Paper Reading Class (Master): “Problem Solving and Open Innovation”
Summer Term 2015
(Blocked in first two weeks of the semester)

Course Description
In an era of vast technology improvements and open innovation, sourcing of external knowledge to solve problems has gained momentum. Consequently, interest in problem solving has increased enormously, making the crowd a viable source of knowledge. Crowd platforms such as Wikipedia, Innocentive and Threadless have emerged as approaches to problem solving that enable individuals and organizations to open up the innovation process beyond existing boundaries. However, despite the increasing attention these approaches have gained recently, not many problem solvers understand for what type of problems they can apply innovative approaches effectively.

The aim of this seminar is to introduce students to key concepts and challenges in the scholarly study of problem solving. Problem solving is a broad term, covering many disciplines such as decision making, organizational behavior, strategic management, and open innovation. In this seminar, we will focus on the relationship of problem solving and open innovation, which is relevant whether you are interested in problem solving per se or problem solving as a setting in which to study innovation-related issues such as crowdsourcing, idea selection and evaluation, individual and firm-based motives, and innovation success.

In this seminar we will explore concepts, theories, and arguments related to these topics. Students will be introduced to relevant and interesting papers that represent leading state-of-the-art research in the field. You will learn the central techniques that are helpful to read and critically discuss scientific articles. Additionally, you will get the chance to develop new ideas that have the potential for future research by formulating enhanced research questions and/or reflecting on theoretical and practical implications.

At the end of this seminar, you should be able to systematically read and understand scientific articles, reflect on them critically, communicate both verbally and in writing critical reviews, and propose research gaps and future research ideas in the fields of problem solving and open innovation.

Course Organization
This course will be taught in English, and students can gain 3 credits for successfully completing it. The course is open to all Master students who are enrolled in either one of the following programs at the University of Passau: MA Business Administration, MA International Economics and Business, MA International Cultural and Business Studies, or MA Wirtschaftsinformatik.

Questions regarding this course may be addressed to the class facilitator Sabrina Vieth (sabrina.vieth@uni-passau.de).
Application
Applications are accepted between 28th January and 2nd March, 2015. The application form is available via download from our website. Please hand in your application to Ulrike Ammer, Innstraße 27, Room 111. Alternatively, you can send your application via email to ulrike.ammer@uni-passau.de.
We will contact successful applicants on Tuesday (3rd March, 2015) via email. With this email, applicants are officially signed in for this seminar unless they immediately withdraw their application. Applicants who fail to hand in assignments will be given the grade 5.0 (fail).

Course Requirements

A. Class participation and interaction (20%)
This is a crucial part of your learning success. We expect you to read all papers on the reading list, and to be prepared and willing to discuss them in class. Good participation also includes asking original questions, making constructive comments, and having a positive attitude about learning.

B. Paper Review – Written work (50%)
You will be assigned one paper from the reading list for review (see list below). The list is structured by topics. We will try to match the papers based on your preferences. This assignment requires you to write a 7 page long review on the assigned paper, including a positioning of the paper within the respective research field, critical discussion of the theoretical framework, method and data, and assessment of its implementations. We will teach you the necessary methods and techniques needed for this assignment in our kick-off session.

C. Presentation (30%)
This will be the oral presentation of your review. We will arrange speaking slots which will cover each of the six general topics from the list below. For every slot, two students will present their reviews, with concluding discussions in the class room. Again, we will introduce you to the necessary techniques you will need to do so.

General Research Topics (see list below for respective articles)

1. The choice of governance form
2. The wisdom of crowds
3. Internal vs. external experts
4. Idea selection and evaluation
5. Characteristics, motivation and effectiveness of problem solvers
6. Openness and Performance
Reading List


1. The choice of governance form
     
     **Abstract.** Scholars have recently highlighted the promise of open innovation. In this paper, we treat open innovation—in its different forms and manifestations—as well as internal or closed innovation, as unique governance forms with different benefits and costs. We discuss how each governance form, whether open or closed, is composed of a set of instruments that access (a) different types of communication channels for knowledge sharing, (b) different types of incentives, and (c) different types of property rights for appropriating value from innovation. We focus on the innovation “problem” as the central unit of analysis, arguing for a match between problem types and governance forms, which vary from open to closed and which support alternative forms of solution search. In all, the goal of this paper is to provide a comparative framework for managing innovation, where we delineate and discuss four categories of open innovation governance forms (markets, partnerships, contests and tournaments and user or community innovation) and compare them with each other and with two internal or closed forms of innovation governance (authority and consensus-based hierarchy).

