Innovation Process Benefits: The Journey as Reward

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WHEN BUSINESS EXECUTIVES and economists think about whether developing an innovation will be worthwhile, they tend to focus on the economic value of the outcome of the innovation process. “Will we earn enough profit from using or selling X innovation to justify the money and time required to develop it?” is, in effect, the question they ask.

However, that standard cost-benefit assessment is seriously incomplete when applied to individual innovators. These individuals can gain significant benefits from participation in a development process as well as — or even instead of — benefits from using or selling the innovation created. When innovation project sponsors can offer volunteer innovators such benefits, the net cost of those innovation projects can be much lower.

To understand this idea, consider the fact that innovation centrally involves problem solving. In other situations, problem solving is known to be valued by participants for the process itself. That is, people often engage in problem solving for the value of participating in the process — independent of any value derived from the solution found. Crossword puzzles provide a good example. Crossword aficionados can spend hours working hard to solve a crossword puzzle. Their reward is entirely in the fun of solving, not in the solution found. (After all, the solution is already known to the puzzle solver.)

THE LEADING QUESTION
What motivates individual volunteers to get involved in innovation projects?

FINDINGS

► Individuals can gain significant benefits from participating in an innovation process.

► Important examples of innovation process benefits include enjoyment, learning, and reputational gains.

► When innovation project sponsors can offer volunteer innovators such benefits, the net cost of innovation projects can be much lower.

Whitewater kayakers who developed novel kayaking equipment for their own use reported that their motivations included not only expected benefits from their innovation but also process-related motivations, such as enjoyment from creating the innovation.

Innovation Process Benefits: The Journey as Reward

Organizations can considerably amplify the resources available to their innovation projects — by helping volunteer innovators benefit from participating in the process.

BY CHRISTINA RAASCH AND ERIC VON HIPPEL
Leveraging External Innovation: Innovators’ Motivation

The Importance of Innovation Process Benefits

The mix of benefits experienced by people participating in innovation projects was first documented in research exploring the conundrum of why highly skilled computer programmers would voluntarily participate without pay in projects to create valuable open-source software. The benefit most frequently mentioned as important turned out to be the output benefit associated with the use of the software they were developing. In addition, however, process benefits such as fun and learning from the innovation activity of software coding turned out to be other important motivators.

To better quantify the importance of innovation-process-related motives relative to output motives, researchers have recently studied the range of motivations experienced by individuals who were creating or modifying consumer products to better fit their personal needs on their own and without being paid to do so — a group we call consumer-innovators. (See “About the Research.”)

A study in Finland asked a representative sample of individual consumer-innovators to divide into five categories their total motivation to develop a particular innovation. When we sort the five categories into output-related and process-related motives, we find that output-related motives that have to do with benefiting from the innovation itself (a combination of personal use and potential profit) represent 54% of consumer-innovators’ total motivation, on average. Process motives (enjoyment of and learning from participating in the innovation process and satisfaction derived from undertaking an effort to help others) account for 45% of their total motivation, on average.

A study of innovators in whitewater kayaking asked the same questions. Whitewater kayakers who reported developing novel kayaking equipment for their own use were asked to describe the relative importance to them of five possible motives for innovating by distributing 100 points across those five motives. The outcomes of that survey, focused on a narrow area of innovation, were similar to the outcomes of the broader survey of Finnish consumer-innovators. (See “What Motivates Consumer-Innovators.”) Output motives that have to do with profiting from creating the innovation (personal use and potential profit) represent 62% of the whitewater kayaking innovators’ total motivation, on average. Innovation process motives (enjoyment of and learning from participating in the innovation process and satisfaction from helping others) account for more than a third of their total motivation, on average.

