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All manuscript must be prepared in letter quality (font size 12) in double-space of A4 paper with margins of one inch on all side using the Times New Roman.

1. Cover Page

Manuscript of a paper should have a cover page providing the title of the paper, the name(s), address(es), phone, fax numbers and email address(es) of all authors and acknowledgements, if any.

2. General Guidelines for Papers

Abstract: Following the cover page, there should be an 'abstract' page, which should contain the title of the paper, the subtitle 'Abstract' and a summary of the paper in single space not exceeding 150 words and Keywords of 3 to 5 words.

Introduction: Briefly describe the objective of the research and explain why it is important.

Methods: Describe the research plan, the materials (or subjects), and the method used. Explain in detail the Data, sample and population, and the variables used.

Results: Present results in a clear, logical sequence. If tables are used, do not duplicate tabular data in text, but do describe important trends and points.

Discussion: Describe the limitations of the research plan, material (or subject), and methods, considering both the objective and the outcome of the study. When results differ from those of previous researchers, explain the discrepancy.

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Example: "…Ahuja et al. [1]. ..... studied [2, 4]. Areibi and Yang [2] obtained .....

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Examples (Reference to a journal publication):

[1] Ahuja, R.K., Magnati, T.L. and Orlin, J.B. , 1993, Network flows: theory, algorithms and applications, Prentice Hall, Englewood Cliffs, New Jersey.

[2] Areibi, S. and Yang, Z., 2004, Effective memetic algorithms for VLSI design = Genetic algorithms + Local search + Multi-level clustering, Evolutionary Computation, 12, 327-353.

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Lexicographic Earliest Arrival Contraflow Evacuation Problem on UPL-TTSP Network

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Abstract

An evacuation plan proposes a way out for maximum utilization of an existing transportation system so that the safest tour and most efficient evacuation time of all expected evacuees could be ensured. This paper studies the auto-based earliest arrival contraflow problem modeled on network with capacitated intermediate vertices. The vertices serve as transshipment vertices as well as temporary shelters of given priority order. It also proposes an efficient solution procedure to the problem for the uniform path length two terminal series parallel (UPL-TTSP) network.

Keywords: Network contraflow, Capacitated vertices, Evacuation planning problem, Disaster management

1. Introduction

Increasing number of disasters due to different kind of natural and human caused hazards have drawn attention of stakeholders for preparation of optimal evacuation plans. Evacuation planning problems can be modeled as network optimization flow problems. Since it is usually not known when disaster will actually happen, it is desirable to organize an evacuation in such a way that as many evacuees as possible are sent to the sink as early as possible. Moreover, it is not always possible to send all the evacuees into the sink due to network capacity constraint and/or time constraint, but can be held at relatively safe intermediate spots besides sending to the sink. One of the potential ways to accelerate the process of achieving this objective is to apply notion of network contraflow in evacuation model with non-conservation flow constraints.

Maximum dynamic flow (MDF) problem, introduced by Ford and Fulkerson [11, 12] is a central problem in network flow theory and in mathematical evacuation planning problem that attempts to determine maximum flow of single commodity from a single source to a

single sink over specified time horizon. The problem with arc direction reversal capability (contraflow), known as maximum dynamic contraflow (MDCF) problem, has been studied and proposed polynomial time solution algorithm in [18]. The MDCF problem with continuous time setting has been studied in [15]. Authors in [5] consider not necessarily equal transit time on anti-parallel arcs and study MDCF problem for general network for discrete as well as continuous time setting.

An extension of MDF problem is earliest arrival flow (EAF) problem. An EAF problem aims to optimize the objective of MDF problem for every time step within pre-specified time horizon. Existence of solution to earliest arrival flow problem was proved by Gale [13]. The problem has been studied in different contexts since then, see [2], [3], [14], [17], [20], [21], etc. To the best of our knowledge no polynomial time exact algorithm for earliest arrival flow problem on general network is known till now. Ruzika et al. [19] considered maximum dynamic flow problem on special class of networks known as two terminal series parallel (TTSP) network. They developed a polynomial time MDF algorithm for TTSP networks and showed that this also solves earliest arrival flow problem for these networks. Authors also pointed out that on series-parallel networks it is always possible to find an earliest arrival flow as a temporally repeated flow. However, the converse is not necessarily true. Earliest arrival contraflow (EACF) problem has been studied and proposed a polynomial time solution algorithm, based on the idea in [19], in [10] for TTSP network. Authors in [5] consider not necessarily equal transit time on anti-parallel arcs to study EACF problem for this class of networks. Network flow problem with non-conservation flow constraints is studied in the context of evacuation planning problem in [9] (cf. [4], [6], [16]). By considering the multinetwork the contraflow evacuation problems with capability of holding evacuees at intermediate spots have been studied in [8]. Authors have proposed polynomial time solution algorithm for static case and pseudo-polynomial time solution algorithm for dynamic case.

This paper studies the earliest arrival contraflow problem modeled on the network that allows holding of flow units at intermediate vertices. It discusses solution procedure for the problem modeled for uniform path length two terminal series parallel (UPL-TTSP) network. The problem is formulated in Section 2. Section 3 discusses its solution procedure. Section 4 concludes the paper.

2. Problem Formulation

Consider a network $N = (V, A, u(a), \tau(a), k(v), s, d)$ with vertex set V and arc set A, both to be finite, such that $n := |V|$ and $m := |A|$. Vertices s and d represent the source and the sink, respectively. Here, $u: A \to \mathbb{N}_0 = \mathbb{N} \cup \{0\}$ represent the arc capacity function which bounds the number of flow units on each arc $a \in A$ at each time step $t \in \mathcal{T} := \{0, 1, \ldots, T\}$ where T is given time horizon. Moreover, the transit time function $\tau: A \to \mathbb{N}$ specifies the time needed by a flow unit to traverse an arc. We assume a terminal set $S := \{v_1, \ldots, v_r\} \subset V$ with prioritized from higher to lower priority, i.e., $d = v_1 \succcurlyeq \cdots \succcurlyeq v_r$, to be given. Similarly, the vertex capacity function $k: S \to \{0, \infty\}$ delimits the total number of flow units, which may be held in each of the vertices $v_i \in S$.

The nonnegative variables $f(a,t)$ defined by $f: A \times \mathcal{T} \to \mathbb{N}_0$ is the number of flow units entering arc a at time step t that specify the flow over time in the network N. This flow unit should be bounded by the capacity of arc, i.e., $f(a,t)$ satisfies the capacity constraints for all $a \in A$ and for all $t \in \mathcal{T}$. That is,

$$0 \leq f(a,t) \leq u(a) \qquad \forall\, a \in A \text{ and } t \in \mathcal{T}. \tag{1}$$

Moreover, $f(a,t)$ has to be equal to zero for all $t > T - \tau(a)$ for all $a \in A$. The excess flow at vertex $v \in V$ at time $t \in \mathcal{T}$, denoted by $ex_f(v,t)$, is defined as

$$0 \leq ex_f(v,t) := \sum_{a \in \delta^{-(v)}} \sum_{\xi=0}^{t-\tau(a)} f(a,\xi) - \sum_{a \in \delta^{+(v)}} \sum_{\xi=0}^{t} f(a,\xi) \tag{2}$$

where $\delta^{-(v)} := \{\, a \in A : a = (w,v) \text{ for some vertex } w \in V\}$ and $\delta^{+(v)} := \{\, a \in A : a = (v,w) \text{ for some vertex } w \in V\}$ denote the set of arcs entering and leaving vertex $v \in V$, respectively.

Further, we need to ensure that the excess flow at each vertex $v \in S$ over time horizon T is to be bounded by the capacity (v) , i.e.,

$$ex_f(v,T) \leq k(v) \text{ for all } v \in S. \tag{3}$$

Consequently, the total flow of evacuees leaving the source s equals the total flow of the evacuees held at vertices $v \in S$ over the time horizon T, i.e.,

$$\sum_{a \in \delta^{+(s)}} \sum_{\xi=0}^{T} f(a,\xi) - \sum_{a \in \delta^{-(s)}} \sum_{\xi=0}^{T} f(a,\xi) = \sum_{v \in S} ex_f(v,T). \tag{4}$$

With these settings, *lexicographic earliest arrival contraflow (LexEACF) problem* on N aims to maximize the flow units sent to the terminals on S in given priority order at each time step $t \in \mathcal{T}$, if reversal of arc direction is allowed. An arc $a = (v,w) \in A$ in which the flow could travel from vertex v to vertex w is replaced by the arc (w,v) for contraflow purpose.

3. Solution Discussion

The solution procedure for the lexicographic earliest arrival contraflow problem for a UPL-TTSP network N is discussed here. A directed dynamic network is a uniform path length (UPL) network for which the sum of the transit times on arcs on any possible path from the source s to the vertex v, for all $v \in V$, is equal. A two terminal series-parallel network $N = (V, A)$ is a directed network with a single source s and a single sink d which has a single arc (s, d) or is obtained from two series parallel networks $N_1$and N_2 by one of the two operations: Parallel Composition and Series Composition. The first suggests to merge source vertices s_1 of $N_1$and s_2 of N_2 to form the source vertex s of N and merge sink vertices d_1 of $N_1$and d_2 of N_2 to form the sink vertex d of N. The second suggests to merge the sink vertex d_1 of $N_1$with the source vertex s_2 of $N_2$to form the network N with source vertex s_1 and sink vertex d_2.