     
     **Abstract.** Open Innovation has been one of the most-debated topics in management research in the last decade. Although our understanding of this management paradigm has significantly improved over the last few years, a number of important questions are still unanswered. In particular, an issue that deserves further attention is the anatomy of the organizational change process through which a firm evolves from being a Closed to an Open Innovator. The paper represents a first step in overcoming this limitation. In particular, adopting a longitudinal, firm-level perspective, it addresses the following question: which changes in a firm’s organizational structures and management systems does the shift from Closed to Open Innovation entail? In answering this question, the paper uses established concepts in organizational change research to look into a rich empirical basis that documents the adoption of Open Innovation by four Italian firms operating in mature, asset-intensive industries. The results show that the journey from Closed to Open Innovation involves four main dimensions of the firm’s organization, i.e. inter-organizational networks, organizational structures, evaluation processes and knowledge management systems, along which change could be managed and stimulated.

     
     **Abstract.** External knowledge sourcing is increasingly important for corporate entrepreneurship. In this study, we examine the effect of external and relational uncertainty on the governance choice for inter-organizational technology sourcing. We develop a number of hypotheses about the impact of environmental turbulence, technological newness, technological distance and prior cooperation on the choice between different governance modes. Data about external technology sourcing transactions in the pharmaceutical industry do not provide evidence for a continuum from less to more integrated sourcing modes. However, we find that the ranking depends on the type of uncertainty, indicating that firms tackle different types of uncertainty with different governance modes.

2. The wisdom of crowds
     
     **Abstract.** Recent research has advanced our understanding of how people use the advice of others to update their beliefs. Because groups and teams play a significant role in organizations and collectively are wiser than their individual members, it is important to understand their influence on belief revision as well. I report the results of four studies examining intuitions about group wisdom and the informational influence of groups. In their overt assessments, experimental participants rated larger groups as more accurate than smaller groups and discriminated more between them when group size was salient. When provided advice, participants relied more on groups than individuals to update their beliefs, but were only modestly sensitive to group size. Most were suboptimal in the use of that advice, overweighting their initial beliefs and underweighting the more valid judgment of the group. Thus although acknowledged in principle, the wisdom of crowds is only shallowly manifest in observed behavior.

Abstract. Although researchers have documented many instances of crowd wisdom, it is important to know whether some kinds of judgments may lead the crowd astray, whether crowds’ judgments improve with feedback over time, and whether crowds’ judgments can be improved by changing the way judgments are elicited. We investigated these questions in a sports gambling context (predictions against point spreads) believed to elicit crowd wisdom. In a season-long experiment, fans wagered over $20,000 on NFL football predictions. Contrary to the wisdom-of-crowds hypothesis, faulty intuitions led the crowd to predict “favorites” more than “underdogs” against point spreads that disadvantaged favorites, even when bettors knew that the spreads disadvantaged favorites. Moreover, the bias increased over time, a result consistent with attributions for success and failure that rewarded intuitive choosing. However, when the crowd predicted game outcomes by estimating point differentials rather than by predicting against point spreads, its predictions were unbiased and wiser.


Abstract. In The Price Is Right game show, players compete to win a prize, by placing bids on its price. We ask whether it is possible to achieve a ‘wisdom of the crowd’ effect, by combining the bids to produce an aggregate price estimate that is superior to the estimates of individual players. Using data from the game show, we show that a wisdom of the crowd effect is possible, especially by using models of the decision-making processes involved in bidding. The key insight is that, because of the competitive nature of the game, what people bid is not necessarily the same as what they know. This means better estimates are formed by aggregating latent knowledge than by aggregating observed bids. We use our results to highlight the usefulness of models of cognition and decision-making in studying the wisdom of the crowd, which are often approached only from non-psychological statistical perspectives.

