



Lead-User Innovation and the U.K. Outdoor Trade since 1850

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The development of the U.K. outdoor clothing and equipment trade provides an ideal laboratory to study the changing nature of consumer innovation from the nineteenth to the twenty-first century. We trace the shifting role and experience of lead-user innovation over a 150-year period, demonstrating significant changes in sporting needs, technology, manufacturing organization, business methods, and communications. We explore the shifting interface between users and manufacturers and the extent to which shared communities of practice and knowledge have influenced product development and been shaped by the innovations themselves. Summarizing research on lead-user innovation and the historical evidence of lead-user innovation in U.K. industry, we explore the changing relationships between outdoor sportspeople and clothing and equipment suppliers, as well as the changing role and experience of lead-user innovation across a range of products, including climbing equipment, rucksacks, and clothing. An analysis of shifting communities of practice through time underpins our co-evolutionary approach.

Definitions of innovation vary enormously and different disciplines treat the concept differently. From a business perspective, innovation is about turning opportunity or need into commercially exploited products and services. Crucially, successful innovation involves balancing need with

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possibility. It involves commercialization, which occurs only when the relationships among consumer demands, technological capabilities, and the wider business and economic environment are understood.¹ Typically, we categorize innovation as product/service, process, radical, or incremental. However, the boundaries are often blurred, and this categorization does not entirely capture the nuances and subtleties of innovation. As a result, it presents just a starting point for understanding, and there are significant interrelationships, overlaps, and shifts through time. Product and process innovation are intimately intertwined, for example, while radical innovation is normally associated with sustained incremental change before a dominant design emerges. There are also some innovations that entirely change mindsets and ways of thinking, whereas others allow repositioning of a company within a market.²

The analysis of how, where, and why innovation occurs is equally complex. There are consistent challenges to Joseph Schumpeter's assumption of the role of the "heroic" individualist entrepreneur, and to the idea of a simple linear relationship between large companies' investments in research and development (R&D) and innovation. There is extensive evidence that innovation is a networked process, and the very organization of many large firms has inhibited innovation. Nor can we assume that product manufacturers typically develop product innovations.³ Product innovation relies on relationships throughout the supply chain with both suppliers and users.

In lead-user innovation, the users themselves, as those who best understand their demands, innovate to produce what they need. They benefit from using rather than selling the product. Recent research on lead-user innovation has demonstrated its potential for improving innovation success rates and for maintaining market leadership. This approach seriously challenges conventional wisdom, where innovation occurs within companies, especially within large corporations. Instead, lead users emerge as the principal sources of many major innovations.⁴ Studies of lean manufacturing highlight the shift in control of the production process from manufacturer to production line worker. Similarly, research on lead-user innovation places innovation in the hands of the user, rather than the manufacturer.

¹ Mark Stefik and Barbara Stefik, *Breakthrough Stories and Strategies of Radical Innovation* (Cambridge, Mass., 2004); Jan Fagerberg, David C Mowery, and Richard R Nelson: *The Oxford Handbook of Innovation* (Oxford, England, 2005)

² Joe Tidd, John Bessant, and Keith Pavitt, *Managing Innovation: Integration, Technological Market and Organisational Change* (London, 2005).

³ Eric von Hippel, *The Sources of Innovation* (New York, 1988).

⁴ Eric von Hippel, *Democratizing Innovation* (Cambridge, Mass., 2005)

The development of the U.K. outdoor clothing and equipment trade provides an ideal laboratory to study the changing nature of consumer innovation from the nineteenth to the twenty-first century. We trace the shifting role and experience of lead-user innovation in U.K. outdoor products over a 150-year period, demonstrating significant changes in sporting needs, technology, manufacturing organization, business methods, and communications. We trace the relationship between the development and impact of lead-user innovations and the way sporting and business changes shaped them. Leading sportspeople link their practical knowledge, derived from use, to innovation. Use and innovation are not isolated activities, however, but are shaped by shared practice. The communities of practice literature makes exciting connections among entrepreneurship, innovation, and networks, underpinned by historical path dependency models of “learning by doing,” making it ideal for looking at user innovation.⁵ A model of learning based on participation rather than theory, communities of practice theory emphasizes the way in which learning is a social rather than an individual activity.⁶ In this essay, we explore the shifting interface between users and manufacturers and the extent to which shared communities of practice and knowledge have influenced product development and been shaped by the innovations themselves.

Lead-User Innovation and British Business: Background

Innovation can take place at any point in the supply chain and is an evolutionary, learning process. It depends on knowledge and experience, which builds and shifts through time, and most often occurs with crossing boundaries and combining expertise and knowledge. Since the 1980s, researchers led by Eric von Hippel have highlighted the importance of users and lead users, in particular, in the innovation process. Lead-user innovators may be either businesses or consumers who, through operating at the “leading edge” of activity, “face new needs significantly earlier than the majority of the customers in the market segment.” They are initially motivated, not by the sale of the product, but because they will reap the benefits from a solution to a user problem.⁷

“Designing for use and testing by use are the essential characteristics of user innovators: they may subcontract production and parts supply, but they cannot subcontract the innovation’s design or testing and be user

⁵ Jean Lave and Etienne Wenger, *Situated Learning: Legitimate Peripheral Participation* (Cambridge, England, 1991).

⁶ Etienne Wenger, *Communities of Practice: Learning, Meaning, and Identity* (Cambridge, England, 1998).

⁷ Von Hippel, *Democratizing Innovation*.

innovators. . . .”⁸ The needs of these users provide the incentive for such innovation, while “usage” gives them the capability to develop and improve.⁹ Use of a product is knowledge-enhancing and builds experience that informs understanding of the capabilities and shortcomings of existing products. By facing extreme or more specialized problems, lead users are also able to build the knowledge needed to provide innovative solutions, rather than relying on established suppliers. Where lead users are industrial or service customers, their user-innovation is likely to be a process innovation, which enhances efficiency or perhaps allows them to increase their product’s sophistication.¹⁰

Researchers have confirmed the frequency of user innovation and explored the knowledge involved. Much of this research has focused on the development of industrial products such as medical instruments or the adaptation of machinery or software for information systems. There is also extensive evidence of lead-user innovation in scientific instruments, where 75 percent of innovation is by lead users, although in plastics and additives it is virtually zero.¹¹

Lead-user innovation has a long history; in the United States, there were no specialist textile machine-makers before 1820, so that all machinery development was lead-user innovation.¹² There is extensive evidence of this kind of activity in the British cotton industry in the eighteenth and nineteenth centuries, where lead-users’ activity often initiated innovation and contributed to the eventual commercialization of inventions. Machine-tool innovation is another example of lead-user innovation, this time by specialist machine-makers.¹³ The development of machine tools improved precision and sophistication in machinery design. It facilitated the shift from use of wood to cast iron in machine making. Examples include the development of the first business computer, LEO (Lyons Electronic Office), by J. Lyons and Company, Ltd., in the 1940s and

⁸ Carliss Baldwin, Christoph Hiernerth, and Eric von Hippel, “How User Innovations Become Commercial Products: A Theoretical Investigation and Case Study,” *Research Policy* 35 (Sept. 2006): 1291-1313, at 1296.

⁹ Christian Lüthje and Cornelius Herstatt, “The Lead User Method: An Outline of Empirical Findings and Issues for Future Research,” *R&D Management* 34 (July 2004): 553-68.

¹⁰ Keith Pavitt, “Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory,” *Research Policy* 13 (June 1984): 343-373.

¹¹ Lüthje and Herstatt, “The Lead User Method”; Roy Rothwell and Paul Gardiner, “Invention, Innovation Re-Innovation and the Role of the User,” *Technovation* 3 (March 1985): 167-86.