To solve the LexEACF problem, if arcs reversibility is allowed only once at time zero, the input network is modified to its corresponding auxiliary network by the technique given in [18] and a maximum dynamic flow is computed on it by using the technique given in [6]. For the modification of input network $N = (V, A, u(a), \tau(a), s, d, T)$, it is transformed into its auxiliary network $\tilde{N} = (V, \tilde{A}, u(\tilde{a}), \tau(\tilde{a}), k(v), s, d, T)$ where arc set $\tilde{A}$ contains undirected arc (v, w) , if $(v, w) \in A$ and/or $(w, v) \in A$ such that capacity $u(\widetilde{v,w}) := u(v,w) + u(w,v)$ and transit time $\tau(\widetilde{v,w}) := \tau(v,w)$ if $(v,w) \in A$, otherwise, $\tau(\widetilde{v,w}) := \tau(w,v)$. During the dynamic flow computation, a lexicographic dynamic flow is computed on so-formed auxiliary network $\tilde{N}$ by using the Lexicographically maximum dynamic flow (LexMDF) algorithm of [7]. The maximum dynamic $s - v_i$ flow on $\tilde{N}$ is obtained iteratively by using temporally repeated flows (TRFs) on it. The TRF is a dynamic flow that can be generated by repeating all possible source to sink path flows starting at time zero and then adopting temporal repetition as far as possible.

For a uniform path length (UPL) network $N = (V, A, u(a), \tau(a), k(v), s, d, T)$, with prioritized vertices $v_i \in V$ sorted as $d = v_1 \succcurlyeq \cdots \succcurlyeq v_r$, the procedure for solving LexMDF problem has following steps: The main idea of the solution procedure of the problem is to find $s - v_i$ paths, for all $v_i \in V: k(v_i) > 0$, at all possible time steps $t \in \mathcal{T}$ with corresponding flow value and send as many units of flow as possible along the paths as long as possible. Such paths can be found by decomposing the flow on solving the *lexicographic minimum cost flow (LexMinCF) problem* on N, see [7]. It gives an extended set $\Gamma_{v_i}^E$ that contains all minimum cost $s - v_i$ paths that exist at any time $t \in \mathcal{T}$ on the residual network of N with respect to the optimal flow $f(v_{i-1})$ at previous immediate prioritized vertex v_{i-1}. Flow units of corresponding values are pushed along each path as long as possible. Moreover, the flow is pushed along the paths in $\Gamma_{v_i}^E$ with the strategy of saving unused paths for the use of next less prioritized vertex v_{i+1} without violating the optimality at v_i. This is assured by selecting the path with highest $F_t\ (\gamma_{v_i})$, the time step at which the flow along γ_{v_i}stops to get repeated, among the paths $\gamma_{v_i} \in \Gamma_{v_i}^E$ with highest $I_t\ (\gamma_{v_i})$, the time step at which the flow along γ_{v_i} starts to get repeated, at the

first and so on. This procedure yields an optimal solution to the LexMDF problem on UPL network N in polynomial time.

Here the LexMDF algorithm is applied for UPL-TTSP network after reducing it into its auxiliary network that modifies the LexEAF algorithm proposed in [7] and solves the LexEACF problem. The modified procedure is given in Algorithm 1 that solves LexEACF problem when arc reversibility on N is allowed only once at time zero.

Algorithm 1. Lexicographic Earliest Arrival Contraflow Algorithm

1. Given a UPL-TTSP network $N = (V, A, u(a), \tau(a), k(v), s, d, T)$, $S := \{v_1, \dots, v_r\} \subset V$ with $d = v_1 \succcurlyeq \cdots \succcurlyeq v_r$ and integer inputs.

2. Transform N into $\widetilde{N} = (V, \tilde{A}, u(\tilde{a}), \tau(\tilde{a}), k(v), s, d, T)$ as in [18].

3. Compute LexMDF on $\widetilde{N}$ using Algorithm in [7]

4. Perform flow decomposition into path and cycle flows of maximum flow obtained from step-3 and remove all cycle flows.

5. Arc $(w, v) \in A$ is reversed if and only if the flow along arc $(v, w) \in A$ is greater than $u(v, w)$ or if there is non-negative flow along arc $\notin A$.

6. Obtain LexEACF solution for UPL-TTSP network N.

We make the following claim which turns out to be important in proving the optimality of solution computed by Algorithm 1.

Claim 1. UPL-TTSP network N, after transforming into its auxiliary network $\widetilde{N}$, remains UPL-TTSP network.

Theorem 1. Given a UPL-TTSP network $N = (V, A, u(a), \tau(a), k(v), s, d, T)$, source s and terminal set $S := \{v_1, \dots, v_r\} \subset V$ with $d = v_1 \succcurlyeq \cdots \succcurlyeq v_r$. Then, Algorithm 1 computes a lexicographic earliest arrival contraflow on N in polynomial time.

Proof: The construction of auxiliary network $\widetilde{N}$ of input network N is well defined and the transformed network remains a UPL-TTSP network due to Claim 1. The algorithm (Step 3) pushes flow of value $f(\gamma_{v_i})$ along each path on extended set $\Gamma_{v_i}^{E}$ for each possible time step $t \in \{0, 1, 2, \dots, T - \tau(\gamma_{v_i})\}$ from the source vertex s to each of the destination vertex $v_i \in S$ in given priority order [6]. Therefore, a maximum flow at each $v_i \in S$ is obtained at the termination of algorithm, [12]. Moreover, the network N being a two terminal series parallel in structure, this flow has an earliest arrival property [19].

The time complexity of Algorithm 1 depends on time complexity of the solution procedure on the reduced network $\widetilde{N}$. Also, it is dominated by solving a LexMDF

problem on $\widetilde{N}$ since the flow decomposition in each iteration and network transformation can be done only in $O(mn)$ ([1]) and $O(m)$ time, respectively. The LexMDF problem can be solved in strongly polynomial time, [7].

4. Conclusion

Earliest arrival flow problems are of much interest to evacuators because these problems ensure that the number of evacuated persons is maximum at each time point within given time horizon T. Evacuation models with intermediate temporary shelters could be extra benefit while implementing them and contraflow approach seems to be a crucial tool to speed up the overall evacuation process during disasters. This paper proposed a network contraflow evacuation model that allows holding of evacuees at intermediate spots despite sending them to the safe destination. It also proposed polynomial time solution algorithm to the lexicographic earliest arrival contraflow problem for UPL-TTSP network.

Searching of solutions to the problem at which the arc reversibility is permitted at any time point within the specified time horizon would be further research in the field considered here. Problem modeled for multinetwork would also be interesting that captures the situation with multiple lanes connecting two places with unequal transit time on them.

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Antecedent of service innovation effectiveness in small and medium enterprises: a case of hospitality sector in Nepal

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Abstract

For a country's economic growth and the productivity of the market, innovation is an integral factor. Service innovations today are transforming into a huge area for investigating dynamic relationships among technological and human processes that lead to the transition to the organization and management of services. In the hospitality industry, service innovation is very commonly needed. Conventional techniques in the hospitality industry are also very popular and notions prevails that hospitality is hard to innovate. With this the aim of this research is to examine the service innovation practices and its effectiveness in hospitality sector small and medium enterprises of Nepal. A sample of 308 responses has been collected from SMEs in hospitality sector. The findings indicate that the effectiveness of service innovation is limited. The highest correlation is observed with process innovation and followed by service innovation, organisational innovation, marketing innovation and human capital competency. It was found that there is an influence of service innovation, process innovation, marketing innovation, organizational innovation, and human capital competency on effectiveness of service innovation in smes of hospitality sector. SMEs from the hospitality sector could use innovation drivers to meet the ultimate company goals by service innovation effectiveness.

Keywords: Service innovation, innovation, SMEs, hospitality.

Introduction

Innovation is an essential element for economic progress of a country and competitiveness of an industry [13]. It plays a crucial role in transforming business dynamics, in developing competitive instruments and in achieving competitive strategy. Innovation is a compelling way to gain value and comparative edge [77]. Innovation plays an important role not only for large firms, but also for SMEs [6, 31]. Initially the idea of service innovation was debated and built over the past few decades. Services dominate the global economy rapidly, with more than 70% of workers in OECD countries and 58% of the global gross domestic product [9]. The hospitality sector is one of the most significant services sectors of modern industry. Globalization and market competitiveness have driven the modern organizations toward innovation in their

operations to gain sustainable competitive advantage [100]. Service innovation is a concept for improving service that is taken into practice [95]. Service innovation involves consumer changes that are seen as unique; or never previously noticed or new to a specific company. New or better methods of planning and delivering systems are service innovation.

