

MANAGING RISK IN MOUNTAINEERING: A PROCESS PERSPECTIVE

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Abstract

Mountaineering is a preferred adventure tourism activity that attracts many enthusiasts. The risk in mountaineering is tangible which could be an impending threat to the life of the tourist. The sustainability of mountaineering expeditions is critical for its success. The survival of business organisations offering mountaineering related services depends upon how risk in mountaineering is been managed. The service organisations in mountaineering may face the loss of reputation, money and the confidence of their patrons, if risks involved in mountaineering is not managed effectively. The research works aim to build a process based risk management system which may help the mountaineering organisation in managing of risk, and to develop strategies to alleviate and curtail the risk.

Keywords: Risk, Mountaineering, Mitigation, Process Approach

INTRODUCTION

Presently, nearly 10% of the worlds' GDP (Gross Domestic Product) is contributed by travel and tourism trade and creates 1 out of every 11 jobs in the world. Further, tourism is amajor industry for foreign exchanges earning of a tourism destination and helps in managing equilibrium of a country's balance of payment (Senthil & Seal, 2017). The global adventure tourism market was valued at \$ 586.3 billion in 2018 and is projected to reach \$ 1,626.7 billion by 2026, registering a CAGR of 13.3% during this period (<https://www.alliedmarketresearch.com/adventure-tourism-market>). The growth of world tourism industry is forecasted with the annual foreign tourist arrival of 1.8 billion in the year 2030. (UNWTO, 2017). The analysts of Markets & Research forecast the global adventure tourism market to grow at a CAGR of 45.73% during the period 2018-2022 (<https://www.researchandmarkets.com/reports/4522329/global-adventure-tourism-market-2018-2022>).

Adventure tourism is a broadening and thriving tourism activity across the world (Bentley, Page & Machy, 2007). In the year 2010, the market size of global adventure tourism was US\$ 89 billion which increased manifold times to US\$ 263 billion in the year 2013. The increased interest towards adventure tourism attributed to international departure and augmented spending on adventure trips (UNWTO, 2014). Even though adventure tourism is centuries old engaged by various expeditors, commercial adventure is a contemporary phenomenon.

The market size of adventure tourism in India is estimated to INR 500 Crore (US\$ 38 million) and the demand for adventure tourism increased 400% between 2008-2015. India's adventure tourism demand doubled in size during this period and expected to emerge as a biggest foreign exchange generator expected to generate US\$ 27 billion by 2018 (Government of Gujarat, 2017). Though mountaineering is popular across the world, the pioneer in India was an English man named Arthor Foot, whose contribution is commendable for gaining its popularity (Adventure Nation, 2017).

Travelex, a mountaineering insurance firm defines mountaineering as "*the sport of walking, hiking, backpacking and climbing mountains which usually involves a mixture of ice climbing, rock climbing and mixed climbing where the climbers carry all their loads with them at all times. It generally requires the use of ropes, picks, axes, and other specialized equipment*" (Squaremouth, 2010). The mountaineering as a sport initially began as a pleasure for people with the motive to refresh their inner self, challenge personal limits, and live an adventurous life (Johnston & Edwards, 1994). Extreme sports are now recognised as adventure tourism activity which is different from conventional sports as it includes high risk and danger for life of the adventure tourist (Moktan, 2017). In India, mountaineering has ample scope for growth and become a hotspot. There are several peaks which are about 7000 meters in altitude located in Himalayas, Karokoram, Arunachal, Sikkim, Uttarakhand, Himachal, Jammu and Kashmir of India which are top mountaineering destinations.

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Studies suggest that soft adventure dominates the market and invariably comprises largest chunk (Fig. 1) but the trend suggest that both the hard and soft segments of the market to grow proportionate in years to come. Similarly, land-based activities would continue to maintain its leadership over the water-based and air-based forms and it is also projected to grow faster in the short to medium term (Fig. 2).