¹² Von Hippel, *Democratizing Innovation*.

¹³ Christine Macleod, “Strategies for Innovation: The Diffusion of New Technology in Nineteenth-Century British Industry,” *Economic History Review*, n.s. 45 (May 1992): 285-307.

1950s. Founded as a small niche catering company in the nineteenth century, J. Lyons emerged by the 1940s as one of the United Kingdom's leading food brands. Their activity included tea, confectionary, ice cream, special event catering, and the Lyons Tea Shops and Corner House.¹⁴ The need to develop business systems was crucial for the efficiency of a diversified business of this kind, and Lyons had a long tradition of employing analysts to develop accounting systems, stretching back to the interwar period. Although the technology to build and design a modern electronic computer was available during the 1940s, the principal interest was in development for scientific, rather than business, uses. By becoming lead-user innovators, Lyons people believed they would be able to develop a machine especially suited to their needs, rather than have to adapt computers designed for large government and scientific projects.¹⁵ They were not the only company during this period to pursue in-house business computing development; others included GEC, AT&E, Marconi, and Decca. But, whereas those companies had prior engineering or electronic manufacturing experience, Lyons had none.¹⁶ Cambridge University, where work had begun on an electronic calculator, collaborated in producing LEO ("one of the most ambitious DIY [Do It Yourself] projects of the 1950s").¹⁷ As lead-user innovators, Lyons were able to develop a machine meeting their precise needs, at a time when an equivalent machine was not commercially available.¹⁸

Consumers as Lead-User Innovators

Lead-user innovation has not, however, been confined to business users; consumers are seen as an increasingly important source of innovation, an interest stimulated by the emergence of open-source communities in software development.¹⁹ This has contributed to extensive research into lead-user innovation and considerable evidence of both industrial and consumer lead-user activity. Researchers have revealed the importance of lead-user innovation in developing a range of outdoor sport equipment and the strong links between tacit knowledge and the development of sporting goods in the United States and continental Europe. There are innovations developed to handle particular sporting challenges and to enhance performance. There is also evidence of knowledge sharing and

¹⁴ Frank Land, "The First Business Computer: A Case Study in User-Driven Innovation." *Annals of the History of Computing* 22 (July-Sept. 2000): 16-26.

¹⁵ Peter J. Bird, *LEO: The First Business Computer* (Wokingham, England, 1994).

¹⁶ John Hendry, "The Teashop Computer Manufacturer: J. Lyons," *Business History* 23 (Jan. 1987): 73-102.

¹⁷ Bird, *LEO*.

¹⁸ Hendry, "The Teashop Computer Manufacturer."

¹⁹ Von Hippel, *Democratizing Innovation*.

enhancement within sporting communities.²⁰ Our study of lead-user innovation in U.K. outdoor products, however, introduces several new dimensions. We explore the extent to which the role and impact of lead-user innovation have shifted over time, and the extent to which such innovation co-evolved with changes in technology, materials, institutions, markets, business structures, and social attitudes. We link this long-term perspective to shifts in the building and functioning of communities of practice among outdoor sportspeople and between sportspeople and business.

The Pioneer Victorian Alpine Lead Users

We can trace modern mountaineering to the 1850s and 1860s, when elite British mountaineers came to the Alps for science and recreation, establishing the Alpine Club in 1857. The coming of the railways in the 1860s, and the first Cook's tours in 1862, widened the appeal. Between 1850 and 1865, mountaineers had climbed most of the Alpine 4,000-meter peaks; 70 percent were U.K. climbers in partnership with their professional guides. However, while the English pioneered mountaineering as a sport, they did not initiate the production of mountaineering clothing or equipment, especially mountaineering hardware, which was produced in the Alps, based on indigenous craft blacksmithing skills.²¹ Mountaineers often designed other equipment, such as tents, sleeping bags, and burners for heating water and food, either making them themselves or entering into dialogues with other mountaineers and artisans in the United Kingdom. Some of these innovations emerged as dominant designs, influencing what was taken for granted in mountain equipment for many years.

Three Victorians—Francis Tuckett, Edward Whymper, and Fred Mummery—stand out as exceptional mountaineers and designers who were all lead-user innovators. They were pioneers in an emerging sport unsupported by established manufacturers or retailers. Before the development of the Alpine hut network in the 1860s and 1870s, climbers and their guides had two choices. Either they bivouacked under rocks or they pounded up and down from the valley below, using candle lanterns at the beginning and the end of a long day. There were no purpose-made

²⁰ Lüthje and Herstatt, “The Lead User Method”; Sonali K. Shah, “Sources and Patterns of Innovation in a Consumer Products Field: Innovations in Sporting Equipment,” MIT Sloan School of Management Working Paper no. 4105 (2000) Cambridge, Mass.; Carliss Baldwin, question and answer session, “How Kayak Users Built a New Industry,” Harvard Business School Working Knowledge, (2006). URL: <http://hbswk.hbs.edu/item/5462.html>.

²¹ Mike Parsons and Mary B. Rose, *Invisible on Everest: Innovation and the Gear Makers* (Philadelphia, Pa., 2003).

tents; those manufactured during this period were large, bulky military-style tents, not designed for rock, snow and ice, or high winds. There were no purpose-made sleeping bags or portable cooking equipment.

Our ancestors may have lacked much of what we deem essential in the mountains, but they possessed a greater natural awareness of how to survive and move around on frozen or mountainous terrain. Many early climbers were intensely practical men who had a typical Victorian fascination with ingenious and extraordinary devices. They had sufficient wealth and leisure to pursue ideas that might make their hobby more pleasurable. They were part of an elite community of practice centered on the Alpine Club, and they shared user experience through a combination of the *Alpine Journal* and the Alpine Club equipment exhibitions of the 1890s and early 1900s.

They used what was available and improved and adapted it to meet changing aspirations and solve new problems, working with artisans and developing patterns. Whymper and Mummery developed outstanding tents (see Figures 1 and 2); Tuckett, the typical Victorian tinkerer, designed a revolutionary blanket sleeping bag and a burner for heating food and liquids. All three of these lead users worked with artisans to develop prototypes, which were then tested and their functionality adjusted. Of the three, Whymper is the best-known example. However, both Tuckett and Mummery also fulfill the criteria of the lead-user innovator and both developed designs which diffused widely and had a lasting impact on what emerged as standard for outdoor activity.²²

Thomas Hiram Holding

Work on modern lead users has shown that a proportion of lead-user innovators do set up their own companies. Some of these are lifestyle businesses, but a few may challenge established manufacturers, even emerge as disruptive innovators.²³ None of the Victorian lead-user Alpinists saw their innovations as a platform for their own businesses, even though in some cases their innovations became the dominant design for decades. Thomas Hiram Holding, however, was different from the Alpinists. By 1900, he had established a prestigious reputation as a tailor, but he was also a pioneer canoe and cycle camper. His tailoring knowledge

²² Edward Whymper, "Camping Out," *Alpine Journal* 2 (1862): 2; Ronald Clark, *The Victorian Mountaineers* (London, 1953); Francis F. Tuckett, "A Night on the Summit of Monte Viso," *Alpine Journal* 1 (1862): 27; full details of the development of these innovations are given in Parsons and Rose, *Invisible on Everest*, 44-84.

²³ Somali Shah and Mary Tripsas, "When Do User Innovators Start Firms? Towards a Theory of User Entrepreneurship," 2004, University of Illinois Working Paper no. 04-0106.

innovations. He combined technical and practical knowledge with sporting expertise to make his sport more pleasurable.

