

PULLING STRINGS

HOW USERS CAN SHAPE INNOVATION

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- Engaging customers in product design can deliver big rewards if done right

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USERS OF PRODUCTS HAVE

long been recognised as sources of innovation. Take the 34th America's Cup, for example, where users (sailors) worked closely with shipbuilders to develop the AC72 wing-sail catamarans needed for the competition. The user-innovation principle provides useful methods for firms to engage, access, and tap user-driven and user-created innovations. New Zealand firms operating in traditional industries, including automotive, food, forestry, fishing, textiles, and construction materials, have long used this principle in their innovation processes. It is now time for these industries to better understand the methods and practical implications of adopting user-innovation in their innovation processes.

ESTER TONGS (ALL ILLUSTRATIONS)



INNOVATION IS A SYSTEMATIC AND DELIBERATE PROCESS OF COMBINING AND RECOMBINING DIVERSE RESOURCES AND COMPETENCIES TO CREATE INNOVATIVE OUTCOMES.

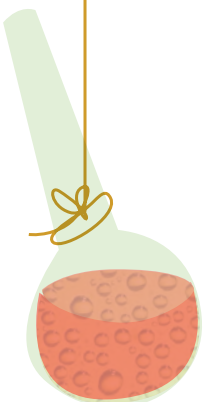
Conventionally, innovation is viewed as a closed and linear process, where a firm's research and development (R&D) efforts are focused on developing and pushing new products and services to meet perceived market needs. Customers are normally involved in testing new products, or to provide feedback for improvements on existing products. Customers usually play, at most, a peripheral role in the actual research and development stages of the innovation process. This is especially so in more traditional industries, such as agriculture, manufacturing, and construction. However, anecdotal and empirical evidence shows that more distributed and collaborative innovation processes now punctuate this model of innovation, with an increasing number of firms actively seeking diverse sources of knowledge in all stages of their innovation activities. In the mid-1970s, Professor Eric von Hippel of Massachusetts Institute of Technology (MIT) observed an interesting anomaly in the scientific instrument sector and found instances where users of scientific instruments frequently invented, prototyped, and tested the instruments before passing them on to the manufacturer for refinement and production. The findings sparked a stream of research into what is now termed "user innovation". Today, firms from diverse industries, including textiles, industrial products, and automotive, are utilising various tools and methods to engage users in all stages of the innovation process.

The adoption of distributed innovation processes is gaining traction in many developed economies because firms are finding conventional ways of innovating insufficient to navigate through a globalised and fast-paced market. New Zealand-based firms – especially those in traditional industries – are not exempted from this development, and having a more user-centric view, and adopting relevant user innovation methods and processes, could set them on a path of reduced wastage and more competitive, market-relevant products. But before delving into an explanation of the various user innovation methods, it is important to first explain what user innovation is and how it differs from conventional technology-push and market-pull innovation models.

WHAT IS USER INNOVATION?

"User innovation" is an umbrella term used to define innovations driven or created by users. Professor Nikolaus Franke summarised it succinctly in the 2013 edition of the *Oxford Handbook of Innovation Management*, defining user innovation as an innovation driven or created by those who will benefit from using it. Users in this context could be intermediate- or end-users of a firm's products and services. They are not restricted to individuals, but may include other firms – especially in business-to-business markets. A group of users worth mentioning is lead-users. Lead-users have advanced, latent needs beyond the current market, which increases the radicalness and novelty of their innovations. Working with lead-users is likely to provide firms with radical innovations, as illustrated in the user innovation initiative at 3M described below.

In the late 1990s, the product development team at 3M was tasked with developing an innovative disposable surgical drape to prevent the spread of infectious diseases in the surgical room. 3M worked closely with medical professionals in less than ideal environments to understand the problems associated with stopping the spread of infectious diseases. Then, the team identified innovators at the leading edge of the trend toward cheaper and more effective infection control. Surprisingly, such innovators were found in fields outside human medical surgery, such as veterinary hospitals and even film-making. Working with these users not only allowed 3M to develop new product lines, but also to identify a breakthrough approach to infection control. The rest as they say is history, and today 3M has a suite of solutions for infection prevention in its health care market segment. A key take-away from the 3M case is that successful implementation of user innovation methods and processes relies heavily on identifying users with the right skills and knowledge. 3M identified two main groups to work with throughout the product development stages: users operating in adverse conditions; and users at the forefront of the trend but located in other industries. Working closely with these two groups enabled 3M to see the big picture of what was needed.