Innovation Process Benefits as Sole Motivation

It is unsurprising that some fraction of the innovation motivation expressed by volunteer innovators in each of the surveys just described was the wish to use the innovation being created. The respondents,

ABOUT THE RESEARCH

To explore the scope of innovation by consumers, one of the authors took part in an earlier project developing a survey-based methodology that was implemented in multiple countries (U.K.: sample of 1,173 responding U.K. consumers; Japan: sample of 2,000; U.S.: sample of 1,992). The study of Finnish consumer-innovators, the results of which are presented in this article, is a new piece in this research stream. It is particularly suited to understand the relative importance of different motives to innovate and targeted questionnaire items to that purpose. An independent whitewater kayaking study asked the same questions regarding motivation of consumer-innovators participating in a single field of consumer product design activity.

The surveys were designed to cast a broad net to ensure that all innovations consumers had created were found — but also to capture information that would enable researchers to screen out all claimed innovations that were not real innovations. Each survey began by asking respondents whether they had developed or modified consumer products for themselves during the previous three years. When the answer was yes, the survey followed up with open-ended questions to obtain a detailed description of what they had done and why. These descriptions were then screened to identify and eliminate “false positives” — claimed innovations that were in fact not innovations. In effect, the surveys were designed to identify and explore only real, new-to-the-market innovations that consumers had developed in their leisure time.
after all, were selected to participate in the surveys because they are consumers who had created or modified products to meet their own needs. But in some cases, individuals who have no interest in the output being created can be induced to volunteer to participate in an innovation project solely for benefits related to participation in the innovation process. Consider the following two examples: Foldit and Swarovski.

Foldit is a project developed and sponsored by scientists from the University of Washington who are studying how proteins fold in nature. They use many specific protein-folding solutions as inputs to their research. Their idea was to seek volunteer help from “the crowd” to help them generate such solutions. Because there are not likely to be a lot of individual solvers who are users or sellers of protein-folding solutions, the scientists needed to attract participants with only innovation process rewards in mind. It was for this reason that they converted their problem into a form of game:

“To attract the widest possible audience for the game and encourage prolonged engagement, we designed the game so that the supported motivations and the reward structure are diverse, including short-term rewards (game score), long-term rewards (player status and rank), social praise (chats and forums), the ability to work individually or in a team, and the connection between the game and scientific outcomes.”

The Foldit game is difficult and requires online training sessions and materials before actual gameplaying can begin. Still, the scientists were successful in attracting many people to help with their project. For example, there were 46,000 Foldit gamers in 2011, voluntarily devoting leisure time to assist the scientists in their work. The work these individuals contributed was very valuable to the scientists, providing specific protein-folding solutions and also methodological insights that could be used to improve computerized folding algorithms.

The scientists conducted a small and fairly informal survey asking why contributors chose to participate in Foldit. Forty-eight players responded with up to three reasons each. Responses were categorized by three previously identified types of motivation to play online games — achievement, social and immersion motivations — plus an additional fourth category related to Foldit’s scientific purpose. Thirty percent of respondents reported

<table>
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<th>Output-related motivations:</th>
<th>FINISH CONSUMER-INNOVATORS (sample size = 176)</th>
<th>CONSUMER-INNOVATORS IN WHITENAS KAYAKING (sample size = 201)</th>
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<td>Expected benefits from using the innovation</td>
<td>51%</td>
<td>61%</td>
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<tr>
<td>Expected profit from selling the innovation</td>
<td>3%</td>
<td>1%</td>
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| Innovation-process-related motivations: | | |
|-----------------------------------------| | |
| Enjoyment from creating the innovation | 20% | 17% |
| Helping others (altruism) | 13% | 10% |
| Learning from creating the innovation | 12% | 8% |

| Other motivations | | |
|-------------------| | |
| 0% | 2% |

Data source: De Jong et al. Data source: Hienerth et al.
that immersion was important (for example, one
answered that “it is fun and relaxing”), 20% men-
tioned achievement (for example, “to get a higher
score than the next player”) and 10% mentioned
social benefits (such as “great camaraderie.”)¹³

Two things are striking about this example.
First, output-related motives, such as using the
solution oneself or wishing to sell it, are entirely
absent. Second, the output of the game does none-
theless play a motivating role. The motivator
described most often — noted in about 40% of re-
sponses — was a wish to make a personal effort to
support the overall purpose of the Foldit project.
For example, one participant indicated a desire to
help “to crack the protein folding code for science.”¹⁹