Holding was founder of the Bicycle Touring Club in 1878, the Association of Cycle Campers (forerunner of the Camping and Caravanning Club) in 1901, and the National Cycle Camping Club in 1906. He had an enduring passion for outdoor living and self-propelled activity, which he recognized was only pleasurable or, indeed, sustainable with compact, lightweight kit (see Figure 3). He was convinced:

. . . that the lighter the weight and the smaller the bulk, the happier will the canoeist be . . . if he intends to stay in a hotel or seek shelter in a house, there is small need to take anything but his bacca box and cane; but if he goes in for camping, and therefore for enjoyment and independence, for economy and health and for self reliance—all these things being inseparable from camping—he must necessarily take that which will protect him from inclement weather and keep up temperature during the cold hours of the night.²⁴

FIGURE 3
Thomas Holding's Cycle Camping Equipment, circa 1910



Source: Photo used with permission of Hazel Constance.

²⁴ Thomas Hiram Holding, *Watery Wanderings: Mid-Western Lochs* (London, 1886), 35.

In common with the Victorian Alpinists, this inventor of the sport of cycle camping found nothing suitable from established manufacturers to meet his needs: “When I made cycle-camping possible I found nothing, adaptable to it, and therefore designing and actually making or instructing others to make such things as would suit the sport.”²⁵ He designed tents, including super-lightweight silk ones, and panniers for bicycles, and he used the bicycle as a platform for related portable equipment design. In 1908, he even designed an 11 centum weight one-horse caravan.²⁶ Several of his lightweight innovations, especially the baby Primus, endured as dominant designs until after the Second World War. Franz Wilhelm Lindqvist had developed the Primus stove in Sweden in 1892; it was the first pressure stove, fueled with paraffin. Used for self-propelled travel, it was heavy and bulky for cycling. Just a year after these were introduced Holding began experimenting:

Three years to get a smaller size—5 inches across—made and then it had projecting legs. So I devised a second model and had the feet set right underneath, the projecting pump shortened and changed the valve from the side to the top, christening it the ‘Baby Primus’ which is the best of all the Primus models. Still pursuing my Spartan notions re compactness, space and solid packing, I designed the So-Soon pans for taking the Primus stove inside.²⁷

From the start, Holding shared his ideas with Club members through his books *Watery Wanderings* and *Cycle and Camp in Connemara*, published in 1886 and 1898, respectively. Before the First World War, he and other user-innovators shared their experiences through a range of specialist cycling and camping club magazines, including the *Cycle Touring Club [CTC] Gazette*, *Cycle Camping*, *Camping*, *Campers’ Quarterly*, and *The Association of Cycle Campers [ACC] Handbook: The Campers’ Quarterly*. In 1908, Thomas Holding published *Campers’ Handbook*, which the *Daily News* described as the Campers’ Koran because it was so comprehensive and authoritative. These publications were full of users’ designs and advice on how to make kit. For a while, the clubs served as a vital mainspring of innovation. By then, Holding had become a lead-user entrepreneur, diversifying his tailoring businesses into supplying camping equipment through an advanced, informative catalogue, *Refined Camping*.

Designing for use became embedded in the ethos of the camping clubs. The ACC exhibited at the Travel Exhibition in 1906 and at the Ideal Home

²⁵ Thomas Hiram Holding, *Refined Camping* (London, 1906), 15.

²⁶ Hazel Constance, *First in the Field: A Century of the Camping and Caravanning Club* (Coventry, 2001).

²⁷ Quoted in Constance, *First in the Field*, 26-27.

Exhibition in 1908. Lightweight tent and equipment design undoubtedly evolved significantly through lead-user innovation by pioneer campers. Holding himself developed a number of designs including an “A” style tent and a Gipsy tent, but his favorite was a small “A” style called the Wigwam made in silk. Weighing just 11 ounces, it fitted in a coat pocket. Unfortunately, it came with heavy steel pegs; he found that aluminum pegs bent. However, in common with Mummery’s ice axe tent, it used walking sticks as tent poles.²⁸ Following Holding’s resignation as president, in 1911 the ACC established a Supplies Department, sourcing camping equipment. In 1919, ACC became the Camping Club of Great Britain and, in 1920, moved into manufacturing, setting up Camp and Sports Co-operators. With the trademark “Camtors,” it produced what some described as the Rolls Royces of the camping world, including the Itisa, a single-pole tent based on a 1916 member’s design.²⁹ Lead-user innovation, therefore, became the basis of the Camtor brand, which survived until the 1960s.

Characteristics of Victorian and Edwardian Lead-User Innovators

Whymper, Tuckett, and Mummery are the most famous lead-innovator mountaineers of their generation. They developed their innovations to meet their own personal needs, rather than with an intention to commercialize them. Yet, some at least of their designs became enduring mountain classics. They had little choice but to develop their own kit, as they were pioneers in an emerging sport that predated the development of a specialist outdoor trade in the United Kingdom. They were practical men able to build a dialogue with the artisans who developed their products for them. The kit they developed, which in turn shaped what they designed, enhanced their sporting experience. This was especially true of Mummery’s tent and his desire for a lightweight approach, but in all cases, their own innovative activity improved their leisure activity. These men also understood materials, and their innovations reflect the technological capabilities of the period. Victorian lead-users were part of an especially close-knit network based around the Alpine Club, which enhanced knowledge sharing.

The *Alpine Journal* did not contain specialist equipment articles, but in telling their expedition stories, the climbers also revealed their solutions to equipment problems. They shared knowledge through the Alpine Club Exhibitions in the 1890s, which included exhibits from the Alpine outfitters alongside those from innovative members. Though none of them aspired to be entrepreneurs, all of them produced designs that set a lasting

²⁸ Holding, *Refined Camping*.

²⁹ Constance, *First in the Field*, 34-35.

standard. At least some of their products, especially the Whymper and Mummery tents, were factory-produced and distributed by large-scale retailers, such as Blacks and Benjamin Edgington, well into the twentieth century. Thus, we cannot understand the lasting impact of Victorian lead-user innovators on the design of mountain equipment simply by looking at nineteenth-century experience. Interwar retailing developments made tents more widely available to the growing number of outdoor enthusiasts. The shift to factory production of tents by firms such as Benjamin Edgington reduced costs, while helping to perpetuate nineteenth-century designs.

It is interesting to compare lead-user innovation from within the Alpine Club and the camping clubs during a similar period. In both, lead-user innovation was a necessity because established manufacturers did not make the required products. Both built knowledge and practice communities linked to club membership and shared activity and disseminated information through club publications. Yet, there were differences—not least was the size of the clubs: both the Alpine Club and the cycle camping clubs were middle class, but cycle camping even before the First World War lacked the social and sporting elitism of Alpine climbing. Another difference was the embedding of user development of regular equipment articles in cycle camping as a competitive sport, in ways that did not occur in the Alpine Club. The reasons are not immediately clear. Judging by the contents of the *Alpine Journal*, climbers preferred reading about climbing rather than equipment, and there were remarkably few designated equipment articles until the second half of the twentieth century.

By contrast, cycle campers, perhaps initially inspired by the founder of their sport, Thomas Holding, were as interested in the development of kit as they were in the sport. In addition, members of the Alpine Club were public school-educated professionals. The Camping Club members, before the First World War, came more generally from a lower-middle-class trading and industrial background, with higher levels of technical knowledge and skill. In addition, though the Alpine Club had kit exhibitions beginning in the 1890s, they would never have contemplated contributing to the Ideal Home Exhibition. That the Camping Club set up a Supplies Division and the manufacturing cooperative Camtors is indicative of a strikingly different culture, born, in part, of the rapidly growing membership and differing origins of the two clubs (see Figure 4).