Being users of the product, they have intimate knowledge about how and why the product works to meet users' needs.

Identifying the right users is only part of what makes user innovation useful for 3M. Another feature that differentiates it from conventional technology-push or market-pull innovation is the involvement of users at very early stages of product development. Conventional technology-push innovation normally seeks user involvement from the prototyping or trial stages onward; while firms adopting a market-pull model will only strive to obtain inputs from past usage behaviours to predict future market needs. However, product developers at 3M were out observing users in the field when identifying the problem, and they continued to involve users at the development and trial stages of product development. This is significant, as 3M product developers were able to tap the tacit knowledge of diverse groups of users in various sectors, learn from them, and develop truly innovative products that served the different market needs.

Closer to home, New Zealand firms in traditional industries are also beginning to adopt user-innovation principles. Take the example of the ZAMMR handle. The handle was designed, prototyped, and tested by sharemilker Grant Pearce who needed a more durable product that allowed for easier set up of electric fences and gate breaks. The ZAMMR handle is now sold by Tru-Test as part of its electric fence products, and Pearce receives a royalty payment for each handle sold. Picking up the user-created ZAMMR handle, which complements its existing products, allows Tru-Test to concentrate its limited resources on core innovation problems.

WHY USERS INNOVATE

Von Hippel has proposed that users innovate because they have the necessary skills and knowledge to do so – including the know-how and know-why of a particular product or need. Being users of the product, they have intimate knowledge about how and why the product works to meet users' needs. While some information is explicit and easily observable by firms, other information – such as usage patterns and behaviours – is tacit. These skills and knowledge form the basis of von Hippel's "sticky information" argument, the logic of which is that, having the skills and knowledge, users will innovate because it is difficult to transfer their innovation-related skills and knowledge to producer firms. Neither firms nor users can easily download or upload the users' innovation-related skills and knowledge with the click of a button, especially the tacit components. According to von Hippel, this is one of the reasons why users innovate in the first place.

The second reason users innovate is that they will benefit from the innovation. According to Associate Professor Marcel Bogers of the University of Southern Denmark and his co-researchers, the benefits that users receive from innovating are twofold. Users innovate because they will benefit from using the innovation, especially if it solves a problem that existing products have failed to meet. They may also reap monetary benefits – for example, as a result of selling a user-created innovation to other users.

METHODS FOR USER INNOVATION

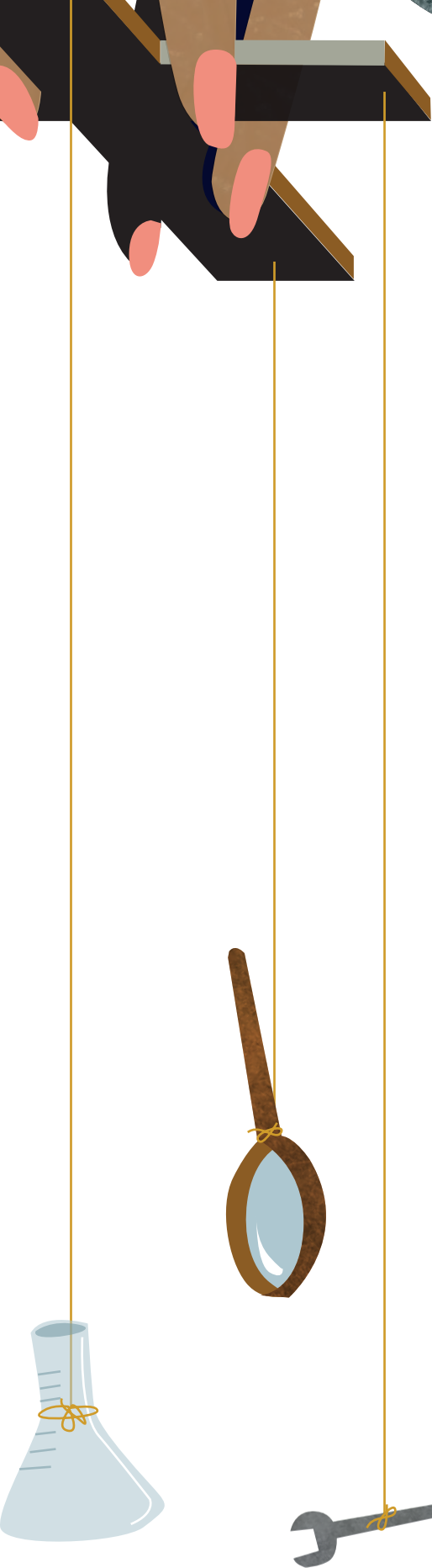
There are three approaches that firms could adopt to engage users in their innovation processes.