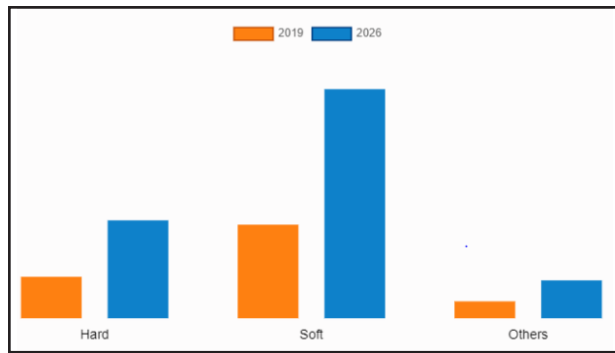
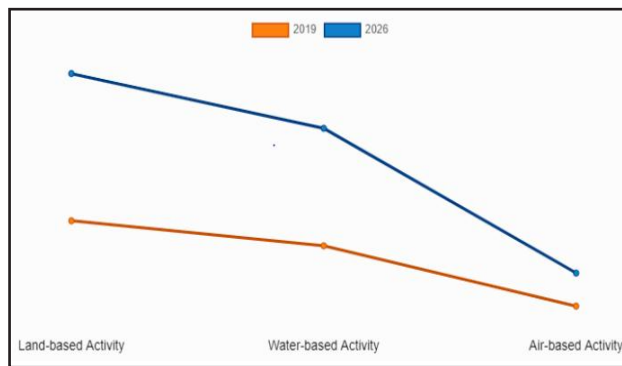


Fig. 1: Adventure Tourism Market by Type: 2019 & 2026



Source: <https://www.alliedmarketresearch.com/adventure-tourism-market>, retrieved on 30.12.2019

Fig. 2: Adventure Tourism Market by Activity: 2019 & 2026

Mountaineering requires both physical and mental strength which helps in bonding between mankind and nature. Mountaineering is a hard adventure activity taken by many explorers with the motive to promote scientific exploration, and to disseminate geographical knowledge to the society (UNWTO, 2014). Mountaineering is an extreme sport which attracts even common people across the world and it is also gaining popularity. Mountaineering works on the notion of thrill and risk. Mountaineer celebrate the risk till they self experience the risk, the celebration ends with emotional distress and loss of life (Mu & Nepal, 2016). The key aim of mountaineering is pursuing excitement with a possible threat to life. The risk is an attraction for hard adventure tourism activities (Smith & Espiner, 2007).

Among different hard adventure activities, mountaineering has more dangers that affect the safety of the mountaineers.

The prevalence of altitude related injuries in mountaineering is high which may occur through falls. There is low level evidence in injury prevention measures in mountaineering (Schöffl, Morrison, Schöffl & T, 2012). The unexpected and rough environment of mountains and physical effort required to manage wilderness poses possible injuries, ailments and new hazards to the mountaineers' well being (Mountaineers, 2003). The data on deaths during mountaineering at the Himalayas collected between 1950-2009. (Salisbury & Hawley, 2011) is presented below in Table 1.

Table 1: Distribution of Causes of Death in Mountaineering

Causes of Death	Count	In (%)
Acute Mountain Sickness	17	3
Exhaustion	5	1
Frost Bite	15	3
Fall	120	23
Crevasse	13	2
Avalanche	17	3
Falling Rock / Ice	301	57
Disappearance	19	4
Illness	13	2
Other	4	1
Total	524	100

Source: The Himalaya by the Numbers, 2011 data between 1950-2009

From the Table 1, it is inferred that most of the fatal injuries happen due to falling rocks or ice at the time of route preparation and ascending to peaks followed by fall. Other incidents of death were comparatively negligible. Risks in mountaineering come in untold forms which could be slips, trips, or falls, either due to motorized and driving hazards or due to an activity centered exposure such as rock fall or drowning (Alaska mountain guides & climbing school, 2017). Mountaineers are said to be risk managers, but considering the nature of the terrain, situations and competency, all combined have an important role to mitigate the risk exposure from extreme to manageable. There is a manifold increase in some people participating in adventure tourism (Gomez & Rao, 2016), (Carter, 2006) without prior knowledge and level of risk (Gold, 1991). When an individual opts for mountaineering, the person considers the thrill and excitement the adventure sports provides without having a through know how about it.