It is interesting that what began as need-driven innovation to fill gaps left unfilled by established craft manufacturers had evolved into almost a self-sufficiency culture among some self-propelled campers after the Second World War. Hazel Constance, author of the official history of the Camping and Caravanning Club, and her husband Pat have been members since 1960. They have written extensively on camping and making camping equipment. Their enormous and varied collection of camping

FIGURE 4
Cantors Advertisement, 1930s

CANTORS
TRADE MARK
RUCKSACKS

THE "CAMWEGIAN"
Illustrated is the premier British-made Norwegian pattern Rucksack. Made of brushed grey canvas and grey chrome waterproof leather with detachable tubular steel frame. Complete with one waist strap and two blanket straps.

| | | |
|-------------------------|-----|------|
| Large 5 pocket Rucksack | ... | 37/6 |
| Small 5 " " | ... | 34/6 |

THE "TORWEGIAN"
Is a Norwegian pattern Rucksack somewhat lower in price than our "Camwegian." Is either Tan or Grey finished canvas, fitted with light steel frame.

| | | |
|-------------------------|-----|------|
| Large 3 pocket Rucksack | ... | 25/6 |
| Small 3 pocket Rucksack | ... | 25/6 |

THE "CRESCENT"
Can be supplied in either Tan or Grey finished canvas, fitted with ultra-light weight cane frame.

| | | | | | |
|-------|-----|------|-------|-----|------|
| Large | ... | 24/- | Small | ... | 21/6 |
|-------|-----|------|-------|-----|------|

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21, NEWGATE STREET, LONDON, E.C. 1.
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artifacts is a testament to their fascination with equipment, something for them inseparable from their sport.³⁰

Changes to the Structure of the Outdoor Trade

Several changes began during the interwar period that eventually created a distance among manufacturers, retailers, and consumers of camping and hiking clothing and equipment. The growth of consumer income encouraged manufacturing and retailing changes that made it easier to buy reasonably priced gear, often on "easy" hire purchase terms. Certainly, compared with the growth of the outdoor trade after 1960, choice remained limited. However, the expansion of Blacks, which combined factory manufacturing with its growing number of retail branches and a

³⁰ Hazel and Pat Constance, interview with Mary Rose and Mike Parsons, March 2001.

mail-order catalogue, was inseparable from the hiking and camping craze and represented the beginnings of a shift away from the small-scale specialist suppliers of the nineteenth century.

In its early years, when the “camping Blacks” were involved, the company remained close to customers’ needs, as reflected in its innovative and informative catalogue aimed primarily at hikers and campers. They out-competed Camtors during the 1930s, when supplying major expeditions gave them contact with mountaineering lead-users. When contact with both types of customers was lost in the 1960s and 1970s, market research was not a good substitute for understanding customer needs. Blacks, as a result, lost competitive advantage in the outdoor market.³¹

The Himalayas, Everest, and Lead-User Innovation

The interwar period brought changes in the hiking and cycling market, but at the very top of the market, craft production and customization remained crucial. From 1921 until 1953, the quest for the summit of Everest became a Holy Grail for Britain’s top mountaineers. Before the First World War, Polar exploration and Alpine climbing had stimulated innovation and knowledge-building among both lead users and the companies and artisans supplying them, and climbers built strong relationships with their suppliers. ³² A number of goods, including tents, stoves, and rucksacks, were factory-produced though sourced through specialist suppliers, while others were produced through small craft workshops, sometimes attached to retailers. Tailoring and boot-making skills remained vital to creating windproof outerwear and footwear.

In the 1920s, expedition members approached specialist manufacturers, tailors, and boot-makers such as Benjamin Edgington, James S. Carter, and Silver and Co. with their personal kit needs. Climbing suits were of a standardized design adjusted to the personal measurements of the climber. The members of the 1924 climbing team were instructed, when they went to Messrs Burberry in Haymarket, to ask for Mr. Pink for a careful fitting, crucial if the outer garment was to fit over multiple layers. This was all part of the dialogue connecting the climbing community to their suppliers and, indeed, to knowledge built on earlier polar expeditions. Himalayan climbing was in its infancy, but mountaineers understood that they would experience climatic conditions similar to those at the Pole: dry, cold, and windy. There was the additional consideration of altitude, however, which produced several equipment and clothing challenges that lead-user innovators, including George Finch, addressed.

³¹ Parsons and Rose, *Invisible on Everest*.

³² *Ibid.*

An Australian-born, Swiss-educated scientist, George Finch had a formidable prewar climbing reputation, and he emerged as perhaps the most important of the interwar Everest lead-users. His combination of sporting, practical, and scientific skills, along with his curiosity, proved an extraordinarily powerful mix; he developed clothing, oxygen, stove, and footwear innovations. Much of the lead-user innovation associated with clothing for Everest in the 1920s was incremental, building on polar knowledge of layering and wind proofing. In addition, as with polar explorers, some of the innovation took place during the expedition. Like many lead-user innovators, George Finch became the expedition mechanic during the 1922 Everest expedition, adjusting, testing, and improving during the long walk across Tibet.³³

Interwar Everest and Lead-User Innovation

The interwar Everest expeditions provide vital insight into lead-user innovation and emphasize the role of learning by doing and using. They also illustrate the evolution of knowledge that developed between 1921 and 1953, with links back to the nineteenth century. John Hunt, the leader of the 1953 Everest expedition, paid especial tribute to George Finch, whose practical approach to Everest, he believed, was vital to later expeditions. There was, he said, “a pyramid of knowledge [and experience] from every attempt, each adding to the last until the puzzle was solved,” he saluted George Finch for his contributions to footwear, oxygen, and clothing.³⁴

This pyramid of user knowledge shaped what individuals took to the mountains, and contributed to the development of mountaineering as a sport. Although the building of climbers’ knowledge was evolutionary, what they chose and developed was linked to changes in materials, technology, and, indeed, science. This was especially clear with respect to the use of oxygen. But how much did this lead-user knowledge influence suppliers of clothing and equipment; did they commercialize these innovations?

During the interwar period, suppliers of major expeditions, whether craft boot-makers like Robert Lawrie, or small workshop producers like Robert Burns, or factory producers and mass retailers like Blacks, were able to derive significant marketing advantage from the association. Nevertheless, this is not the same as saying that these companies embedded lead-user knowledge in their products. Both Lawrie and Burns were climbers themselves, which made it easier for them to discuss designs with their lead-user clients. As a result, they did make use of lead-user knowledge to develop and perfect their designs. Robert Lawrie, leading interwar mountain boot-maker, had supplied the 1930s Everest

³³ George Finch Diary, 21 March 1922, National Library of Scotland, ACC 8338.

³⁴ John Hunt, *The Ascent of Everest* (London, 1953).

expeditions. He designed a general climbing boot weighing 1,700 grams “lined with opossum fur between two layers of leather with a woollen felt sole” as used in 1924, but with a thin rubber sole.³⁵ Other elements of Finch’s design, particularly the outer protective layer, look remarkably like a predecessor to the high altitude SATRA boot used in 1953. As Charles Wylie of the 1953 expedition observed: “We enjoyed the advantage of light boots throughout the expedition and there were no cases of frozen feet.”³⁶ Manufacturers never commercialized this boot, however.