As such, service innovation is much sought in the hospitality sector. Innovations in services today are evolving into an enormous field to research complex relations between technical and human processes leading the transition in service organisation and management. Innovations of service delivery systems can be used, but this is mostly used instead as innovation in consumer products. New and substantially modified service models, customer engagement platforms, service distribution mechanisms, lead to a new one or more renewed offerings and improves the marketable service. Customers perceive service in such a way that they can be a key factor in buying decisions. Innovation of service plays an important part in order to best serve customers. In hospitality sector conventional approaches are still prevalent are difficult to innovate in hospitality. With an evolving philosophy of service science that reflects contemporary society, the innovation services are given a strong path in a different way.

In that sense, the conventional method of service delivery of small to medium-sized undertakings is being used aggressively. Service innovation aims to keep the company prosperous and improve staff awareness and competence. Innovation of services allows small to medium-sized companies to deal with giant companies as well.Small and medium-sized businesses must explore opportunities to boost their productivity with restricted capital for innovative ways of operating and rising market shares. Innovation is one of the main philosophies for these competitive circumstances. To do so, people have to adjust the way they decide, try to do it differently and make decisions different from what they did.Organizational leaders must explicitly recognize the aims and purposes of this process and effectively engage in order to meet the objectives of this process in order to ensure that service developments in SMEs are successful. Service innovation is essential for small and medium-sized enterprises in sectors but the methodological research on innovation is relatively inadequate in SMEs in the hospitality sector.

Several scholars have shown that the achievements of SMEs have been significantly influenced by their innovation practices [54, 69]. [48] found that large companies are more innovative than SMEs. Additionally, according to [68] larger firms than SMEs are more adoptive to emerging technology. Researchers like [79, 99] found that product/service innovation activities of SMEs are more important than process innovation.Organizational leaders must explicitly recognize the aims and purposes of this process and effectively engage in order to meet the objectives of this process in order to ensure that service developments in SMEs are successful. Service innovation is essential for small and medium-sized enterprises in sectors but the methodological research on innovation is relatively inadequate in SMEs in the hospitality sector. In hospitality related literature, studies on service innovation, as well as its antecedents, are seriously scant [25].

Researches in innovation are mostly concentrated to manufacturing sector, focused to science and technology and its link to economic productivity, new product development [21]. The study of technical change in the service sector was largely neglected as services were viewed as low technology users [21]. Although innovation of services in the service sector, especially in hospitality, is crucial and evolving in the current situation. The literature on service innovation is expanding into a diverse and multidisciplinary body of knowledge spanning economics, marketing, organizational science and management perspectives [85, 74, and 67].

This study focused and emphasizes to the effectiveness of the service innovation that should be a priority of companies and managers in the development of the organization's smooth operations. Leaders in maintaining competitive companies should learn the connection between the guiding forces of service innovation and its performance. More precisely, recognizing the relation between different main factors most critical for service innovation would provide corporate managers with comprehensive advice on how to create a culture for ingenuity in employees in order to increase skills that increase the chance of success. Thus, the aim of this research is to examine the service innovation practices and its effectiveness in hospitality sector small and medium enterprises of Nepal.

Concept of Innovation

Innovation, in Joseph Schumpeter, a German economist view, who developed the early concept of innovation in economic development and entrepreneurship comprise the elements of creativity, research and development (R&D), new processes, new products or services and advance in technologies [63]. Similarly, [57] innovation is the creation of new wealth or the alteration and enhancement of existing resources to create new wealth. As such [92], innovation is as a process of idea creation, a development of an invention and ultimately the introduction of a new product, process or service to the market. [87] suggests that creativity is one of the most significant strategic arms and is seen as the key value potential of an organization in general. Likewise, [62] considered innovation as an effective way to improve firm's productivity due to the resource constraint issue facing a firm. [8] add that the capability in product and business innovation is crucial for a firm to exploit new opportunities and to gain competitive advantage.

The idea of innovation in the literature is becoming more diverse and complex. It is an innovative method that sets the way for a sequence of subsequent developments in a significant innovation. Especially in the hospitality innovation is a joint action between manufacturers, employers and founders. Innovation can therefore be used in the hospitality industry as a critical driver. Innovation is an innovative method that sets the way for a sequence of subsequent developments in a significant innovation. Hospitality innovation is a joint action between manufacturers, employers and founders. [11, 15, 1, 35, 82], such scholars have established various innovation fostering models. Scholars like [45, 28] presented the critical role of innovation in business profitability and the growth of the organisation.

Emergence of service innovation

Service innovation research shows three distinct phases, that reflects the era of evolution of service innovation i.e., Formation phase 1986–2000, Maturity phase 2001–2005 and Multidimensional phase 2006–2010. Between 1986 and 2000, the first period of included comparatively fewer publications. Service marketing rapidly grew out of a relatively low level as a sub discipline for marketing research in the 1980s [39]. The first stages of service-innovation study, [39] called into question the existing product-focused vision of innovation that regarded it as more or less synonymous with technological innovation, research and development (R&D), and new product development. In the formation phase, new views of services and service innovation provided foundations for further research [12, 37]. Following an expanded emphasis on innovative product and manufacturing processes [e.g. 96], the phase addressed a latent demand for services applicability. There was also considerable emphasis on the differences between product and process innovation, as drawn from [2]. Throughout the formation process these distinctions led to an increased demarcations perspective along with research the underlies that services have special characteristics [24, 40].

In 2001, marked the start of the second evolutionary phase, or the maturity phase. In this step the key concern was the participation of consumers, which was historically somewhat less discussed and their unintentional positions in the innovation process. The phase consists of the perspective of customer's active participation, involvement in the services process as co-creator of value of the service. The few prominent scholars in this direction were [61, 70, 78, 98, 3, 4, 65, 66, 101]. Studies continued to concentrate on how to learn from consumers and to participate in the field of creativity and innovation more consistently. The era emphasized the non-technological innovation such as [36, 49] and more attention were given that innovation is not only a concern of the technology. A broad range of concepts were integrated such as strategy, leadership, management in service innovation, studies such as [51, 53, and 97].

In 2006 third phase in the evolution, the article of [55] presented service innovation into a multidisciplinary perspective. Likewise, [10] presents the deployment of services perspective. Thereafter, areas like innovation management, technological and non-technological innovation were in the line. [5, 33, 83] studies presented the multidimensional perspective of service innovation. Shifting the concept of service innovation from technological perspective to customer's view point perspective, for example, [83] as well as [41] stressed that progress in technology and non-technology should not be separate but rather represent a view of synthesis.

Likewise, customer involvement, regarding strategy, innovation systems, business model innovation studies like [104, 64, 5, 43 94, 22, 33 84] were put forward in the concept of service innovation.

Process phases of service innovation

The process of innovation can incorporate both incremental and radical change. To develop an effective innovation process, it is needed to focus not only on products, technology and processes, but also on the culture of the organization, its norms, values and beliefs [46]. [59] points out that the innovation process needs continuous upkeep and renovation so it has much easier losses than acquisition to invent. Likewise, [81] shows that process approaches to change implementation in service innovation. [16, 17] emphasized on incremental innovation produces in the form of continuous improvement. In similar manner, [93] emphasized on organisational structure to support innovation in the organisation. [20] focuses on multiple stakeholders, Rothwell (1992) focuses on understand the needs of the consumers.

The innovation process begins with developing a flourishing ideal environment and then by management procedures capturing and analyzing it which ensure that ideas are effectively transformed into products or services. Innovation diffusion – the method of introducing and incorporating fully-fledged innovations – is the third pillar that drives this entire process.

Innovation is an incorporated process that evolves in three main phases. The creativity phase is where an innovation trip starts [34, 27]. The development of ideas is not a random process and should not be left to chance. This is where a good innovation plays a crucial role by ensuring the transition from an idea to an innovation. The third stage is the diffusion phase; executed diffusion greatly increases the chances of innovation's acceptance.

Dimension of service innovation

Schumpeter is the first investigator to establish invention theory. [88] describes innovation in five dimensions that is initiation of a new product/service or a new type of already known product/service, application of new or significantly improved methods of production, opening a new market, acquiring new sources of supplies, new industry structures such as the destruction of a monopoly position. Likewise, the dimensions of service innovation presented by several studies that are –service/product innovation [75, 50], process innovation [75, 50, 91, 38, 44], marketing innovation [75, 38, 50, 91, 44], organizational innovation [29, 86,38, 50,91, 44], human capital competency [18].

Service feature innovation: Service innovation means introduction of new products or services in order to create new markets or customers, or satisfy current markets or customers [102, 103]. Service is not a type of retail offerings but a value-creation viewpoint. According to [37], the emphasis on value by costuming lens is important and co-creating value along with customers provides the basis for characterizing the service by the collaborative, processual, experiential and relationship. A service innovation often requires reproducible components that in other situations or contexts can be found and systematically replicated. Hospitality companies, like hotels are a perfect example of an industry that might benefit from service innovation. First, from a customer's perspective

[30]; secondly, accelerations in information technology [73], thirdly, brand loyal behavior [73]. In order to add value to the guests' experience, hotel managers and marketers must meet the challenge of determining which services are preferred by hotel guests [73]. In contrast with product innovation research, the study in service innovation research is however low [26].