LEAD-USER METHOD

Lead-users are important sources of innovation for firms. The lead-user method enables firms to systematically search for user innovations and breakthrough opportunities. First introduced by MIT Professors Glen Urban and Eric von Hippel, the lead-user method has four phases: 1) Specifying lead-user indicators; 2) Identifying the lead-user group; 3) Generating the concept with lead-users; and 4) Trialling the concept.

In Phase 1, firms need to grasp the existing market or technological trend to determine the attributes that distinguish lead-users from ordinary users. Next, they must define the measures used to assess the benefits that lead-users would expect as a result of solving a specific need. Firms can use three indicators to measure the level of expected benefits: 1) Evidence of user product development or modification; 2) Dissatisfaction with existing products; and 3) Speed of innovation adoption. In Phase 2, firms could utilise the metrics developed in Phase 1 to identify lead-user groups or subgroups that are relevant for the innovation problem at hand via tools such as a questionnaire. Phase 3 involves working closely with the selected lead-users to derive product concepts and prototypes for testing. Face-to-face sessions and workshops ensures maximum interaction with, and between, lead-users to create an innovative and viable product concept. In Phase 4, the concept is tested on ordinary users in the target market. As lead-users have needs beyond the existing market, testing among ordinary users will predict the acceptance and usefulness of the product concept to the general market.





The Danish toy manufacturer Lego offers a useful illustration of the lead-user approach. Lego works closely with lead-users to develop and improve its Mindstorm range of products. The company harnesses lead-users to develop and test new products by including them at the various stages of the innovation process. Although Lego operates in a traditional industry – toy manufacturing – it has successfully adopted user innovation. The results are evident; in addition to manufacturing Lego sets, the company runs theme parks and produces animated movies.

TOOLKITS

Toolkits are essential tools that firms offer to users, enabling them to design products according to their personal preferences. Toolkits usually take the form of software or online-based platforms that allow users to visually design their own products and provide instant feedback during the design process. Using toolkits, firms outsource product design and focus instead on the manufacturing process. While users are rarely given absolute freedom, toolkits allow for product customisation within acceptable parameters. A good example is the jewellery sector, where online toolkits such as Ponoko and Shapeways allow users to design jewellery and other products through 3D modelling. Throughout the design process, users can obtain instant visual feedback on how the design fits the user's preferences and the producer's manufacturing limitations. Designs that conform to acceptable production parameters can then be produced and shipped to users.

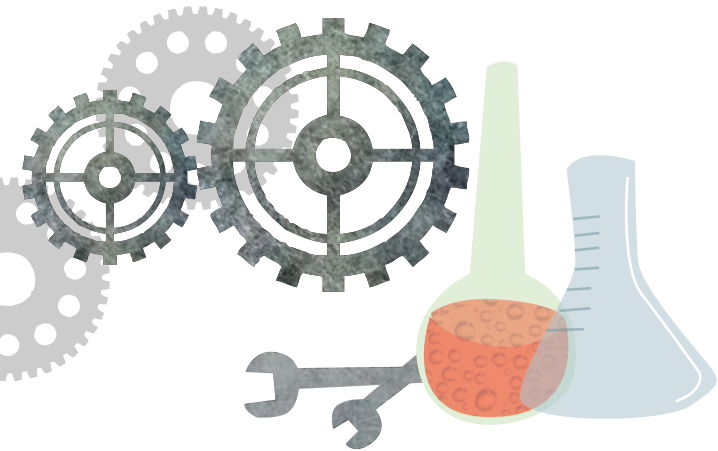
Swedish furniture-maker Ikea offers an online toolkit called Home Planner. Home Planner allows users to design a complete kitchen – from cabinet choice to preferred appliances. While the choices are limited to the company's wide range of kitchen products, Home Planner provides users with an instant 3D visualisation of how the selected kitchen would look before they place an order for delivery and installation. Thus, by avoiding the impossible task of designing unlimited kitchen configurations, Ikea is able to innovate in other ways, such as by creating breakthrough modular products, improving its processes, and focussing on designing furniture solutions.