Ideas and innovation certainly transfer best where there is shared understanding based on experience. Robert Burns, the Manchester mountain equipment manufacturer, himself an enthusiastic climber, built a genuinely strong relationship with Himalayan lead-user Frank Smythe. He developed sleeping bags, rucksacks, and an Everest tent for the climber in the 1930s, and the two enjoyed a lively and creative dialogue (see Figure 5). Burns has no doubt that the knowledge he gained from supplying high-altitude expeditions improved the design of the products he made for the

FIGURE 5
Robert Burns Advertisement

BETTER BY BUILT BURNS

EVEREST

Kangchenjunga Nanda Devi

Foraker Kamet

TENTS
SLEEPING BAGS
RUCKSACKS
PADDED CLOTHING
MOUNTAIN STRETCHERS

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HAROVER MILLS
BUXTON STREET, London Road, MANCHESTER, 1

Source: 1936 *Alpine Journal* (with permission of Fell and Rock Library).

³⁵ RGS Everest Files, 24 Oct. 1932, Equipment Advice.

³⁶ Hunt, *Ascent of Everest*, 252.

average consumer: “Great expeditions, record breaking and even stunts, almost always influence the design and construction of equipment or machines used afterwards in everyday affairs and the Everest Expedition of 1933 [shows this].”³⁷ This is especially interesting because, unlike the earlier generation of U.K. Alpine craft suppliers, Burns had built his original business around the interwar hiking and camping movement, not elite mountaineers.

Climbing Hardware

Before 1960, the only outdoor products for which U.K. companies had a competitive advantage were textile-based: clothing and tents. In 1953, continental Europe was the source of anything remotely technical, from rucksacks through ice axes, crampons and climbing hardware, and technical boots. Thus, we need to explore the causes and consequences of the emergence of lead-user innovation in more technical products in the United Kingdom.

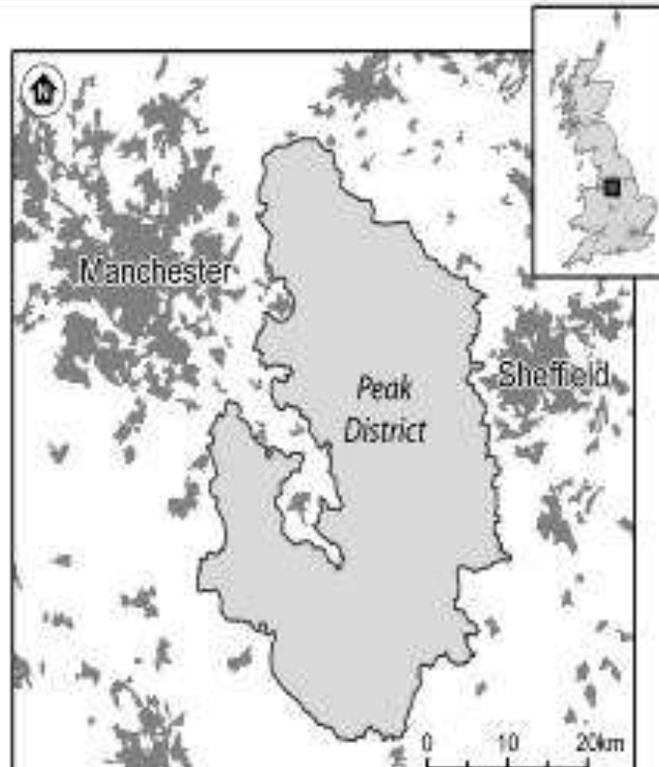
Although mass participation in outdoor activities such as hill walking and cycling grew strongly during the interwar period, a mass market did not result because incomes were low. A range of forces, including increasing leisure time, greater mobility, and changing access laws, made outdoor activities more popular. The first ascent of Everest, in 1953, made mountaineering more visible. John Hunt provided a vital boost to outdoor education in the United Kingdom. The outdoor education centers became a crucial bulk market for U.K. outdoor companies in the 1960s and 1970s. Demand continued to rise in the 1970s and 1980s, bolstered by the development of activities such as backpacking, Scottish ice climbing, and skiing.³⁸ Rising demand created growing opportunities for innovative outdoor companies; this became inseparable from the changing needs of a new type of user. The Peak District (see Figure 6) was the heart of the growth of urban climbing and outdoor activity and was crucial to lead-user innovation and design after the Second World War.

The Derbyshire Peak District, with its proximity to Manchester and Sheffield, became increasingly popular with urban, working-class, and lower-middle-class dwellers during the interwar period. On a typical weekend in 1931, ten thousand walkers visited Derbyshire, mainly from the neighboring conurbations. Many became involved in the access movement and the Mass Trespass of 1932. British mountaineering had its origins in the nineteenth century among the moneyed, public school–

³⁷ Robert Burns, “Everest Equipment,” *Rucksack Journal* (1933), 259.

³⁸ John Hunt, *Life Is Meeting* (Newton Abbot, 1978); Jeff Connor, *Creagh Dhu Climber: The Life and Times of John Cunningham* (Glasgow, 1999).

FIGURE 6
Location of the Peak District between Manchester and Sheffield



Source: Commissioned by the authors for Mary Rose, Terence Love, and Mike Parsons, “Path Dependent Foundation of Global Design-driven Outdoor Trade in NW of England,” *International Journal of Design* 1 (Dec. 2007).

educated professional elite. It was this elite who contributed to the interwar popularity and, indeed, to the 1953 Everest expedition. The Peak climbers were a new breed who pursued very different “rules of the game” and who had different knowledge and skills. The slump devastated industries such as cotton and steel during the interwar period and led to a sharp rise in unemployment in both Manchester and Sheffield. Many flocked to the gritstone edges of the Peak District:

Peakland mountaineering did not share the upper class origins of the sport elsewhere in Britain and the district surrounded by the great industrial masses of Sheffield, Nottingham, Derby, the Potteries and Manchester and its neighbours has been primarily a working-man’s playground, while Wasdale and Ogwen remained for a long time in the leisured atmosphere of the traditional climbing families and their friends, there grew up in the Peak

District an independent tradition of hard walking and hard climbing that owed little to external influence.³⁹

After the Second World War, this group emerged at the leading edge of British climbing; they formed the crucial bridge between regionally based industrial skills and the design of innovative outdoor products. The emergence of this new group of climbers altered the profile of British climbing and influenced equipment development fundamentally. The Peak District climbers shared the outlook and background of Continental climbers who, in the late nineteenth and early twentieth centuries, had developed technical rock-climbing in both the Western and Eastern Alps.⁴⁰

In the Alps, the combination of industrial, practical, and climbing knowledge influenced innovative design of mountaineering hardware and other equipment. The areas bordering the Peak District replicated this trend.⁴¹ The emergence of communities of practice, where lead-users innovate to meet their own personal needs, sometimes becoming lifestyle entrepreneurs, also occurs in other outdoor sports.⁴² What is significant, in the case of the emergence of the British outdoor trade, was the extent to which this activity mapped onto the region's industrial past. This manifested itself in a number of ways, including people who combined the knowledge of materials, manufacturing, and craft processes with the demands of sport.

Lead-user innovators are involved in the dance of two questions: What do we need? and What is possible? The combination of the knowledge of the capabilities of materials, industrial processes, and sporting needs was a creative mixture. It played a fundamental role in the innovation and design process in mountaineering and climbing equipment and in the raising of climbing standards in the United Kingdom from the 1950s onward. Being entirely separate, socially and geographically, from the traditions of British mountaineering, the working-class climbers did not know what they were not supposed to do.⁴³ However, they recognized that their gritstone rocks needed technical climbing equipment. In other words, the distinctive physical geography of the Peak differed from the Lake District and North Wales, where the mountaineering elite typically

³⁹ Eric Byne and Geoffrey Sutton, *High Peak: The Story of Walking and Climbing in the Peak District* (London, 1966), 29.