Process innovation: The process innovation is the implementation of a new manufacturing system. It is a method that can also take place economically in a new manner [88]. The direct effect of process innovation on efficiency in SMEs [23], and SMEs can be able to introduce transformation processes more quickly and at a lower cost of transitioning compared with larger companies thanks to their operational simplicity [19]. It covers organizations that manage and manage new products and services for customer design and manufacture. Thus, process innovation involves creating or improving methods of production, service or administrative operations [56] as well as developments in the processes, systems and reengineering activities undertaken to develop new products and services.

Marketing innovation: According to [52], marketing innovation deals with the market mix and market selection in order to meet a customer's buying preference. [22] suggests that marketing innovation has a vital role to play in achieving consumer expectations and resolving marketing opportunities. In this respect, any marketing innovation has to be directed at meeting customers' demand and satisfaction [7].

Organizational innovation: The new, collaborative/organizational structure/legal system that effectively re-drives or strengthens the company is organisational innovation. It addresses innovative ways to organize internal cooperation, lead and motivate employees, to building careers and to offset salary and benefits employment [76]. Organizational innovations can also be aimed at improving workplace satisfaction and nurturing internal knowledge and competence assets [47, 89]. Organizational innovation covers staff responsibilities, duties and new methods of coordinating and controlling staff [80].

Human capital competency: It is a widely held view that human capital represents an essential driver for innovation [18]. The [71] defines human capital as the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being. It is the extensive experience and thought leadership in the area of competency-based management. It offers organisations, through a more creative approach to skills, the capabilities and attitudes of their human assets needed for the good exercise of a task.

This research study considered five dimensions for effectiveness of service innovation in hospitality sector, that are - service/product innovation, process innovation, marketing innovation, organizational innovation and human capital competency.

Methodology

This study focused to the service innovation and its effectiveness in the context of small and medium enterprises in hospitality sector in Nepal. The research applied the descriptive and explanatory research design. The research is descriptive in nature as it describes the present situation of the service innovation in small and medium enterprises of hospitality sector in Nepal. The research applied the descriptive and explanatory research in hospitality sector in the study area. Additionally, the research is explanatory since it has been conducted to identify the extent and nature of cause-and-effect relationships of dimensions of service innovation to the effectives of the service innovation in the context of small and medium enterprises in hospitality sector in Nepal.

The population of interest consisted of SMEs in hospitality sector, which included travel and tourism, hotel and restaurants that is mid-range hospitality business in Kathmandu valley, Pokhara, Chitwan, Butwal, Bhairahwa/Lumbini, and Dharan. First the aforesaid mid-range hospitality businesses were selected and the employees working, managers and owner in these organisations were included in the study. A sample of 450 respondents was selected with convenience sampling of 150 each from hotels, restaurant &café, and travel &tours. However, only 308 responses have been collected - hotels (97 nos.), restaurant &café (107 nos.), and travel &tours (104 nos.). The primary source of data was collected through structured questionnaires. The questionnaire contains 29opinion statements using a five-point Likert scale for each statement ranging from 'Strongly Agree' to 'Strongly disagree', coded by '5' representing 'Strongly Agree' and '1' representing 'Strongly Disagree'. The opinion items were adapted from [75] and [58]. The first part of the questionnaire deals with demographic information of respondents which includes nature of the company, gender, position, experience, education, legal registration, business experience, number of employee, type of the product of the organization where the respondent is associated with. The second part deals with questionnaires related to variables considered in this research. The overall Cronbach's Alpha of 29 numbers of items was 0.955.

Respondents' characteristics

In the study the majority of organizations surveyed were small enterprises than medium enterprises, small enterprises consists of 81.49% and 18.51%were medium enterprises.There was a participation of 31.49% of hotels, 34.74% of restaurant/café and 33.77% of travel & tours. The legal status of the organisations of the respondents was 43.18% in sole proprietorship, 39.61% in partnership and 17.21% in private limited company. The majority of the organisation 45.13% has 21 to 30 numbers of employees. Likewise, the majority of organisations were in the business two years 50.97%. There were 62.34% of male and 37.66% of female respondents. Most of the respondents were the owner of the business 44.48%, followed by 31.49% of managers and 24.03% of employee. The respondents have diverse educational level, the majority of them 50.97% were graduates and 31.82% of the respondents were having more than five years of work experience in the field of hospitality.

Table 1: Sample characteristics

Nature of Company	n	Percent	Gender	n	Percent
Small	251	81.49%	Male	192	62.34%
Medium	57	18.51%	Female	116	37.66%
Total	308	100.00%	Total	308	100.00%
Type of Organisation	**n**	**Percent**	**Position**	**n**	**Percent**
Hotel	97	31.49%	Employee	74	24.03%
Restaurant/Cafe	107	34.74%	Manager	97	31.49%
Travel & Tours	104	33.77%	Owner	137	44.48%
Total	308	100.00%	Total	308	100%
Experience	**n**	**Percent**	**Education**	**n**	**Percent**
Six Months	49	15.91%	Below Secondary	17	5.52%
Two Year	95	30.84%	Secondary	47	15.26%
Five Year	66	21.43%	Under Graduate	87	28.25%
More Than Five Year	98	31.82%	Graduate	157	50.97%
Total	308	100.00%	Total	308	100.00%
Legal Registration	**n**	**Percent**	**Number of Employee**	**n**	**Percent**
Sole Proprietorship	133	43.18%	1 to 10	82	26.62%
Partnership	122	39.61%	11 to 20	139	45.13%
Private Limited	53	17.21%	21 to 30	87	28.25%
Total	308	100.00%	Total	308	100.00%
Business Experience	**n**	**Percent**			
Six Month	12	3.90%			
Two Year	157	50.97%			
Five Year	73	23.70%			
More Than Five Year	66	21.43%			
Total	308	100.00%			

Results

Status ofeffectiveness of service innovation

Effectiveness of service innovation is the dependent variable of this research. The results show the descriptive statistics of effectiveness of service innovation. There are seven statements used to measure the effectiveness of service innovation in the respondents' organisation. The responses were collected in the five-point Likert scale. The result shows that the items have a mean value ranging from 4.20 to 4.55 i.e. the response were positive in regards of the efforts towards effectiveness of service innovation in SMEs in hospitality sector. Among the seven statements, the statement with code 'ESI2' has scored the lowest mean of 4.20 (SD=0.930) and statement with code 'ESI6' has scored the highest mean of 4.55 (SD=0.571).The highest agreement stated that the service innovation in the organization becomes first priority in business. Wherein, lowest mean shows that respondents are less agreed onthe service innovation in their organization helps to increase employee competency. The respondents perceived that the service

innovation in my organization is effective and service innovation in the organization makes our business more competitive. Likewise, respondents perceived moderately that the service innovation is related with the increase employee knowledge, helps to motivate the overall staff or helps to make the strategy of the business. The overall mean of effectiveness of service innovation is 4.32 (SD= 0.495). This shows that the effectiveness of service innovation in SMEs is perceived moderately in practices and it helps to improve the business competitiveness. This shows that the organizations are still to explore the fullest of the service innovation in their respective business that may bring competitive advantage in the arena.

Status of service innovation

Service innovation in designing the service is one of the dimension of the overall service innovation. There were four statements used to explore the service innovation in the five-point Likert scale. The result shows that the items have a mean value ranging from 4.20 to 4.37 i.e. the response is moderate in concern to service innovation practice. The result shows that 'SI3' has the highest mean of 4.37 (SD=0.695) and 'SI2' has the lowest mean value of 4.20 (SD=0.930). The most agreed statement stating that organization provides comfortable and user friendly services. The least agreement was for the statement that organization emphasizes on quality of service delivery. It indicates that the organisations are committed to provide the customer centric services, however, they are not so focused to maintain the quality of the service they provided. The overall mean of service innovation is 4.27 (SD= 0.638). This shows that the organisation is moderately focused in service design and creative service delivery. The organizations are least emphasized to improving the service delivery and they are moderately focused to provide innovative service to increase market share.

Status of process innovation

The process innovation dimension was measured with four statements in the five-point Likert scale. The result shows that the items have a mean value ranging from 4.20 to 4.37, shows a moderate agreement of the respondents towards process innovation in their organization.Among the four statements, the statement with code 'PI1' has scored the lowest mean of 4.20 (SD=0.930) and statement with code 'PI2' has scored the highest mean of 4.37 (SD=0.695).The most agreed statement, stating that the organization emphasizes on improving internal operation of business process. Likewise, the least mean shows that respondents are less agreed that their organization focus on improving effectiveness of process innovation. The overall mean of process innovation is 4.26 (SD= 0.568), it shows that a moderate focus of these organisation is towards process innovation. The organisations emphasize moderately the information and communication technology and lesser focused to creating or improving method of production.

