Association (Manual of American Psychological Association) system. APA, 2010) and the use of electronic resources available on the Internet and various databases.

Primary sources: The study relied on collecting primary data on the questionnaire, as it was developed to suit the nature of the study. The questionnaire was designed by extrapolating the scientific dimensions that include primary variables and based on what was presented in previous literature in scientific research.

Tool validity

The two researchers presented the study tool to a group of experienced and specialized academic referees consult the validity of the suitability of the paragraph to the content, the adequacy of the study tool in terms of the number of paragraphs, its comprehensiveness, the diversity of its content and the evaluation of the level of language formulation, or any other remarks they deem appropriate regarding It relates to amendment, change or deletion as the arbitrator deems necessary. The arbitrators 'observations and suggestions were studied, and revisions were made in light of the recommendations and opinions of the jury, such as:

- Clarifying some terms.
- Amending the content of some paragraphs.
- Amending some sections to make them appropriate.
- Deleting or merging some paragraphs.
- Correcting some linguistic drafting errors.

Tool Reliability

The reliability of the tool used (the questionnaire) was confirmed by calculating the value of the Cronbach's Alpha Coefficient, where the result is statistically acceptable if its value is more significant than (0.60), and whenever the value approaches (1), one, i.e., 100%, this indicates that higher

Sig value of the data is greater than (0.05) and the KS value is less than (5) (Doane & Seward, 2011, 156).

Study Model

Independent Variable

Innovative Marketing

Dependent Variable

Competitive Advantage

Innovation by Product
Innovation by Pricing
Innovation by Distribution
Innovation by Promotion

Cost
Quality
Flexibility
Time
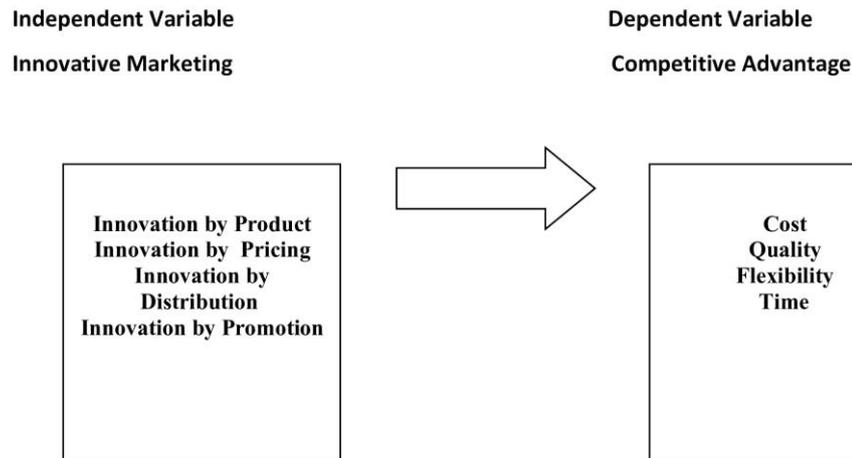
Table No. (1) (Cronbach Alpha) for the items of the study tool

Dimension		Cronbach Alpha	Items
1.	Product Innovation	0.841	4
2.	Pricing Innovation	0.843	4
3.	Innovation by Distribution	0.891	5
4.	Promotion Innovation	0.903	5
Innovative Marketing		**0.938**	**18**
1.	Cost	0.863	5
2.	Quality	0.906	5
3.	Flexibility	0.897	4
4.	Time	0.863	4
Competitive advantage		**0.944**	**18**

Based on the results in Table (1) for the Cronbach Alpha internal consistency coefficient values for the study tool items, which ranged between (84.1% -92.6%), which are values greater than (70%), which indicate consistency between the paragraphs of the study tool. The study tool can be described as consistent, and the data obtained is suitable for measuring variables.

Normal Distribution Test

The Kolmogorov-Smirnov test was performed, which is used to test the normal distribution of data in case the number of cases or observations is greater than (50), (Abu Zeid, 2010, 313) and one of the conditions for the normal distribution is that the Sig value of the data is greater than (0.05) and the KS value is less than (5) (Doane & Seward, 2011, 156).