3. Internal vs. external experts


Abstract. Who provides better inputs to new product ideation tasks, problem solvers with expertise in the area for which new products are to be developed or problem solvers from “analogous” markets that are distant but share an analogous problem or need? Conventional wisdom appears to suggest that target market expertise is indispensable, which is why most managers searching for new ideas tend to stay within their own market context even when they do search outside their firms’ boundaries. However, in a unique symmetric experiment that isolates the effect of market origin, we find evidence for the opposite: Although solutions provided by problem solvers from analogous markets show lower potential for immediate use, they demonstrate substantially higher levels of novelty. Also, compared to established novelty drivers, this effect appears highly relevant from a managerial perspective: we find that including problem solvers from analogous markets versus the target market accounts for almost two-thirds of the well-known effect of involving lead users instead of average problem solvers. This effect is further amplified when the analogous distance between the markets increases, i.e., when searching in far versus near analogous markets. Finally, results indicate that the analogous market effect is particularly strong in the upper tail of the novelty distribution, which again underscores the effect’s practical importance. All of this suggests that it might pay to systematically search across firm-external sources of innovation that were formerly out of scope for most managers.


Abstract. Generating ideas for new products used to be the exclusive domain of marketers, engineers, and/or designers. Users have only recently been recognized as an alternative source of new product ideas. Whereas some have attributed great potential to outsourcing idea generation to the “crowd” of users (“crowdsourcing”), others have clearly been more skeptical. The authors join this debate by presenting a real-world comparison of ideas actually generated by a firm’s professionals with those generated by users in the course of an idea generation contest. Both professionals and users provided ideas to solve an effective and relevant problem in the consumer goods market for baby products. Executives from the underlying company evaluated all ideas (blind to their source) in terms of key quality dimensions including novelty, customer benefit, and feasibility. The study reveals that the crowdsourcing process generated user ideas that score significantly higher in terms of novelty and customer benefit, and somewhat lower in terms of feasibility. However, the average values for feasibility—in sharp contrast to novelty and customer benefit—tended to be relatively high overall, meaning that feasibility did not constitute a narrow bottleneck in this study. Even more interestingly, it is found that user ideas are placed more frequently than expected among the very best in terms of novelty and customer benefit. These findings, which are quite counterintuitive from the perspective of classic new product development (NPD) literature, suggest that, at least under certain conditions, crowdsourcing might constitute a promising method to gather user ideas that can complement those of a firm’s professionals at the idea generation stage in NPD.
4. Idea selection and evaluation


**Abstract.** We compare how people react to good ideas authored by internal rivals (employees at the same organization) versus external rivals (employees at a competitor organization). We hypothesize that internal and external rivals evoke contrasting kinds of threats. Specifically, using knowledge from an internal rival is difficult because it threatens the self and its competence: It is tantamount to being a “follower” and losing status relative to a direct competitor. By contrast, external rivals pose a lower threat to personal status, so people are more willing to use their knowledge. We conducted three studies. Study 1 showed that internal and external rivalry involved opposite relationships between threat and knowledge valuation: The more threat internal rivals provoked, the more people avoided their knowledge, whereas the more threat external rivals provoked, the more people pursued their knowledge. Study 2 explored the types of threat that insiders and outsiders evoked. In particular, people assumed that they would lose more personal status if they used an internal rival’s knowledge and, therefore, reduced their valuation of that knowledge. Finally, Study 3 found that self-affirmation attenuated these patterns. We suggest that the threats and opportunities for affirmation facing the self dictate how people respond to rivals and, ultimately, their willingness to value new ideas.