Status ofmarketing innovation

The dimension of marketing innovation was measured with five statements in the five-point Likert scale. The result shows that the items have a mean value ranging from 4.09 to 4.44 i.e. the response indicates a moderate to low marketing innovation practice in the organisation.Among the five statements, the statement with code 'MI3' has scored the lowest mean of 4.09 (SD=0.971) and statement with code 'MI2' has scored the highest mean of 4.44 (SD=0.677). The results indicate that the organization focused on changes in pricing strategy. Most organizations also have good system to meet the current needs of marketing factors. However, respondents are less agreed on their organization focuses on new sales channel.The overall mean of marketing innovation is 4.31 (SD= 0.514), shows that the small and medium enterprises in hospitality sector give importance to marketing innovation moderately. The organizations are lesser focused to the changes in product / service promotion, the organization emphasizes on utilization of social media marketing and emphasizes on seasonal changes in marketing instruments.

Status oforganizational Innovation

The organisational innovation dimension was measured with four statements in the five-point Likert scale. The results showsthe items have a mean value ranging from 4.23 to 4.32 i.e. the response is with moderate agreement towards organisational innovation.Among the four statements, the statement with code 'OI2' has scored the lowest mean of 4.23 (SD= 0.843) and statement with code 'OI3' and 'OI4' have scored the highest mean of 4.32 (SD= 0.763 and 0.711) respectively. The most agreed statement, stating that organization emphasizes on new way of decision making for division of workandorganization focuses on establishing culture of creativity and innovation. The least agreement was on organization emphasizes on new method of responsibilities.The overall mean of Organizational Innovation is 4.29 (SD=0.554). This shows that the organisations are moderately practicing organisational innovation. The organisations find that the organizational innovation as an important driver for effectiveness of service innovation and trying to focuses on establishing culture of creativity and innovation. The organizations are initiating new method of responsibilities, decision making for division of work and business practices.

Status of human capital competency

The human capital competency dimension of service innovation was measured with five statements used in the five-point Likert scale. The result shows that the items have a mean value ranging from 4.19 to 4.33 i.e. show a moderate initiation maintain human capital competency in the organisations. Among the three statements, the statement with code 'HCC3' has scored the lowest mean of 4.19 (SD=0.782) and statement with code 'HCC2' has scored the highest mean of 4.33 (SD=0.713). The most agreed statement, stating that organization emphasizes on new ways of organizing and empowering staff and least agreed by the respondents that the organization is emphasizes on improving work satisfaction. The overall mean of human capital competency is 4.25 (SD=0.508).

This shows that the organizations are moderately emphasizing the dimension of human capital competency in their organisation. The organisations are emphasizing least towards nurturing internal knowledge and competence assets and on promoting the creativity of employee. However, organizations put efforts on retaining staff and maintain flexibility in the workplace. Additionally, organizations are moderately involved on new ways of organizing and empowering staff.

Table 2: Descriptive analysis of dimension service innovation and the effectiveness of service innovation

Variables	Mean	SD
Service innovation	4.27	0.638
Process innovation	4.26	0.568
Marketing innovation	4.31	0.514
Organizational Innovation	4.29	0.554
Human capital competency	4.25	0.508
Effectiveness of service innovation	4.32	0.495

Relationship of antecedents of service innovation and the effectiveness of service innovation

Pearson Correlation analysis was used to determine the relationship between the antecedents of service innovation and the effectiveness of service innovation. The result shows that the dimension service innovation and effectiveness of service innovation correlation coefficient as $r=0.829$, $p<0.01$, which implies that the two variables are strongly positive correlated. The correlation coefficient of service innovation is statistically significant at 1% significant level. Likewise, process innovation and effectiveness of service innovation correlation coefficient as $r=0.842$, $p<0.01$, which implies that the two variables are strongly positive correlated at 1% significant level of significance. Similarly, correlation coefficient between marketing innovation and effectiveness of service innovation is $r=0.738$, $p<0.01$, which implies that the two variables have strong positive correlation at 1% significant level of significance. In the similar manner, the correlation coefficient between the organizational innovation and effectiveness of service innovation is 0.784, $p<0.01$, which implies that the two variables have strong positive correlation at 1% significant level. Similarly, correlation coefficient between the human capital competency and effectiveness of service innovation is $r=0.681$, $p<0.01$, which implies that the two variables havemoderate positive correlation at 1% significant level. The highest correlation is observed with process innovation and followed by service innovation, organisational innovation, marketing innovation and human capital competency.

Table 3: Relation between Service Innovation and its Effectiveness

Variables	Service Innovation	Process Innovation	Marketing Innovation	Organizational Innovation	Human Capital Competency
Pearson Correlation	.829**	.842**	.738**	.784**	.681**
Sig. (2-tailed)	.000	.000	.000	.000	.000

Impact analysis of antecedents of service innovation on the effectiveness of service innovation

Multiple linear regression analysis was used to analyze the influence of antecedents of service innovation on the effectiveness of service innovation in SMEs in hospitality sector. The impact is expressed in the following equation:

$$\hat{Y} = \alpha + \beta 1\ X1 + \beta 2\ X2 + \beta 3\ X3 + \beta 4\ X4 + \beta 5\ X5 + ei$$

Where,

$\hat{Y}$ = Effectiveness of Service Innovation (dependent variable)
X1 = Service Innovation
X2 = Process Innovation
X3 = Marketing Innovation
X4 = Organizational Innovation
X5 = Human Capital Competency
α = Constant
$\beta 1, \beta 2 \ldots \beta 6$ = Regression coefficients of factor 1 to factor 5 respectively
ei = Error term

Table 4: Regression analysis output

R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F**	**Sig.**
.857[a]	0.817	0.811	0.14733	181.123	.000[b]
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	0.686	0.155		4.416	0
SI	0.318	0.108	0.41	2.955	0.004
PI	0.442	0.079	0.508	5.607	0.001
MI	0.022	0.138	0.023	0.162	0.002
OI	0.097	0.096	0.109	1.017	0.011
HCC	0.065	0.041	0.067	1.603	0.012

Results presented in Table 4.19 show multiple correlation coefficient (R), coefficient of determination (R square), and F-ratio which are used to predict the goodness-of-fit of the regression model. R of independent variables X1, X2, X3, X4, and X5 on the effectiveness of service innovation ($\hat{Y}$) is 0.857, which shows that effectiveness of service innovation has positive correlation with the five independent variables. Further, R square is 0.817, which suggests that 81.7% of the variation of effectiveness of service innovation is explained by the five independent variables.The model is a good predictor of the relationship between the dependent and independent variables F-ratio is 181.123 (p=0.001). As a result, the independent variables (service innovation, process innovation, marketing innovation, organizational innovation, and human capital competency) are significant in explaining the variance in effectiveness of service innovation. The results of regression summarizes the beta coefficients shows that Process Innovation, ($\beta 2$ =0.442, p=0.000) carries the heaviest weight for effectiveness of service innovation, followed by Service Innovation ($\beta 1$=0.318, p=0.004), Organizational Innovation ($\beta 4$=0.097, p=0.011), Human Capital Competency ($\beta 5$=0.065, p=0.012), and Marketing Innovation ($\beta 3$= 0.022, p=0.002).

We can write the estimated equation as follows:

$$\hat{Y} = 0.686 + 0.318*X1 + 0.442*X2 - 0.022X3 + 0.097*X4 + 0.065*X5 + ei.$$

The result shows that process innovation is the significant antecedent while the other independent variables i.e. service innovation, marketing innovation, organizational innovation, human capital competencyare significant.

Discussion

This study was aimed at analyzing the antecedent of service innovation effectiveness in SMEs of hospitality sector. While service innovation is not a recent phenomenon, innovation research in general appears to concentrate on technical innovation by manufacturing companies [32, 36, and 94]. With this perspective, innovation studies concentrate on commodity (e.g., goods) and method (e.g., manufacturing systems) innovation e.g., [96], generally avoiding service innovation and its intrinsic possibilities. However, in developed economies, the service sector now dominates their gross domestic products, and its share continues to grow [43]. Therefore, both services and service innovation represent central drivers of broader economic growth and innovation [42, 72].

In the hospitality sector SMEs in Nepal, the effectiveness of service innovation is limited. This shows small companies mildly and also calls for market productivity to be strengthened. In service architecture and innovative service provision, SMEs have a moderate emphasis. Organizations are least dependent on better customer delivery and are moderately focused on providing new services in order to maximize market share. SMEs also concentrate on process innovation moderately. Organizations have modest emphasis on ICT and less focus on the development or enhancement of production processes. Similarly, hospitality-based SMEs offer marketing creativity moderate significance. The companies are less concerned about product/service promotion shifts

and stress the use of social media ads and seasonal changes in marketing instruments. Similarly, organizational creativity is mildly practiced by SMEs. The SMEs have a little emphasis on artistic and creativity culture. The organisations are initiating a new system of accountability, decision-making and market separation. SMEs also emphasize fairly the dimension of their organisation's human capital competence. The companies are not focusing on the promotion of internal expertise and skills and on the promotion of employee innovation. But companies make sure to protect their employees and to keep their workplace flexible.