Many participants’ apparent strong interest in sup-
porting the overall purpose of the Foldit project,
independent of personal use or sale interests in the
output, suggests that in the competition for leisure-
time participants, games with a purpose in line
with volunteers’ general values or interests may
have a competitive advantage over games without
such a purpose.¹⁸

Swarovski, a producer of crystals, gemstones,
brooches, jewelry, and other products that is based in Watten,
Austria, is another organization that attracted indi-
viduals to participate in an innovation process.
The company sought to induce consumers to par-
ticipate in designing fashionable and creative new
jewelry. With the help of Hyve Innovation Com-
munity, a company that specializes in building
online problem-solving sites open to volunteers,
Swarovski in 2008 created a crowdsourcing site
offering participants nonmonetary benefits such
as the opportunity to develop and showcase their
own jewelry designs; to comment on and vote
on the designs of others; to upload avatars and
photos; and to be included as a trendsetter in a
book about trends in watch design.¹¹ The project
was successful: More than 1,700 participants up-
loaded more than 3,000 designs, many of very high
quality. Indeed, although not planned or an-
nounced during the project, some prizes were
presented afterwards to acknowledge especially
excellent contributions.¹²

Researcher Johann Füller surveyed contribu-
tors to 10 different virtual co-creation projects
hosted by Hyve for several companies, including
Swarovski. The projects ranged from the develop-
ment of a baby carriage and furniture to the design
of mobile phones, backpacks and jewelry. Füller
found that the contributors surveyed reported that
“intrinsic innovation interest” and curiosity were
the strongest motivators for their participation.
“In contrast to open source communities and user
innovations, where members engage in innovation
tasks because they can benefit from using their
innovation, consumers engage in [Hyve] virtual new
product developments mainly because they con-
sider the engagement as a rewarding experience,”
Füller wrote.¹³

Amplifying Innovation Efforts
We have now explained that there are three funda-
mental types of rewards from voluntary participation
in an innovation project. Two — rewards from
using or selling the innovation created — are
output-related benefits. The third type — often
neglected in the conventional economics of inno-
vation but, as we have seen, quite powerful — involves
process rewards obtained from participating in the
innovation process. Think of a triangle, where
participants motivated by only one of these three
types of motives reside at one of its three tips.
Those motivated by more than one of the three
fundamental types of motives are located along
an edge or at a position within the triangle that
reflects the particular proportion of motives they
experience. (See “Three Types of Motivation to
Innovate.”)

Suppose, for example, that an individual was
drawn to work on a project to develop a novel kayak
50% for the fun of it and 50% in order to obtain and

THREE TYPES OF MOTIVATION TO INNOVATE
Three fundamental types of mo-
tivations affect voluntary
participation in an innovation
project: use, sale and process
benefits. Participants motivated
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tal motivation types are located along an edge or at a position within the triangle that
reflects the particular proportion of motivation they experience.
use the novel kayak for himself. That person would probably consider it worthwhile to invest $1,000 of time and materials in a project that would create a kayak he valued at $500 — because he or she, in effect, consumed the other $500 in the form of fun.

What does this mean for researchers and businesspeople? Because people are willing to make valuable contributions to a project motivated partly or entirely by innovation process benefits, they gain by participation in the innovation development activity itself, a project sponsor can increase — “amplify” — the labor applied to the project, because he or she is not paying full price for the labor being supplied. (See “Amplifying Innovation Expenditures.”)

Implications for Innovation Project Sponsors

Innovation effort amplification as we have described here can be applied to any type of innovation project carried out by any type of project sponsor. Thus corporate projects like the Swarovski contest we described, community projects like Linux open-source software development and scientific projects like Foldit can all use these principles to increase the effort applied to their projects by volunteer contributors.