Table No. (2) The normal distribution of data based on (Kolmogorov-Smirnov) test

Type	Variables	Mean	Std.	K-S	Sig
Independent	– Product Innovation	4.31	0.670	0.981	0.291
	– Pricing Innovation	4.23	0.688	0.725	0.669
	– Distribution Innovation	4.20	0.694	0.855	0.458
	– Promotion Innovation	4.14	0.739	1.171	0.129
	Innovative Marketing	**4.21**	**0.585**	**0.771**	**0.592**
Dependent	– Cost	4.21	0.651	0.929	0.354
	– Quality	4.23	0.734	0.746	0.634
	– Flexibility	4.24	0.740	1.006	0.263
	– Time	4.21	0.661	1.325	0.060
	Competitive advantage	**4.22**	**0.591**	**0.699**	**0.713**

Based on the test data shown in Table No. (2), which indicates that the data distribution was normal, as the Sig value for all dimensions reached values greater than 5% and the K-S test values for all dimensions less than (5).

Adapting the study model to the used statistical methods
First: The Multi collinearity Test

Table (3) Results of the multiple correlation strength test between independent variables

Independent Variables	VIF	Tolerance
Product Innovation	1.813	0.552
Pricing Innovation	2.247	0.445
Distribution Innovation	2.524	0.396
Promotion Innovation	2.055	0.487

Second: The Autocorrelation Test

This test verifies that the data is free from the autocorrelation problem in the regression model, which impairs the model's predictability. This is confirmed by conducting the Durbin-Watson Test, where its value is limited between (0-4), and whenever this value approaches (2) this indicates that there is no self-correlation problem (Dawood & Al-Sawai, 2016, 315- 320).

Usually, the calculated Durban-Watson value is compared with its two tabular values, namely the upper value (du) and the lower value (dl). If the calculated value falls between the two values then it cannot be determined whether or not the autocorrelation problem is present, while if the computed value is greater than the value The upper tabular value (du) and less than (2), then this means that there is no self-correlation problem in the regression equation, but if the calculated value is less than the lower tabular value (dl) then this means that there is a self-correlation problem in the regression equation, and both are calculated The lowest and highest tabular value when the number of observations (n = nK) and the number of variables equal (K-1) with significance level of (0.05) (Shekhi, 2019, 99; Gujarati, 2008,470).The following figure shows the areas of acceptance and rejection of the (Durbin - Watson test).

Acceptance and rejection areas for a test (Durbin–Watson)
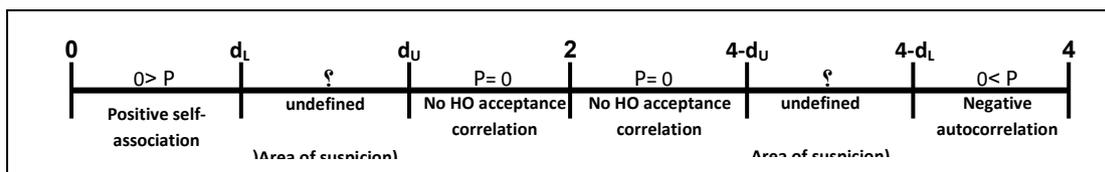
Table No. (4) results of the self-correlation test (D-W) for the study hypotheses

Hypotheses	D-W computed value	D-W higher tabular values dU	D-W minimum tabular value dl	Result
H0	**2.009**	1.809	1.728	No self-correlation problem
$H0_{.1}$	**1.868**	1.779	1.758	No self-correlation problem
$H0_{.2}$	**1.907**	1.779	1.758	No self-correlation problem
$H0_{.3}$	**1.979**	1.779	1.758	No self-correlation problem
$H0_{.1.4}$	**1.850**	1.779	1.758	No self-correlation problem
$H0_{.2}$	**1.934**	1.809	1.728	No self-correlation problem
$H0_{.3}$	**2.138**	1.809	1.728	No self-correlation problem

Table No. (5) shows the results of the (Durbin-Watson) test, as it becomes clear that the value of (DW) computed for the study hypotheses is greater than its higher tabular values (du) and close to the value (2) at the level of significance (5%), which indicates no existence of an autocorrelation problem and its validity for use in a regression model.

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