In addition, companies participate moderately in innovative approaches to organize and inspire employees. The SMEs are more focused to marketing innovation than the other innovation practices in SMEs of hospitality sector, followed by organizational innovation, least emphasize is given to human capital competency, service innovation and process innovation. The finding is aligned with the notion of [43], the innovation process can be planned, intentional, or unintentional, such that it emerges through an interactive learning process initiated by any involved parties. Related to the distinction between product and service innovation is a distinction between innovations in manufacturing versus service sectors. Wherein the findings are not supportive in the context of the innovation practice the SMES of hospitality sector in Nepal. As it was emphasized that travel agencies and hotels as a small tourist business require service innovation rather than method innovation, much like the findings of studies carried out in [79,99]. These findings can suggest that organisations that successfully control services innovation aspects add to the efficiency of service innovation. This perspective indicates organizations that effectively manage dimensions of service innovation helps to generate positive outcome in its effectiveness.

This study found that positive relationships exist among all the factors of service innovation and effectiveness of service innovation. All the service innovation dimensions of service innovation correlated with effectiveness of service innovation. These findings are consistent with the literature on innovation. Although there are some studies examining innovation [80, 90] and activities of innovation in tourism industry [50] in literature; the empirical studies on innovation issue, especially in tourism industry is very low.

The highest correlation is observed with process innovation and followed by service innovation, organisational innovation, marketing innovation and human capital competency. It signifies that the organisation should focused to process innovation where the organization need to involve in changes in the service process aimed at reducing the costs, wastes and lead time or at improving service efficiency. Organisation need to focus on improving effectiveness of process innovation by focusing on improving internal operation of business process. Thereafter, the organisations need to emphasize towards service innovation in organization emphasizes on continuity in improving of service delivery. Service innovation helps organization to maintain the quality of service delivery. In hospitality sector service innovation provides comfortable and user friendly service. Hospitality sector SMEs need to focus on providing innovative service too increase market share.

Subsequently, organizational innovation needs to be focused as a new, embracing collaborative/organizational structure or legal framework that efficiently redirects or enhances the business in certain fields of hospitality sector. New method of business practices. New method of responsibilities and decision making for division of work need to emphasize by the organization. Organizational innovation focuses organization on establishing culture of creativity and innovation. In line with these, organization need to focus the marketing innovation that deals with the marketing mix and market selection in order to meet a customer's buying preference. SMEs in hospitality sector need to focus on changes in service promotion. It emphasizes SMEs towards the new sales channel in the market. Seasonal changes in marketing instruments are carefully handled in the hospitality sector with the help of marketing innovation. Utilization of social marketing is very crucial for SMEs in hospitality sector. Equally important, human capital competency need to be focused on promoting the creativity of employee and new ways of organizing, directing and empowering staffs. It will help on retaining staff, maintain flexibility and control cost in hospitality sector. The SMEs in hospitality sector need to emphasize in nurturing internal knowledge and competence assets.

The findings of this study indicate that there is an influence of service innovation, process innovation, marketing innovation, organizational innovation, and human capital competency on effectiveness of service innovation in SMEs of hospitality sector. The finding of the study indicates the process innovation carries the heaviest weight for effectiveness of service innovation, followed by service innovation, organizational innovation, human capital competency and marketing innovation. The notion of process innovation comes first in this study differs sole connection with [79, 99], where it was mentioned small tourist business require service innovation rather than method innovation. The study findings imply to organizations that by improving service innovation, process innovation, marketing innovation, organizational innovation, and human capital competency can increase in effectiveness of service innovation. These results provide some insight into the importance of service innovation and its effectiveness in the organization.

The main aim in the current study was to examine whether a relationship exists between service innovation and effectiveness of service innovation, the study also focus on identifying major factors that contributes in effectiveness of service innovation. This study found that positive causal relationships of service innovation dimensions and effectiveness of service innovation in SMEs of hospitality sector. This research work also involved restaurants and café, travel agencies and hotels in Nepal by using innovative measurements perspective. In order to deliver innovative and new creative goods or facilities to our guests in advance, travel agents and hotel, restaurant managers should track innovation efforts in accordance with the findings. Hence, from all the studies conducted from past research concludes that there is a significant impact of service innovation in the organization. The organization having a service innovation gets more benefit in the future. Moreover, it also helps in the smooth functioning of the business through the management of the human capital competency. The dimensions of service innovation positively effects effectiveness of service innovation in SMEs.

Conclusion

The larger purpose of this study was to determine if drivers of service innovation has an effect on its effectiveness in the context of SMEs of hospitality sector in Nepal. SMEs of hospitality sector could utilize the drivers of service innovation to achieve the overall business goals through effectiveness of service innovation. This service innovation might bring competitive advantages to all the participants in the new business model. For SMEs of the hospitality industry in Nepal as well as internationally, service excellence can be the vector of economic development and competitive benefit. With the growing development of today's services and economy, the significance of recognizing the principles and practices of service innovation is also rising. It is also possible to fail and excel in service innovation. The outcome can only be said from experience. Nevertheless, no inconvenience or profit can always be sought and sought by hospitality small and medium-sized companies, since it is the path to human development. Therefore, the company should concentrate on service innovation that can change the way the service is provided and delivers convenient and friendly service, in order to introduce an appropriate service innovation.

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Attitudes and purchase intention towards eco-friendly products among Nepalese youth

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Abstract

This research study aimed to examine the green purchase attitudes of Nepalese youths. Due to the rapid technological changes the environment may be affected positively or negatively. This research is conducted to identify factors affecting young Nepalese consumers' intention in purchasing eco-friendly products and targeted on the youths with the age ranging from 18 to 35 years. Therefore, there are two independent variables identified in this research project that could affect youth consumer attitude toward intention to purchase green products. These include the attitudes toward environmental protection and knowledge & awareness of eco-friendly products whereas the other variables such as eco labels, educational level and the experience had been identified as the intervening variables all of which had the major impact on the green purchase intention (GPI). Primary data were collected through the questionnaire in order to inspect the research objectives. In total 115 resposnes were collected and the reliability test, descriptive analysis, hypothesis test and Pearson correlation analysis are carried out. Consequently, this study carried out to determine the significance of contributing youth attitudes toward intention to purchase green products in Nepalese scenario.

Key words: Green Marketing, Green purchases Intention, Eco friendly products, youths.

Introduction

The concept of environmentalism and becoming green was not so prominent before the late 1980s. The green movement first started in Great Britain. British consumers played an initial role of "Greening" movement. Company's contribution to environmental degradation and damage influenced consumers to adopt the greening movement. Thus, eco-friendly marketing concepts spread beyond the Great Britain boundary. Furthermore, some realists raised their voices about sustainable green consumerism that does not harm environment Polonsky [8] Prothero [9].

In Nepal, the market for eco-friendly products is yet to become a mainstream. There is very little academic information available about green consumers in under-developed countries like Nepal, National Geographic [7]. It is within the background of this research gap that the present research will be conducted to assess Nepalese

consumers' pro-environmental concerns, knowledge of environmental issues, awareness of eco-friendly products, and any potential effect that these factors may have on green buying behavior.

Many studies have revealed that consumers who are concerned with the environment and are knowledgeable about the environmental issues, when shopping try to purchase only eco-friendly products, Laroche et al. [6]. Increasing pro- environmental concerns and awareness of eco-friendly products among consumers have resulted in their green buying behaviour. Recent increase in the number of individuals who are willing to pay more for the eco-friendly suggests that the market for eco-friendly products is ever expanding, Laroche et al. [6]. Previous research conducted internationally suggests that the eco-friendly category of consumers is continuing to evolve and that consumers tend to vary in terms of their acceptance of eco-friendly products and lifestyle, Jungermann & Jungermann [5]. Buying eco-friendly products have become trendy among consumers with pro-environmental concerns and awareness of eco-friendly products. Therefore, marketers can now assist organizations in establishing and communicating a strong environmental image, and help to create a clear competitive advantage to their consumers, Bohlen, et al. [3].

Similarly, Alwitt and Berger [2] study found that 70% of consumers show their concern for the environment, but their actions are inconsistent with these attitudes when it comes to consuming products and services. They commented that the likeness of a product depends on attitude with a varying degree of confidence, certainty, accessibility or knowledge. Therefore, many researchers moved to social psychological research in the attitude area to improve a comprehensive theory of consumer behavior Ajzen & Fishbein, [1] .

But in overall, consumers who are more aware about environmental protection are more concerned about ecological lifestyles. People want to improve their lifestyles by taking new challenges. They consider that environmental protection is not only the responsibility of firms and institutions, but it is also their responsibility as consumers. People's personalities manipulate what attitudes they have toward the environment, Fraj & Martinez [4].

Objectives of Research

This study attempts to find out if Nepalese young consumers' pro-environmental concerns, awareness and knowledge about environment related issues impact their buying behavior to prefer and buy eco- friendly products and pay a premium price for such products. This study will portray a tentative scenario where Nepal and Nepalese young consumers stand on environmental consciousness and eco-consumerism. This can help society to make progressive efforts towards green consumerism in future days whatever the research result will be.