When project participants are partly rewarded by output — as they are in the consumer-innovation studies discussed in an earlier section — then recruitment efforts are necessarily restricted to people who have at least some level of desire for a kayak or LEGO design or whatever is the object of the project. Still, the nature of the output can be tailored to appeal to more or fewer users, depending upon the project specification. For example, a kayak so sophisticated that only a few will be able to use it will be appealing to fewer potential project participants — but perhaps more intensely appealing to those few — than a kayak potentially usable for a wider range of purposes.

If one adds potential project participants who are 100% rewarded by innovation process benefits, this may open a wider pool of potential volunteer participants; in such cases, innovation has become increasingly democratized. A caution, however: Potential project volunteers who are 100% rewarded by innovation process benefits may have reduced concern for the quality of the output they create, since they themselves do not have any use for that output. For example, if I am participating in a project to develop a novel kayak entirely for the fun of it, I may have no inherent interest in whether the design I create even floats — let alone whether it performs well.14 To deal with this, project sponsors must tie project participation rewards tightly to the quality of the output created, from the sponsoring organization’s perspective. For example, in the case of the Foldit project described earlier, players moved up in the game rankings only if their protein designs were judged to be of high quality.
LEVERAGING EXTERNAL INNOVATION: INNOVATORS’ MOTIVATION

quality by computerized tools developed by the researchers and incorporated into the game.

The motivational composition of the group of contributors will determine which tasks do or do not get done. Potential participants will be heterogeneous and particular with respect to the types of problem solving they enjoy. For example, engineers may be willing to join a kayak design project couched in terms of a rewarding engineering problem such as analyzing hull hydrodynamics to create the hull with the least resistance to passing through the water. Athletes may be attracted to a different aspect of the same project, such as: How can you descend a waterfall safely in a kayak with this hull design? Following this logic, the efforts of innovation-process-motivated contributors may be focused on some aspects of the project, while the efforts of output-motivated contributors may be focused on other aspects. This division of labor may well be desirable, and can even be promoted via intentional incentive design, since output-motivated contributors, particularly users, often have special knowledge of desirable innovation features that contributors motivated only by innovation process motives may lack. This suggests that output-motivated contributors should have a special role in shaping objectives and design specifications.

Finally, the role of paid R&D staff can be to solve those problems that otherwise would not get solved or would be more expensive to gamify and crowdsource than to pay for. Prior researchers have found that in software companies that work with open-source communities, it can be the task of paid employees of the software company to take care of the mundane and less appealing parts of programming and documentation such that the volunteer contributors get a rewarding, enjoyable experience. Thus a company using crowdsourcing in innovation can have two roles: gamifier and residual solver of problems not appealing to volunteers.

Implications for Research

From an organizational theory perspective, project sponsors can use different organizational forms to implement innovation amplification. Among them are crowdsourcing contests that rely on competition, communities that rely on collaboration, and single-solver forms in which every contributor simply enjoys puzzle-solving. Importantly, the chosen form can be expected to affect the motivational composition of the group of participants, which in turn can be expected to affect amplification success. Future research needs to explore the relationship between organizational forms and the motivation, preferences and performance of the population of problem solvers in more detail.

From a macroeconomic perspective, there has long been a fundamental assumption that an activity is labor (which economists assume to be arduous but productive) or leisure (which we think of as enjoyable but unproductive) — but not both at the same time. This premise has led directly to the conclusion that when people work less, value creation declines and GDP falls; in other words, society becomes poorer. However, if leisure can be productive, the trade-off is much softer than had been thought. We follow scholars such as Luis von Ahn, one of the founders of reCAPTCHA, and Clay Shirky, author of the book Cognitive Surplus: Creativity and Generosity in a Connected Age, in arguing that substantial amounts of leisure time can indeed be converted to productive use.

We conclude by noting that designing innovation projects with individual volunteers’ innovation process benefits in mind can amplify total investment in R&D and innovation in societies, by making it attractive for some consumers to devote some fraction of their leisure time to that purpose. The net effect is to make innovation cheaper from the societal perspective and also from the perspective of an innovation project sponsor. And the net
effect of that is that there will be more viable innovation opportunities and more innovation.

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