⁴⁰ Byne and Sutton, *High Peak*.

⁴¹ Parsons and Rose, *Invisible on Everest*; Mary Rose, Terence Love, and Mike Parsons, "Path Dependent Foundation of Global Design-driven Outdoor Trade in NW of England," *International Journal of Design* 1 (Dec. 2007): 57-68.

⁴² Shah, "Sources and Patterns of Innovation"; von Hippel, *Democratizing Innovation*.

⁴³ Joe Brown, *The Hard Years* (London, 1974).

climbed. This had a significant impact on equipment development after the Second World War.

U.K. textile-related equipment for climbing and mountaineering was well developed by the 1960s, and often many years in advance of that in continental Europe. Climbing hardware, on the other hand, was fifty years behind.⁴⁴ This resulted, in part, from the ethics of the British climbing establishment, which abhorred artificial aids. Another factor was the physical difference between most of the climbing areas favored by the British climbing establishment and the Eastern Alps with its big walls, where many of the major climbing hardware innovations originated. However, the creation of a new device, the nut, which did not damage the rock, had a lasting impact on the development of climbing hardware design in the United Kingdom. The device was called a nut simply because the initial inspiration was an engineer's nut with the thread removed.

The sporting origin of the removable nut, to replace the piton (which was left on the rock face), came from the British practice of threading the rope through a small rock that was naturally jammed in a crack. Many of the peak climbers worked in engineering workshops and collected Whitworth nuts, then filed the threads from the inside, threaded a nylon cord through them, and used them instead of stones. Climber John Brailsford, a one-time Sheffield steel apprentice and blacksmith, who by 1961 was working as a craft teacher in Derbyshire, made the first manufactured nut, the Acorn. Using aluminum die-casting, Brailsford went on to develop the much-improved MOAC nut, one of the crucial innovations on which the U.K. mountain hardware industry was based (see Figure 7). Brailsford was not the only innovator in U.K. mountain hardware, but he became a supporting master artisan for many who came later.⁴⁵ This, combined with his shift into outdoor education and, later, mountain guiding, meant his knowledge had a disproportionate impact on developments in the 1960s and 1970s.

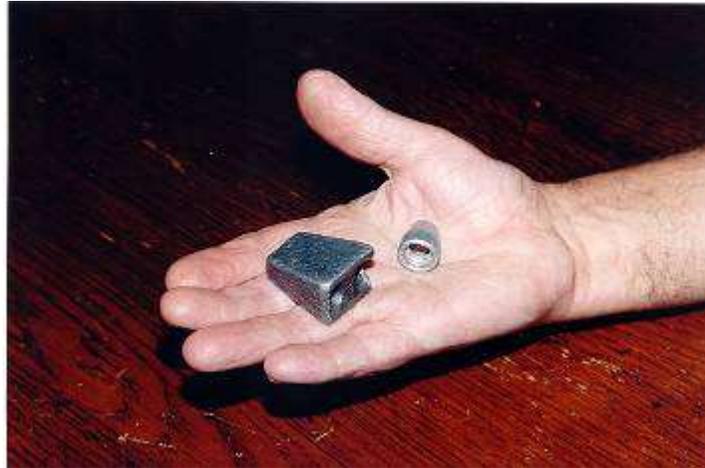
The nut was initially sand-cast, but once the concept was established, many different lead users and lead-user manufacturers explored the "design space" to use a variety of different production techniques, from extrusion to forging to die-casting. As has been the case in other sports, a few, new small lead-user entrants into manufacturing subsequently developed companies with a worldwide reputation.⁴⁶

⁴⁴ Parsons and Rose, *Invisible on Everest*.

⁴⁵ John Brailsford, interview with Mike Parsons, Aug. 2001.

⁴⁶ Shah, "Sources and Patterns of Innovation."

FIGURE 7
The MOAC Acorn Design, Based on an Engineering Nut



Source: Authors' personal collection.

The physical environment around their companies was very important to the founders, however. It meant they were able to climb in evenings, rather than waiting until the traditional free time of weekends. The interplay between practical manufacturing knowledge, artisanship, and sport is not the only source of path dependence of design in U.K. outdoor products. The Peak District was the playground of outstanding working-class climbers who emerged as lead-user innovators. Of these, the best known were Don Whillans and Joe Brown, whose climbing expertise captured the nation's imagination during the 1950s and 1960s.

Intensely practical and trained as a plumber, Don Whillans had an “analytical attitude to gear” according to Pete Hutchinson, owner of Mountain Equipment. He was a typical lead-user designer, looking for the solutions to his own particular climbing needs.⁴⁷ His classic designs included the Whillans Box, a high-altitude tent developed for him by Karrimor, and the Whillans sit harness developed with Troll, both of key importance to his move into high-altitude climbing in the Himalayas in the 1960s.⁴⁸ Some lead users, like Whillans, were not remotely interested in the business side of innovation. The comparatively few who did attend to the business side were often life-style entrepreneurs, using their business

⁴⁷ Von Hippel, *Democratizing Innovation*.

⁴⁸ Parsons and Rose, *Invisible on Everest*.

to support their climbing. Joe Brown, the postwar working-class climber, was quite clear that for him climbing came before his business.⁴⁹

Some lead-user innovators have challenged established manufacturers in the outdoor trade over the last 150 years. Worldwide, these include Vitale Bramani, the Italian who developed the rubber Vibram sole in the 1930s; Yvon Chouinard, the Canadian founder of Chouinard Equipment and, in the 1970s, the international brand Patagonia.⁵⁰ In the United Kingdom, of course, a lead-user cooperative established the Camtor brand in the 1920s. Rab Carrington emerged in the 1970s as a leading-edge climber, with a reputation for hard, lightweight routes in the Alps, South America, and the Himalayas. In many ways, he shared a life-style entrepreneur's attitude to his business. When he started in 1981, he commented: "I was under the impression, when I went into business, that I would only have to work six months of the year, that I could have every summer off, but, unfortunately, that soon changed."⁵¹

Carrington was clear that his standing as a leading climber gave his Rab brand credibility, and his knowledge as a lead user informed his designs for sleeping bags and down clothing. This does not make him a lead-user innovator, as he developed none of his designs for his own use. However, his deep mountaineering knowledge and concern for functionality over style meant that his products were highly respected, and he overtook the U.K. market leader, Mountain Equipment, in 1992.⁵²

There were others, such as Tony Howard, one of the founders of Troll Products. He was a lead user, an innovator, and, subsequently, a manufacturer.⁵³ The company derived its name from the Troll Wall in Norway, climbed by Howard and his climbing partners in 1965.⁵⁴

Troll Products was located in a small wooden shed in Greenfield, West Yorkshire. Greenfield is a small, ex-textile town on the Lancashire side of the Pennines. Historically, its industrial significance lay in its location at the intersection of roads from Manchester to Huddersfield and Holmfirth, and the Huddersfield Narrows canal with its technologically impressive 5 km Standedge tunnel, which provided the key transport link across England from the Mersey to the Humber estuaries. Waist belts, Troll's first products, were a direct response to the technical climbing development taking place on Peak District gritstone from the 1950s on.

⁴⁹ Brown, *The Hard Years*.

⁵⁰ Yvon Chouinard, *Let My People Go Surfing: The Education of a Reluctant Businessman* (New York, 2005).

⁵¹ Rab Carrington, interview with Mary Rose, 11 May 2001.

⁵² Pete Hutchinson, Mountain Equipment founder, telephone conversation with Mary Rose, 10 May 2001.

⁵³ Tony Howard, interview with Mike Parsons, 14 Sept. 2001.