The major objectives of this study include:

a) To assess various individual factors affecting the Green Purchase Intention (GPI) of youths.

b) To examine if contextual factors i.e. information on eco-labels, consumers' product experience and their education level affect their Green Purchase Intention (GPI).

Hypothesis

The hypothesis to be tested are set as follows:

H1: People, who have positive attitude towards environmental protection, will have a favorable correlation with Green Purchase Intention (GPI).

H2: People, who have knowledge and awareness of eco-friendly products, will have a favorable correlation with Green Purchase Intention (GPI).

H3: People, who trust the information conveyed on eco-labels, will have a favorable correlation with Green Purchase Intention (GPI).

H4: People, who had positive experience of eco-friendly products in the past, will have a favorable correlation with Green Purchase Intention (GPI).

Methodology

Area of Study: The youths currently studying and working within Kathmandu valley.

Sample size: Out of the youths from Kathmandu, 115 students from different parts of Kathmandu were selected for the response collection.

Sample technique: This was a descriptive research study based on convenience sampling technique.

Sources of data: Primary as well as secondary data sources were used in the research. Questionnaire was the main instrument for collecting primary data. All together 125 questionnaires were distributed but only 115 were collected hence got the 92% response rate. The secondary sources for data collection were mostly an internet for literature survey and books and journals to get some relevant information regarding the topic.

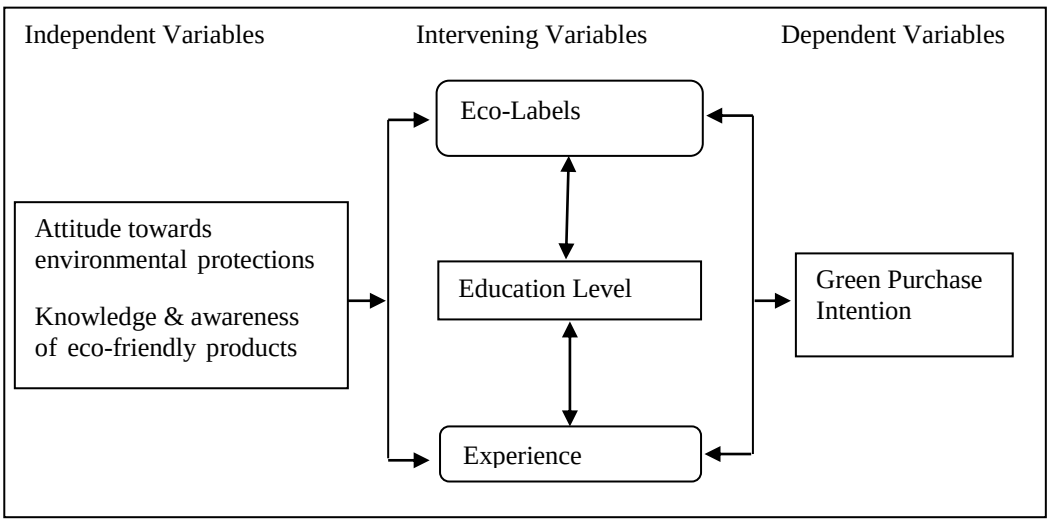
The overall research study was based on the questionnaire with the following scales and categories:

Scales of response: 1= Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; 5= Strongly Agree

Categories of Questionnaire: Category 1: Pro-environmental concern; Category 2: Knowledge & Awareness; Category 3: Eco labels; Category 4: Consumer Experience; Category 5: Willingness to pay more; Category 6: Green Purchase Intention

Validity and reliability: For the validity of the questionnaire, a pilot test was conducted with the help of random 10 youths through personal contact. On the basis of their recommendation, the required changes in the questionnaire had been made. The reliability of the category wise questionnaire was checked through Cronbach's alpha which was found to be in the range of 0.725 to 0.876; which is greater than the stated value i.e.0.7; hence the reliability of the questionnaire verified.

Conceptual Framework



Respondents' Profile

This section deals with the demographic analysis and interpretation of primary data collected through questionnaires. This helps to get insight into the demographic characteristics of the respondents under study. The respondent profile includes gender, qualification, occupation, age-group and income level.

Demographic description of the respondents

	Demographics	Frequency	Percentage
Gender	Male	69	60%
	Female	46	40%
	Total	**115**	**100%**
Age	18-23 years	10	9%
	24-29 years	65	57%
	30-35 years	41	36%
	Total	**115**	**100%**
Education	Bachelors	45	39%
	Masters	70	61%
	Total	**115**	**100%**
Occupation	Students	72	63%
	Professionals	43	37%
	Total	**115**	**100%**
Monthly Income level	Below Rs. 15000	16	14%
	Rs. 15000 – Rs.25000	43	37%
	Rs. 25000 – Rs. 35000	32	28%
	Above Rs. 35000	17	15%
	Not Earning	7	6%
	Total	**115**	**100%**

Source: Field Survey, 2019

Demographic Analysis

Table describes the demographic details of the respondents which consists of 60% male and 40% female with the age group classification of 18-23 years, 24-29 years and 30-35 years by 9%, 57% and 36% respectively. Out of the total respondents 39% and 61% of the students had bachelors and masters degrees respectively. Most of the respondents were students covering 63% and the professionals covering 37% out of total. Among the respondents 37% were getting monthly income of Rs. 15000 to Rs. 25000. Out of them 14% of respondents were earning below Rs. 15000 and 6% of the respondents were not earning any amount.

Descriptive Statistics of the questionnaire

Category	Statements	Mean	Rank	Average
Attitude	I would describe myself as environmentally responsible.	3.62	3	**3.51**
	I am worried about the worsening of the quality of Nepalese ecological environment.	3.89	1	
	When I purchase products, I try to make efforts to buy products that are low in pollutants.	3.23	4	
	I am interested in asking about the environmental consequences of a product before buying it.	2.98	5	
	To be honest, I feel that environmental problems affect my personal (every day) life.	3.82	2	

Category	Statements	Mean	Rank	Average
Knowledge & Awareness	I am aware about following eco-friendly products: a) Biodegradable	3.89	1	**3.79**
	b) Recyclable	3.69	2	
	c) Organic	3.89	1	
	d) Energy efficient	3.67	3	
	I am aware that purchasing eco-friendly products will contribute to the sustainable ecological future.	3.87	-	
Eco Labels as a choice of purchase	When I want to buy a product, I look at the eco-labels to see if it contains things that are eco-friendly.	3.04	3	**3.33**
	If the product is eco-labelled, this information changes my choice of purchase.	3.52	1	
	I trust the information of eco-labels on eco-friendly products.	3.43	2	
Product Experience	I trust the quality of eco-friendly product	3.43	4	**3.72**
	Based on the brand/product image, I strongly feel about buying eco-friendly product.	3.87	1	
	I would recommend the eco-friendly products to other if it has performed well as promised in the past.	3.73	3	
	I intend to purchase eco-friendly products in the future as well.	3.83	2	
Willingness to pay more	I agree that the price of eco-friendly products is supposed to be higher.	3.61	1	**3.41**
	I am willing to pay more for eco-friendly products.	3.20	2	
Green Purchase Intention	Whenever I have thought of buying some products, I first asked for eco-friendly products if available.	2.71	4	**3.18**
	I have purchased light bulbs that were more expensive but saved energy.	3.71	1	
	I make energy effort to reduce the use of plastic bags.	3.68	2	
	I have always purchased spray (deodorant, perfumes, hair spray, room fresheners, etc.) that are ozone free.	2.67	5	
	I have convinced members of my family or friends to buy organic foods which are least harmful to the environment.	3.13	3	

Source: Field Survey, 2019

Result Analysis

a) Attitude toward environmental protection

In Table 3.2, Q1.1, Q1.2, Q1.3 and Q1.5 scored mean value above 3 (mid-range value) which also implies that respondents agreed on the respective issues regarding attitude towards environmental protection. Among the set of questions of this independent variable, Q1.2 was the most prioritized issue which scored the highest mean value i.e. 3.89 indicating that people were worried about the quality of Nepalese ecological environment. On the other hand, Q1.4 with a mean value of 2.98 showed that people were least interested in asking about the environmental consequences of a product before buying it. However, the aggregate mean value of the attitude towards environmental protection (independent variable) is 3.51 implying that the overall attitude of the respondents regarding environmental protection was positive which indicates that respondents were environmentally responsible and also thought that environmental problems affect their everyday life.