CROWDSOURCING

The idea of crowdsourcing is to harness the skills and knowledge of the “crowd” to obtain the best solutions to innovation problems. Crowds are valuable because they comprise contributors with a wider range of skill sets, perspectives, and solutions heuristics than employees in



the firm. Crowdsourcing is particularly useful when the problem is ill-defined, ambiguous, and requires substantial creativity to solve. Crowdsourcing the solutions for such problems allow firms to tap a wide array of contributors who compete to have their solution adopted. Utilising crowdsourcing requires firms to go through the following steps: 1) Identify the innovation problem; 2) Broadcast the problem to source solutions; 3) Evaluate submissions; 4) Reward the winning contributors and adopt their solution. A recent example of crowdsourcing in New Zealand is life insurance company Sovereign Assurance’s “Be the difference challenge”. The online crowdsourcing platform aims to generate innovative ideas, solutions, and concepts to improve the wellbeing of New Zealanders. In return, Sovereign is offering scholarships worth \$5,000 each to five winning ideas or solutions in the innovation contest.



USER INNOVATION IN
TRADITIONAL INDUSTRIES

PRACTICAL IMPLICATIONS

Just because some firms are adopting user innovation, does not mean that other firms should rush to implement it with the hope of obtaining innovations for free. There are still practical issues to be considered, such as the innovation problem, intellectual property (IP) rights, and the internal organisation of the firm.

Specifically:

- The methods mentioned above are not mutually exclusive. Firms can adopt a combination of them.
- The choice of whether user innovation is appropriate largely depends on the innovation problem that the firm is trying to solve.
- Firms can follow two basic principles: 1) If the innovation problem is multifaceted and ambiguous, firms are better-off harnessing the power of crowdsourcing which will increase the range of ideas and solutions likely to be received; 2) If the innovation problem and expected user benefits arising from its solution are well-defined, then the lead-user method will enable firms to access radical ideas and product concepts.
- Firms need to assess the expected value of the user innovation. If it forms a core product or technology, the firm might consider taking the time to transfer

the IP through lengthy documentation and procedures. However, if the user innovation complements or is an add-on to existing products, then the licensing option would be more realistic.

- A bureaucratic structure is unlikely to foster the external sourcing of user innovations because the red-tape will subject staff to intense rules and procedures in order to steer radical, external ideas or solutions through the heavily-regulated organisational channels.
- Firms can always facilitate user innovation through better communication channels (such as that between front-line and research departments) to ensure that user inputs are communicated clearly. Better communication channels also allow for better inter-departmental collaborations when needed. Practices that reward staff for successfully

commercialising innovative user ideas and solutions also send clear signals to staff and act as incentives for them to work more closely with users.

Firms need to understand that there is no one-size-fits-all method, and that employing user innovation requires them to first understand the innovation problem and IP issues before choosing their user-innovation method or mix of methods to employ. Many firms exploiting user innovation ask the users involved to relinquish all IP rights to the ideas or solutions that they created. But the difficulty of transferring these IP rights might not be worthwhile if the user-created innovation only solves a minor innovation problem. Taking into account the problem will enable firms to choose the most appropriate user innovation method(s) which, in turn, affects how IP rights should be managed. ■



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KEY TAKE-OUTS

- Overseas firms in traditional industries have been adopting user-innovation principles for years, and New Zealand-based firms are beginning to do the same.
- The most appropriate user-innovation method depends on the type of problem that needs solving.
- Firms need to ensure that the intellectual property of user-driven innovations is managed accordingly, whether through buy-out or licensing arrangements.
- To succeed, firms need conducive organisational structures and complementary practices that facilitate access and transfer of user-driven innovations.

IRRIGATION SYSTEMS are essential for dairy farming. The uniqueness and harsh conditions of New Zealand dairying increase the need for firms to harness innovations created by farmers. There are instances where lead-users – innovative farmers – install unique configurations of existing irrigation equipment to increase efficiency. Industry organisation DairyNZ understands the importance of these user-created configurations. Rather than ignore innovative practices and compete with lead-users to devise better irrigation systems, DairyNZ decided instead to work closely with them to develop best practices that could be adopted by the wider dairy-farming community – a process that perfectly illustrates user innovation.