⁵⁴ *Ibid.*

The shift toward aided climbing meant that climbers were carrying more gear and were tying a rope around their waists. The waist belts replaced the rope and allowed them to carry more. The design of these simple belts was also linked to the decline of the textile industry: originally they were made of old leather belting from local textile mills, although later on they were made of nylon webbing.⁵⁵ By 1968, Troll Products' workshop comprised three small, interconnected sections, each about 8 feet (2.5 meters) square: office, machine shop, and store/polishing room. The business's products around 1968 were comprised of "chocks" (a wide range of metal wedges used in safety protection by climbers), etriers (short ladders for climbers made of nylon tape and stiffened with polystyrene cement), and cagoules (knee-length waterproof smocks made from polyurethane-coated nylon with stitched and glued seams). In 1969, Don Whillans approached Troll about the development of what became the sit-harness for high-altitude resting during climbs.

There were no sit-harnesses on the market and Don came up with the idea of a fabric seat linked into the waist belt. We played around with Don's idea and took the fabric out and replaced with web. Eventually we came up with the basic Whillans harness still using mill belting. Although it was initially slagged off by the journalists it took off and nothing replaced it until 1978.⁵⁶

During this period, the company did modify and improve the sit harness, but it became the dominant design internationally as well as in the United Kingdom. Troll and Karrimor, the rucksack manufacturers, were among the pioneer U.K. outdoor companies in the 1960s that worked with lead-user innovators, and they shared another characteristic. They were among the suppliers of Chris Bonington's 1970 expedition to Annapurna, an expedition that was a turning point for both British mountaineering and British outdoor companies. In climbing terms, Britain's new breed of climbers had further improved the techniques of big wall and technical climbing developed in continental Europe and America. However, the high-profile media coverage of the Annapurna expedition turned the suppliers into international brands overnight. In a retrospective interview, Tony Howard confirmed that he saw the Annapurna South Face as the key turning point for his company's development, because of the high profile of the sit harness in photographs, on TV, and in lectures.⁵⁷ This was not just publicity hype, however, as the sit harness was a breakthrough that brought a completely new level of safety and performance to climbing. Bonington described it as "an outstanding

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ Tony Lack, "Troll Safety Equipment," *Mountain Ear* (Jan. 1992).

success, for it enabled one to rest back in the seat while jumaring up snow slopes.”⁵⁸

Annapurna 1970 had a similar impact on Karrimor for rucksacks, the Whillans Box (the special aluminum-framed high-altitude tent designed to Whillans’ specifications and made by Karrimor using pack frame technology), and the Karrimat. So great was the level of publicity that the company struggled to keep up with demand.⁵⁹ Neither company could have survived long had their only market been for leading-edge climbing, however high profile. That market is tiny and some of the innovations, such as the Whillans Box, did not diffuse. But the expeditions enhanced the companies’ reputation for functionality and usability, crucial in the emerging bulk markets linked to outdoor education and backpacking during the 1970s.

Karrimor and Lead-User Innovation

Founded in 1946 as a cycle bag company, Karrimor emerged, by the 1970s, as the United Kingdom’s leading rucksack brand, securing 80 percent of the U.K. market and exporting 50 percent of its output.⁶⁰ The company developed a strong reputation for innovative products, derived in part from working with leading-edge sportspeople. As a supplier of major expeditions and an active outdoor sportsman, Mike Parsons was able to build strong relationships with many lead-user innovators, including Don Whillans, Joe Brown, Dougal Haston, Joe Tasker, Peter Boardman, Peter Habeler, Chris Bonington, John Cleare, and Alex Macintyre. One of his most promising relationships was with Alex Macintyre, who became a Karrimor technical advisor in the early 1980s.⁶¹ For Alex, going lightweight was less about weight than about commitment and a way of thinking:

Above all cunning is the lot of the Alpinist. The term “lightweight” is not enough to describe his activities for it encompasses a much wider brief than he entertains. The key to this Alpine Style is the intent with which the Alpinist approaches his proposed route, the intention to climb it in one single push without previous knowledge or camps placed prior to the final venture. The commitment is total, the calculations crucial, the freedom exhilarating and the weight of the sac still crippling!⁶²

⁵⁸ Chris Bonington, *Annapurna South Face* (London, 1971).

⁵⁹ Parsons and Rose, *Invisible on Everest*, 235-36.

⁶⁰ Mike Parsons and Mary Rose, “Communities of Knowledge: Entrepreneurship, Innovation and Networks in the British Outdoor Trade, 1960-1990,” *Business History* 46 (Oct. 2004): 609-39.

⁶¹ Doug Scott and Alex MacIntyre, *Shisha Pangma: The First Alpine-Style Ascent of the South West Face* (London, 1984).

⁶² Alex McIntyre, *Karrimor Technical Guide* (Accrington, England, 1983).

He climbed with great audacity and developed a completely new style and philosophy of Himalayan climbing. His dialogue with Mike Parsons began in the early 1980s, as he attempted ever more difficult routes. Mike gave him access to the development staff:

No-one else previously had ever had the ability to get stuck in, let alone willingness to do it. . . . Quickly he developed a very large 80 litre capacity or lightweight pack which we named the Mac pack. After several trips the pack became a well sought after requirement by many leading expeditions of different nationalities. The only problem being that they wanted them all giving and that there was no real commercial market for such product.⁶³

This, of course, can be the problem with lead-user innovation, when needs and uses are too extreme for the average user. However, the diffusion of innovation to a wider market is about imagination, adaptation, incremental innovation, and combinations of technologies and ideas. Sporting needs and technologies change, and one can combine knowledge developed in different sets of circumstances to develop innovations. This was the case with the understanding Parsons gained from Alex on the Mac Sac: “To date there is the possibility that this market will begin and some of the lessons I learned with Alex will be put into the new *OMM* [Original Mountain Marathon, Ltd.] lightweight pack range.”⁶⁴

Having worked with most of the top mountaineers of his generation, including Alex Macintyre, Parsons was clear how important this kind of interchange was to his ability to innovate. But the trauma of Alex’s death in 1982 left Parsons convinced that he had to move away from the kind of close individual relationship he had had with lead users. During the 1980s, he was also keen to build the scope of the company without losing touch with users, as so often happens when businesses grow. The best innovations often involve boundary crossing, and there is evidence in good sports innovation that the most innovative users are multisport.⁶⁵ Parsons’ own multisport activity placed him in a position to devise a “Think Tank” of lead users, including mountain photographers and polar explorers, as well as climbers and mountain guides. He met with them quarterly to brainstorm on product innovation. As he said:

I am not in that category myself [lead user] as you know, but did pride myself on having the widest spread of outdoor activity competence, there being few outdoor professionals even with my spread. It was probably for this reason that I ensured there was

⁶³ Mike Parsons e-mail to John Porter (Alex Macintyre’s climbing partner), April 2006.

⁶⁴ Ibid.

⁶⁵ Lüthje and Herstatt, “The Lead User Method.”

leading edge representation from almost all sports outdoor sports on my Think Tank.⁶⁶

Lead-User Outdoor Innovation in 2009

Lead-user innovation, derived from knowledge built from using, is becoming increasingly important in the twenty-first century. We have shown that, historically, lead users have played a vital role in innovation in outdoor products. In some cases, lead-user innovations such as the Whymper tent have emerged as dominant designs. In other cases lead-user innovators have adjusted and tinkered with their clothing and equipment to make it fit for their particular purpose. This incremental innovation often played a crucial role in the success of their chosen activity. This was undoubtedly easier in the nineteenth century. The industrial processes for the majority of outdoor products were craft-based. Users were, therefore, in a position either to make their own or to talk directly to an artisan who could make it for them.