b) Knowledge and awareness of eco-friendly products

Table 3.2 shows the overall knowledge and awareness of eco-friendly products. All the questions in category 2 scored value above 3 (mid-range value) which also implies that respondents agreed on the respective issues regarding knowledge and awareness of eco-friendly products. Among the set of questions of this independent variable, Q2.1 scored the highest value i.e. 3.89 indicating increased individual awareness on purchasing eco- friendly products which will contribute to the sustainable ecological future. Similarly, this part of questionnaire also revealed that people were aware of eco-friendly products namely: a) Biodegradable, b) Recyclable, c) Organic, and d) Energy efficient; the mean score of all questions being above 3. In comparison to all other eco-friendly products, people were least aware of organic products followed by biodegradable products, which scored 3.67 and 3.69 respectively on mean score. However, the aggregate mean value of the knowledge and awareness of eco-friendly products (independent variable) is 3.79 implying that the overall knowledge and awareness level of the respondents on eco-friendly products is high.

c) Eco labels as a choice of purchase

Table 3.2, third section shows the overall concern of respondents on eco-labels of eco-friendly products. In this analysis all the responses scored value above 3 (mid-range value) which also implies that respondents were concerned regarding information of eco-labels on eco-friendly products. Among the set of questions of this intervening variable, Q3.2 scored the highest value i.e. 3.52 indicating that if the products were labelled as eco-friendly, this information will change their choice of purchase. On the other hand, Q3.1 with a mean value of 3.04 showed that people were comparatively less concerned in looking at the information to see if it contains things that are eco-friendly while purchasing products. The aggregate mean value of respondents' concern regarding eco-labels (independent variable) is 3.33 implying that the overall concern of the respondents for information conveyed on eco-labels was positive. In other words, it also indicates that respondents trusted the information provided on eco-friendly products.

d) Product experience

In Table 3.2 forth section, e very questions scored value above 3 (mid-range value) which also implies that respondents showed positive behavior regarding eco-friendly products if the product experience in the past has been convincing. Among the set of questions of this intervening variable, Q4.2 scored the highest value i.e. 3.87 indicating that people would recommend the eco-friendly products to other if it has performed well as promised in the past. Similarly, Q4.1 and Q4.3 also showed a similar conclusion regarding their trust on the eco-friendly products and their purchase behavior in future as well.

The aggregate mean value of respondents' experience of eco-friendly products is 3.72 implying that respondents had positive experience on eco-friendly products. In other words, it also indicates that respondents trust the quality of eco-friendly products and are intended to purchase them in future as well.

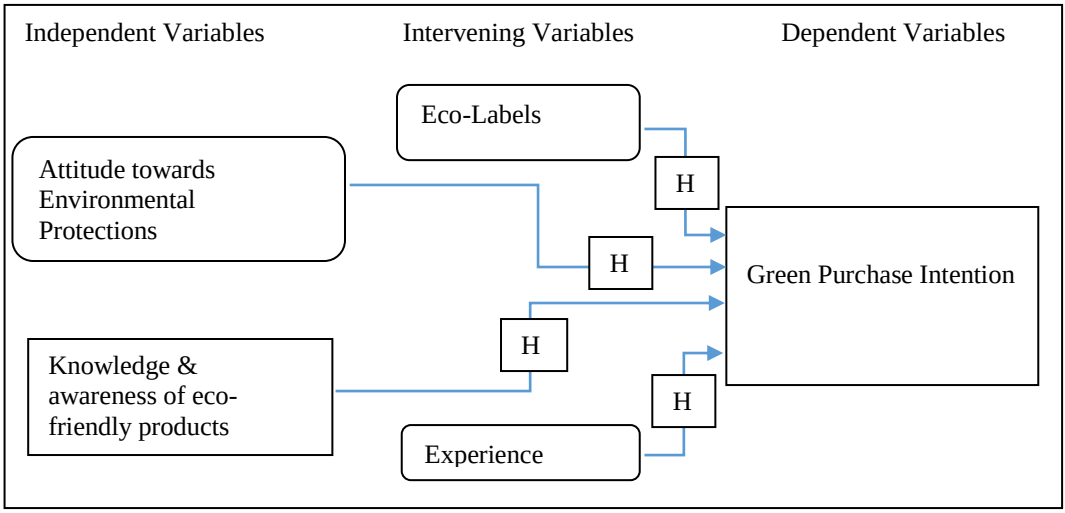
e) Willingness to pay more

Table 3.2 fifth section shows the willingness of respondents to pay more for the eco-friendly products. Both the questions i.e. Q5.1 and Q5.2scored value above 3 (mid-range value) which also implies that overall willingness to pay more for the eco-friendly products was positive. Among the set of questions, Q5.1 scored the highest value i.e. 3.61 indicating that people agreed on the fact that the price of eco-friendly products is supposed to be higher. But at the same time, when the same people were asked whether they were willing to pay more for the products, their response was not as positive as in the first case. The mean score of Q5.2 is 3.20 which is lower than that of Q5.1 i.e. 3.61. The aggregate mean value of respondents' willingness to pay for the eco- friendly products is 3.41 implying that people were willing to pay more for the products. They also thought that the price of such products is supposed to be higher, which is a good sign for the marketers, who are doing business on such eco-friendly products.

f) Green Purchase Intention

Table 3.2 sixth section shows the overall intention of respondents towards purchasing eco-friendly products. In that section Q6.2, Q6.3 and Q6.5 scored value above 3 (mid-range value) which also implies that respondents agreed on the respective issues regarding green purchase intention. Among the set of questions of the dependent variable, Q6.2 scored the highest value i.e. 3.71 indicating that people had favorable attitude towards purchasing energy saving appliances. Similar were the responses on recyclable and organic products with respective mean scores of 3.68 and 3.13 respectively. On the other hand, people did not have favorable attitude towards ozone free sprays which is shown by the lowest mean score of 2.67. More interestingly, eco-friendly products were not the first choice of the people while showing purchase behavior. In other words, whenever they had thought of buying some products, they hardly asked for eco-friendly products if it is available. The aggregate mean value of green purchase intention (dependent variable) is 3.18 implying that the overall intention of people in purchasing green products was positive. Especially, people were aware and tend to purchase recyclable, energy efficient and organic products

Hypotheses Testing



For the purpose of testing stated hypothesis, the correlation analysis and p-value tests were used with the help of SPSS software.

Correlation Analysis

Correlation Analysis

		Attitude Towards Environmental Protection	Knowledge & Awareness	Eco Labels	Product Experience
Green Purchase Intention (GPI)	**Pearson Correlation**	0.715**	0.631**	0.674**	0.622**
	Sig. (2 tailed) = 0.000				
	N = 115				

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

Table shows the correlation analysis between dependent variable Green Purchase Intention (GPI) and other independent/intervening variables i.e. attitude towards environmental protection Knowledge & awareness, Eco labels and Product experience. Since the p value is less than alpha i.e. $p(0.000) < \alpha(0.01)$, the correlations are significant between GPI and other mentioned variables. There was positive relationship between GPI and all other variables individually. Hence, HYPOTHESIS 1 (H1) – people, who have positive attitude towards environmental protection, will have a favourable correlation with Green Purchase Intention (GPI) – is accepted.

Further, with the correlation coefficient value of 0.631, it can be said that there was positive relationship between knowledge and awareness of eco-friendly products and green purchase intention. That showed that people who had knowledge and awareness of eco-friendly products had a favorable Green Purchase Intention (GPI). Hence,

HYPOTHESIS 2 (H2) – people, who have knowledge and awareness of eco-friendly products, will have a favourable correlation with Green Purchase Intention (GPI) – is accepted.

Again, with the correlation coefficient value of 0.674, it can be said that there was positive relationship between information conveyed on eco-labels and green purchase intention. In other words, people who trusted the information conveyed on eco-labels had a favorable Green Purchase Intention (GPI). Hence, HYPOTHESIS 3 (H3) – people, who trust the information conveyed on eco-labels, will have a favorable correlation with Green Purchase Intention (GPI) – is accepted.

Now, with the correlation coefficient value of 0.622, it can be said that there was positive relationship in between product experience and green purchase intention. In other words, people who had positive experience of eco-friendly products in the past had a favorable Green Purchase Intention (GPI). Hence, HYPOTHESIS 4 (H4) – people, who had positive experience of eco-friendly products in the past, will have a favourable correlation with Green Purchase Intention (GPI) – is accepted.

Discussion

The history of green marketing as a marketing strategy is not so long. In this study, it can be seen that eco labels, product experience and willingness to pay more acted as potential background factors for young consumers' attitude, knowledge and awareness formation. So, marketers should deliver positive and emotional appeals to educate young consumers' product preferences. Accordingly, marketers can take initiatives to increase knowledge building activities like eco-workshops in colleges and organizations, field trips, and tree plantation. Furthermore, from the empirical findings, it can be seen that there has been a rise in intention to buy eco-friendly products, especially in the 24-29 age-group. Thus, national and international green marketers should target this segment (24-29 age-groups) with knowledge building activities. In this study, the researcher has found that these two are strong predictors of buying eco-friendly products. So, this has led to increasing necessity and importance in the side of marketer to educate people more about such products and has also pressurized them to meet and maintain the required and expected quality level of such products.

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[2] Areibi, S. and Yang, Z., 2004, Effective memetic algorithms for VLSI design = Genetic algorithms + Local search + Multi-level clustering, Evolutionary Computation, 12, 327-353.

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