**Abstract.** In their search for innovation, organizations often invite external contributors to make suggestions. Soliciting suggestions is a form of distant search, since it allows organizations to tap into knowledge that may not reside within their organizational boundaries. Organizations engaging in distant search often face a large pool of suggestions, an outcome we refer to as crowding. When crowding occurs, organizations, whose attention is limited, can pay attention to only a subset of suggestions. Our core argument is that crowding narrows organizations’ attention; that is, despite organizations’ efforts to reach out to external contributors to access suggestions that capture distant knowledge, they are more likely to pay attention to suggestions that are familiar, not distant. We test our theory with a unique longitudinal dataset that captures how 922 organizations responded to 105,127 crowdsourced suggestions from external contributors. After distinguishing between three different dimensions of distance (content, structural and personal), we find that (1) all three types of distance have independent negative effects on the likelihood of attention; (2) crowding amplifies these negative effects; and (3) there are differences among the effects’ magnitudes. We elaborate on the broader implications of these findings for the literatures on attention, search, and crowdsourcing.


**Abstract.** Selecting among alternative projects is a core management task in all innovating organizations. In this paper, we focus on the evaluation of frontier scientific research projects. We argue that the intellectual distance between the knowledge embodied in research proposals and an evaluator’s own expertise systematically relates to the evaluations given. To estimate relationships, we designed and executed a grant proposal process at a leading research university in which we randomized the assignment of evaluators and proposals to generate 2,130 evaluator-proposal pairs. We find that evaluators systematically give lower scores to research proposals that are closer to their own areas of expertise and to those that are highly novel. The patterns are consistent with biases associated with boundedly rational evaluation of new ideas. The patterns are inconsistent with intellectual distance simply contributing “noise” or being associated with private interests of evaluators. We discuss implications for policy, managerial intervention and allocation of resources in the ongoing accumulation of scientific knowledge.


**Abstract.** Research on information processing, managerial cognition, and social networks demonstrates that people rely on other people for information. However, this work has not specified how seeking information from others results in actionable knowledge—knowledge directed at making progress on relatively short-term projects. This research employs both qualitative and quantitative methods to investigate how personal sources of information contribute to actionable knowledge. Our qualitative study found that people cultivate different kinds of information relationships that are the source of 5 components of actionable knowledge: (1) solutions (both know-what and know-how), (2) referrals (pointers to other people or databases), (3) problem reformulation, (4) validation, and (5) legitimation. Our quantitative study revealed that, while source expertise predicted receipt of these components of actionable knowledge, so too did expertise of the seeker and features of the relationship between the seeker and source. We draw implications from these findings for the study of social capital and organizational learning.
5. Characteristics, motivation and effectiveness of problem solvers


  Abstract. We examine who the winners are in science problem-solving contests characterized by open broadcast of problem information, self-selection of external solvers to discrete problems from the laboratories of large research and development intensive companies, and blind review of solution submissions. Analyzing a unique data set of 166 science challenges involving over 12,000 scientists revealed that technical and social marginality, being a source of different perspectives and heuristics, plays an important role in explaining individual success in problem solving. The provision of a winning solution was positively related to increasing distance between the solver’s field of technical expertise and the focal field of the problem. Female solvers—known to be in the “outer circle” of the scientific establishment—performed significantly better than men in developing successful solutions. Our findings contribute to the emerging literature on open and distributed innovation by demonstrating the value of openness, at least narrowly defined by disclosing problems, in removing barriers to entry to nonobvious individuals. We also contribute to the knowledge-based theory of the firm by showing the effectiveness of a market mechanism to draw out knowledge from diverse external sources to solve internal problems.


  Abstract. Economists studying innovation and technological change have made significant progress toward understanding firms’ profit incentives as drivers of innovation. However, innovative performance in firms should also depend heavily on the pecuniary and nonpecuniary motives of the employees actually working in research and development. Using data on more than 1,700 Ph.D. scientists and engineers, we examine the relationships between individuals’ motives (e.g., desire for intellectual challenge, income, or responsibility) and their innovative performance. We find that motives matter, but different motives have very different effects: Motives regarding intellectual challenge, independence, and money have a strong positive relationship with innovative output, whereas motives regarding job security and responsibility tend to have a negative relationship. We also explore possible mechanisms underlying the observed relationships between motives and performance. Although hours worked (quantity of effort) have a strong positive effect on performance, motives appear to affect innovative performance primarily via other dimensions of effort (character of effort). Finally, we find some evidence that the role of motives differs in upstream research versus downstream development.