Various establishment or organizations assisting in mountaineering only brief about the risks as been presumed by themselves rather than needs of those proceedings to the expeditions. There are various risk management process and tools which include mostly focusing on present risk rather than on future risk. Risks involved which are shared to

expeditors are mostly general and not specific to a location or terrain. Insufficient qualitative analysis without proper scaling of risk leads to deceptive time loss and resources being spent on improper risk. Service providers and firms have to focus on a system or process to identify, analyse, evaluate and control the risk in the mountaineering. The research aims to build a process to identify, analyse and evaluate the risk that helps to mountaineering related service providers and institutions to develop standards to mitigate risk in mountaineering.

RISK MANAGEMENT IN MOUNTAINEERING

Largely, the adventure service providers opt for a multistage intervention procedure coined by Priest and Gass (Priest & Gass, 1997) to manage the risk (Beard, Swarbrooke, Leckie & Pomfret, 2012). Brown proposed the REACT model to manage the risk following the sequence of Recognition, Evaluation, Adjustment, Choice and Transfer of risk (Brown T., 1999). It has been found that traditional approaches to risk management might break-down under extreme risk and that new approach which has not been attempted may prove to work in these circumstances (Baxter, 2008). Haddon matrix (Haddon, 1980) is a risk management framework conceptualised by William Haddon Jr, to countermeasure risk and injuries in general (Williams, 1999). Later, Bahr and Maehlum used the matrix for injury prevention in sports (Bahr & Maehlum, 2004), (Thomas, Séan, Ben & Richard, 2015), (Smith III, 2013).

The Haddon matrix is a 3×3 matrices. Rows of the matrix denote the various phases of an event or experience and column denotes the dynamics which leads to the risk of life. The first row of the matrix is pre event, event and post event. Pre event denotes the precursors of injury before an event. The term 'event' describes the causes of injury during an event, while 'post event' in third row details about post injury, first aid and rehabilitation of the injured after the event.

The first column represents the host or the expeditor or the person at the risk of injury in an activity. The second column narrates about the agent/equipment or vehicle or vector which carries or transmits the mechanical/thermal or electrical energy to host or mountaineer which may cause injury. The third column is focusing on the environment which includes the location, surface, weather, rock, avalanche and also the norms, policies, rules and the practices followed in the mountaineering activity (Senthil & Seal, 2017). The basic components of Haddon matrix are presented in Table 2.

Table 2: Haddon Matrix for Identification of Risk

Assessment	Epidemiological Factors		
	Host	Agent or Vehicle	Environment
Pre-event			
Event			
Post- event			

Haddon matrix is criticised for its narrowness on focusing accident injury (Borowy, 2013). Another criticism is about the absence of evidence of early prevention efforts narrated in Haddon matrix (Pike, Richmond, Rothman, & Macpherson, 2015). The concept of epidemiology is not synced with injuries in mountaineering. Haddon treated the injury as a disease rather than an occurrence (Office of the Provincial Health Officer, 2016). For developing a process of risk mitigation at the organisation level needs a more detailed approach. A standard for risk mitigation profound by ISO is more versatile and detailed to build resilient risk management at the organisation level. ISO (International Organization for Standardization) is a nongovernmental and an independent institution which provides innovative solutions to universal challenges by developing international standards through experts who voluntarily share knowledge and build consensus.

Standards are world class specification that ensures maximum quality, safety and efficiency of products, service and process (International Organization for Standardization, 2017). ISO 21101: 2014 narrates about the safety management system necessary for the adventure tourism providers. ISO 21102: 2014 describes the roles, competencies and responsibility of service providers (Leaders) and ISO 21103: 2014 specifies the information to be provided before, during and after the adventure tourism activities to the participants. The approach followed in this research is researcher's own perspective which is not indented to neither supersede nor undermines the existing standards, laws of the country.