As the scale and complexity of industrial production accelerated over the last century, users have found it harder to get hands-on experience to achieve whatever innovations they wish to make. In addition, the spread of offshore manufacturing since the 1980s has created a physical gap between designers and manufacturers. For knowledge, as opposed to physical products, however, researchers have demonstrated that the accessibility of Open Source software has led innovation to shift to individual users and user communities.⁶⁷ With physical products, lighter-weight materials have made customization easier, whereas the Internet has enhanced information-exchange within user communities and between users and businesses.

Mike Parsons' business, OMM, Ltd., illustrates this, where lightweight products, fabrics, and components make it easy for users to customize their clothing and equipment. Indeed, the very philosophy of the brand is flexibility and customization, with users making decisions about what they need for a particular activity. Parsons has designed the OMM product platform to meet a range of specialist markets, including adventure racing, climbing, and mountain backpacking. Users share a need for lightweight products, but require differing weights and functionality. Designed for customization by the user, the equipment can be stripped down to the "leanweight." Unusual among outdoor manufacturers, the OMM Product Manual encourages customization, while the [OMM Website](http://www.theomm.com/products/keyFunctions.html) illustrates how to strip down and customize each pack: <http://www.theomm.com/products/keyFunctions.html> (see Figure 8).

⁶⁶ E-mail from Mike Parsons to Mary Rose, 8 May 2001.

⁶⁷ Von Hippel, *Democratizing Innovation*.

FIGURE 8
Mike Parsons at Friedrichshafen Outdoor Show, July 2006



On right is the Mountain Mover 55 pack, showing how it can be customized by users.

Source: Personal collection and OMM website.

By actively encouraging customization and lead-user innovation, Parsons is able to reinforce knowledge-exchange relationships with his lead-user customers. This close user contact, in turn, helps him develop new gear, as he commented recently on ideas sent by one lead user: “Gives me much food for thought as we are looking ahead now. . . . there is always something in looking at what keen users want to do to customise and indeed that’s the source of some of my ideas so far; interpreted of course.”⁶⁸

Since the nineteenth-century origins of mountaineering and outdoor activity, communities of users have shared knowledge. Modern Internet communications, including Web forums, shared social Web space, and blogging, widen awareness of what people use and how they adapt it. There is, of course, a wide variation in the quality of knowledge shared and the potential insights gained. At the very least, however, these sources, centered on a range of specialist sites, give insight into what is going on, is in use, and has been adapted.

For a micro-business such as OMM, engagement through the open-source collaborative space Google Groups since 2007 has created an online multi-sport lead-user group of fourteen members spanning climbing,

⁶⁸ E-mail from Mike Parsons to Mary Rose, 8 May 2001.

mountaineering, adventure racing, fell running, orienteering, and mountain-biking. Some of these were self-selected, some were invited to join, and all are actively involved at the highest level of outdoor activity and in adapting their own equipment to meet their specific needs. This group of people meets physically infrequently, but they display a community of shared practice, trust, and knowledge similar to that of the climbing teams we have discussed. Their sustained interaction with each other and business owner Mike Parsons has led to far more than simple incremental innovation. The knowledge shared reduced the development time for a new product range from eighteen months to just nine months in 2008/9.

Conclusions

Our 150-year overview demonstrates the importance of lead-user innovation in U.K. outdoor products. We have shown that users operating at the leading edge of their sport, not companies, developed a number of major innovations. Mountaineers had little alternative in the nineteenth century; their sport was new, and there were no specialist suppliers. They had to innovate because established U.K. craft suppliers did not meet their needs. Development of craft-based products occurred through face-to-face dialogue informed by use.

Lead-user innovators such as Edward Whymper, Francis Fox Tuckett, and Fred Mummery designed prototypes, and usage encouraged further incremental innovation. While none of these men ran outdoor businesses, their innovations all emerged as the dominant design for their particular product category. These men were part of a small group of climbers, centered on the Alpine Club, where they exchanged knowledge and experience through the club journal, meetings, and, crucially, shared experience. Changes in both manufacturing and distribution meant that these designs reached a wider audience. Nevertheless, the U.K. climbing community was tiny until after the Second World War, and nothing resembling a modern outdoor trade existed. Mountaineers were not the only lead-user innovators in outdoor sports before the First World War. Sports such as cycle and canoe camping witnessed similar levels of user knowledge and innovation. Innovation by users remains embedded in the culture of self-propelled camping to the present day.

The ability of lead users to innovate is based on the knowledge that comes from practical use and need. Belonging to a close community of practice makes it easier to exchange and understand knowledge, and often enhances it. Some communities of practice, like any networks, become inward-looking; this happened in the U.K. climbing community from the late nineteenth century to the Second World War. The overlap of knowledge and communities of practice in Britain's declining industrial regions with a new generation of postwar climbers shaped innovation in U.K. outdoor products from the 1960s to the 1990s.

If relatively few lead-user innovators set up leading outdoor brands, we should not conclude that lead-user innovation has little business significance. Lead-user innovation involves innovating ahead of market trends. Certainly, some innovations designed for extremes, such as the Whillans Box, do not have commercial potential. Our evidence demonstrates, however, that many lead-user innovations do diffuse within the market. In addition, we have shown that the knowledge derived from developing leading-edge products informs product development at all levels by improving quality. Collaboration between established companies and lead users undoubtedly brings benefits to the established company in future product development. Innovating entrepreneurs are engaged in a dynamic dance of two questions: What is needed? and What is possible? Collaborating with lead users can enhance both elements of that dance. One of the keys to successful relationships between lead users and established businesses lies in shared understanding. If relatively few lead users founded successful businesses, skilled users have set up many outdoor businesses. They are close enough to their lead users to appreciate their needs and to identify how to combine them with what is possible.

Lead-user innovation is not just about product development by consumers, however. Maintaining competitive advantage depends on productivity growth through process innovation. Lead-user innovation by industrial companies solving machinery needs can allow the manufacture of new products or facilitate process innovation. Though it is likely to be especially important in new and emerging industrial sectors, solving needs through innovation and customization remains crucial in any intensely competitive market.

The implications for businesses engaging with lead-user innovators go beyond product development to embrace the wider diffusion of innovation. The position of lead users as early adopters, whose needs typically pre-date that of the normal user by five years, makes them important for businesses' first mover advantage. It also makes them "trusted" champions of products, which can encourage the early majority to try a new product.⁶⁹ Where lead users represent a range of activities, they bring the potential for combining skills and knowledge, leading, perhaps, to disruptive innovation.

We have shown that lead-user innovation has been very strong in the development of outdoor products in the United Kingdom for 150 years. There have been successive waves of lead-user innovation, linked to new (and old) technologies and sporting development. The long-term perspective demonstrates that, through time, there have been shifts in the role, impact, and behavior of lead-user innovation in outdoor sports. We have concentrated on the U.K. experience, with only passing attention to

⁶⁹ Everett Rogers, *Diffusion of Innovations*, 3d. ed. (New York, 1983).

an international perspective. We have also highlighted the importance of shared communities of practice for lead-user innovation, within and between sport and business. Innovation tends to occur at the interstices of communities of practice, which bring the opportunities for boundary crossing. The breaking down of geographic barriers in mountaineering and business since the Second World War provided the opportunity for both sporting and design boundary crossing. Future research will explore international patterns in lead-user innovation, where geographical, sporting, and skill differences have contributed to shifting waves of lead-user innovation in down clothing, footwear, crampons, and mountain hardware, especially during the twentieth century.