  Abstract. Studies of the sources of innovations have recognized that many innovations are developed by users. However, the fact that firms employ communities of users to strengthen their innovation process has not yet received much attention. In online firm-hosted user communities, users freely reveal innovations to a firm’s product platform, which can put the firm in a favorable position (a) because these new product features become available to all users through sharing on a user-to-user basis, or (b) because it allows the firm to pick up the innovations and integrate them in future products and then benefit by selling them to all users. We study the key personal attributes of the individuals responsible for innovations, namely the innovative users, to explain creation of value in this organizational context. The main question is why such users contribute to firm-hosted user communities. Analyzing data derived from multiple sources (interviews, a Web-log, and questionnaires), we find that innovative users are likely to be (i) hobbyists, an attribute that can be assumed to (positively) affect innovators’ willingness to share innovations, and (ii) responsive to “firm recognition” as a motivating factor for undertaking innovation, which explains their decision to join the firm’s domain. In agreement with earlier studies, we also find that innovative users are likely to be “lead users,” an attribute that we assume to affect the quality of user innovation. Whether or not a firm-hosted user community can be turned into an asset for the firm is to a great extent conditional on the issues studied in this paper.

6. Openness and Performance


  Abstract. This article examines how the choice of governance mode for external R&D, along with openness to new ideas and codifiability of knowledge, affects R&D performance. Superior R&D performance is therefore viewed as arising through (a) the choice of approaches used by the firm to access knowledge from outside (university partnering, alliance partnering, and contracting), (b) the knowledge context of the firm (its openness to new ideas and the codifiability of its knowledge assets), and (c) the interactions between these two sets of factors. These arguments are tested, and mostly supported, using data on the R&D activities of 107 large firms based in the United Kingdom and Sweden.

Abstract. Openness and free information sharing amongst scientists are supposed to be core norms of the scientific community. However, many studies have shown that these norms are not universally followed. Lack of openness and transparency means that scientific problem solving is constrained to a few scientists who work in secret and who typically fail to leverage the entire accumulation of scientific knowledge available. We present evidence of the efficacy of problem solving when disclosing problem information. The method’s application to 166 discrete scientific problems from the research laboratories of 26 firms is illustrated. Problems were disclosed to over 80,000 independent scientists from over 150 countries. We show that disclosure of problem information to a large group of outside solvers is an effective means of solving scientific problems. The approach solved one-third of a sample of problems that large and well-known R & D-intensive firms had been unsuccessful in solving internally. Problem-solving success was found to be associated with the ability to attract specialized solvers with range of diverse scientific interests. Furthermore, successful solvers solved problems at the boundary or outside of their fields of expertise, indicating a transfer of knowledge from one field to others.


Abstract. Contests are a historically important and increasingly popular mechanism for encouraging innovation. A central concern in designing innovation contests is how many competitors to admit. Using a unique data set of 9,661 software contests, we provide evidence of two coexisting and opposing forces that operate when the number of competitors increases. Greater rivalry reduces the incentives of all competitors in a contest to exert effort and make investments. At the same time, adding competitors increases the likelihood that at least one competitor will find an extreme-value solution. We show that the effort-reducing effect of greater rivalry dominates for less uncertain problems, whereas the effect on the extreme value prevails for more uncertain problems. Adding competitors thus systematically increases overall contest performance for high-uncertainty problems. We also find that higher uncertainty reduces the negative effect of added competitors on incentives. Thus, uncertainty and the nature of the problem should be explicitly considered in the design of innovation tournaments. We explore the implications of our findings for the theory and practice of innovation contests.
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<th><strong>Application closing date</strong></th>
<th>Please submit to Ulrike Ammer, Innstr. 27, Raum 111 or <a href="mailto:ulrike.ammer@uni-passau.de">ulrike.ammer@uni-passau.de</a></th>
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<td>Introduction of reading list</td>
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<td>Assignments of topics and papers</td>
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<td>21/04/2015, 9:00 – 12:00</td>
<td>Asking questions and getting assistance from your supervisor.</td>
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<th><strong>Submission deadline for written paper review</strong></th>
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