ISO 30001: 2009 standards provide a set of principles, framework and process for managing risk in an organisation that increase the probability of achieving goals and mitigating the risk. Risk has been defined as per ISO 31000: 2009 as "*effect of uncertainty on objective*". An effect is a deviance from the expected path or result which could be either positive or negative. The objectives have different characteristics which include health, monetary, safety and environmental. The risk characteristics are often referred to as prospective events,

consequences or a combination of it. The uncertainty is a state with limitation, of the scarcity of information related to, either understanding or knowledge of an event its consequences or likelihood (Lark, 2015; Hills, 2011).

The ISO 31000 supports in a convenient way of thinking about risk, risk management and the process of mitigating risk. The major advantage of ISO 31000 over other approaches towards risk management is it addresses many ambiguities and inconsistencies. But adopting standards to a unique area of work is a challenge and change is inevitable (Purdy, 2010). The process of risk management as per the ISO 30001 is given in Fig. 3.

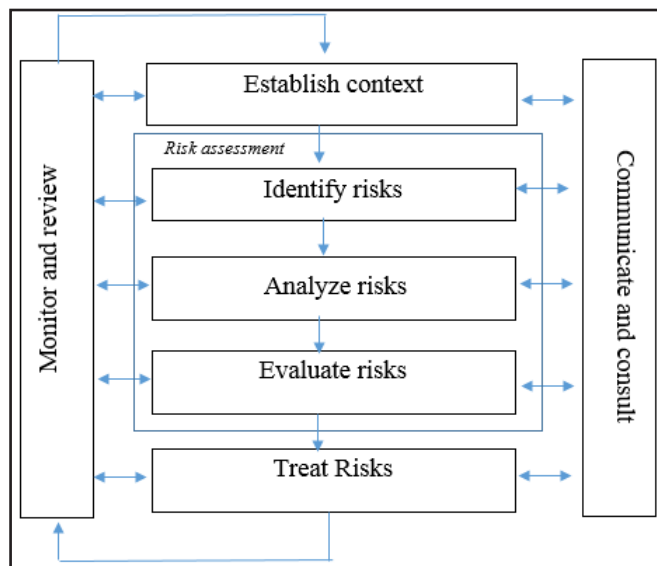


Fig. 3: Process of Risk Management

Establishing the context is a vital component of risk management. The perspective of risk changes according to the objectives of the stakeholders of an organisation. The changing perspective attributed to the impact of the environment. The context has three elements which are external (outside factors affecting success or failure),

internal (values, culture and organisational capabilities) and the risk management objectives (strategies, resources, responsibilities and assessment). Risk assessment involves three sub process of identification, analysis and evaluation of the risk. Risk identification involves a process of locating risk, recognising and defining risk. Risk analysis is the process to realise the type and the level of risk.

The risk evaluation is a method to compare the severity of risk resulted during risk analysis against standards laid down. The control procedure of managing risk is included in the process of risk treatment. The control process must be aimed to either maximise the positive outcomes or to reduce negative outcomes. Communication and consultation should be a continuous process through risk management process with key stakeholders. Monitor and reviews state the process of continuous surveillance and internal auditing of risk management process (University of Queensland, 2015).

Risk Management in Mountaineering Adopting ISO 31000

Step 1: Establishing the Context in Mountaineering

Mountaineering is an external activity carried out in a natural environment that restricts service providers control over the activities. Haddon approached the context of risk as three epistemological factors, i.e. Host, Agent and the Environment. In mountaineering host is the participant, agents the equipment necessary for mountaineering and the environment is about physical features of the location, norms, policies and the practices followed by the service providers.

Step 2: Risk Assessment in Mountaineering

The risk assessment starts from the identification of risk. Through Haddon Matrix, the risk in mountaineering is identified. Haddon Matrix on the risk associated with mountaineering is presented in the following Matrix 1.

Matrix 1: Matrix of Identified Risks in Mountaineering

	Contest of Risk		
	Host (Mountaineer)	Agent or Vehicle (Equipment used in Mountaineering)	Environment (Location, Norms, Policies, and Rules in Mountaineering)
Pre-event	<ul style="list-style-type: none"> Poor fitness Poor training about risk Chronic respiratory problems Overconfidence Previous injuries Poor navigation skill 	<ul style="list-style-type: none"> Poor material and design of the equipment No periodic maintenance of the equipment User - equipment mismatch Untrained guides 	<ul style="list-style-type: none"> Unexpected weather Altitude risk Temperature extremes Incorrect information Attitude toward mountaineering Lack of equipment design regulation Non regulation of operators

	Contest of Risk		
	Host (Mountaineer)	Agent or Vehicle (Equipment used in Mountaineering)	Environment (Location, Norms, Policies, and Rules in Mountaineering)
Event	<ul style="list-style-type: none"> Inappropriate clothing Loss of balance Loss of contact with team members Protective gears unused consumption of alcohol and psychotropic drugs Non compliance of instructions 	<ul style="list-style-type: none"> Faulty equipment Poorly designed equipment Failure of equipment 	<ul style="list-style-type: none"> Cloud Burst Avalanche Snowfall Atmospheric pressure slip, trip or fall due to the surface Lack of communication infrastructure
Post-event	<ul style="list-style-type: none"> Fear and trauma Social situation 	<ul style="list-style-type: none"> Malfunctioning of equipment 	<ul style="list-style-type: none"> Hypothermia Lack of trauma care Lack of emergency transport system Insurance support for mountaineering Lack of rehabilitation

Risk analysis is the process to realise the type and the level of risk. The risk in mountaineering is classified Low, Moderate, High and extreme. But analysing and scaling of risk depends on the scope and the urgency. Hence, mountaineering service provider has to predict their own relevance to the context (Ulrich, 2001). The risk has to be evaluated based on its impact and likelihood of occurrence. The term

impact denotes the consequences after the occurrence of risk and likelihood is the probability of the occurrence of the risk. The evaluation of risk can be done using a risk matrix, which is simple to understand and use, have a comprehensive description of and guides the appropriate actions to minimise, and mitigate the risk (Ristic, 2013). The Risk Matrix is presented in Matrix 2.

Matrix 2: Risk Evaluation Matrix

	Probability of Occurrence					
		Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Consequences	Very High (5)	5	10	15	20	25
	High (4)	4	8	12	16	20
	Medium (3)	3	6	9	12	15
	Low (2)	2	4	6	8	10
	Very Low (1)	1	2	3	4	5

The risks identified having a score between 1 to 3, is set to be low, 4-9 moderate, 10-15 high and 16 and above considerate high severity risks (Ristic, 2013).

Step 3: Treating Risk

Risk treatment is a process involving changing the consequences of the probability of the risk. Risk treatment is a creative process of developing control and modify existing control (Broadleaf Capital International, 2014). The treatment includes the transfer of risk and averting of risk (The Public Risk Management Association, 2010). Treatment of risk becomes effortless when mountaineering service providers recognise the risk in a systematic manner.

Step 4: Monitor and Review

Each mountaineering expedition is unique. Considering it, the risk assessment has to be documented using risk registers and check list. Though, there is no standard format for check lists been followed, but the service provider should develop and customise documents that that mentions control and action plans which could be auditable (The Public Risk Management Association, 2010).

Step 5: Communication and Consultation

Effective communication between all stakeholders both internal and external, is important for the realisation of the

effective risk management process. All the stakeholders should recognise the about the decision been made and the motive behind it. Consultation and communication should be on a regular basis with all stakeholders, so that they are engaged about the risk involved.

CONCLUSION

Mountaineering as a sport is achieving more popularity among adventure tourists across the world. Mountaineer celebrate the risk till they self experience the risk, the celebration ends with emotional distress and loss of life. For thrilling, challenging and authentic mountaineering experience, the expeditors are ready to pay a premium price. Mountaineering has its unique risk for life and injury Service providers of mountaineering expedition are accountable for managing risk and also formulate strategies to mitigate it. The ISO standard based risk management process approach suggested in this research address the concerns related to the identification, analysis, evaluation, treatment of risk in mountaineering.

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