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IMPLEMENTATION OF CROWDSOURCING INTO BUSINESS AND INNOVATION STRATEGIES: A CASE STUDY AT BOMBARDIER TRANSPORTATION, GERMANY

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IMPLEMENTATION OF CROWDSOURCING INTO BUSINESS AND INNOVATION STRATEGIES: A CASE STUDY AT BOMBARDIER TRANSPORTATION, GERMANY

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RÉSUMÉ

Le *crowdsourcing* regroupe un ensemble de nouvelles pratiques d'affaires touchant l'innovation et la collaboration. Il offre aux entreprises de multiples avantages, notamment l'évolutivité de la force de travail, la diversité des contributeurs provenant de l'externe (la « foule »), une variété d'idées nouvelles et des solutions rapides. Le crowdsourcing peut aussi entraîner d'impressionnantes économies pour les entreprises qui l'utilisent, de même qu'une visibilité accrue. De plus, comme le crowdsourcing favorise un contact étroit avec des clients potentiels, il peut offrir une meilleure lecture du marché et conséquemment, alimenter positivement les stratégies organisationnelles nécessaires à l'innovation.

Comme pratique d'innovation, le crowdsourcing a gagné en popularité au cours de la dernière décennie. Même s'il s'agit d'une tendance relativement récente, il a déjà reçu beaucoup d'attention de la part des chercheurs. La revue de la littérature réalisée dans ce projet de maîtrise révèle en effet que cette pratique est déjà utilisée dans plusieurs secteurs de l'industrie, bien que ce soit surtout le cas dans les industries de biens de consommation. Bien qu'enrichi de descriptions pertinentes liées au crowdsourcing, la littérature demeure relativement pauvre de données empiriques touchant l'impact de cette pratique sur les modèles d'affaires.

Dans ce contexte, l'objectif général de ce mémoire consiste à analyser la mise en œuvre du crowdsourcing comme stratégie d'innovation et d'affaires d'une entreprise réelle. Au vu des connaissances actuelles sur le crowdsourcing et des objectifs de la recherche, l'étude de cas qualitative, exploratoire et descriptive fut sélectionnée comme la principale stratégie de recherche. Plus précisément, le cas étudié (Bombardier Transportation) fut sélectionné dans une industrie de biens industriels, nommément l'industrie de l'équipement de transport ferroviaire. Cette société ayant mis en place trois initiatives de crowdsourcing depuis 2009, elle s'est avéré un choix pertinent pour répondre aux objectifs de recherche. Cette étude de cas vise également à examiner comment l'implantation du crowdsourcing peut influencer la culture organisationnelle d'une entreprise, d'analyser diverses décisions technologiques qui soutiennent la mise en œuvre du crowdsourcing, d'identifier les obstacles à la mise en œuvre, et de comprendre les limites de ce modèle.

Cette étude apporte une contribution importante aux connaissances actuelles sur le crowdsourcing en examinant son utilisation comme approche d'innovation et d'affaires dans un secteur encore

peu étudié. Plus spécifiquement, la recherche contribue au corpus théorique actuel en décrivant et en analysant trois initiatives réussies de crowdsourcing chez BT ; ces initiatives portent sur deux types de crowdsourcing (interne et externe) et dont les finalités diffèrent (créativité et résolution de problèmes). L'étude examine aussi l'impact réel de crowdsourcing sur l'entreprise et sur ses stratégies d'innovation.

En termes pratiques, cette étude peut s'avérer instructive et utile pour des gestionnaires qui envisageraient la mise en œuvre du crowdsourcing comme élément d'une stratégie d'innovation. En particulier pour les secteurs de biens industriels, le cas BT permet de comprendre les avantages et contraintes de telles pratiques au sein des organisations. Les résultats de cette étude et les analyses comparatives peuvent aussi aider les gestionnaires à identifier, réduire, atténuer ou éviter les effets négatifs et des pratiques inappropriées de crowdsourcing, tout en les aidant à atteindre leurs objectifs d'innovation et de collaboration d'une manière plus efficace et efficiente.

ABSTRACT

Crowdsourcing is an emerging model of collaboration and innovation. As such, it provides firms with multiple advantages, notably work force scalability, diversity of crowd workers, a variety of novel ideas, and rapid solutions. Moreover, crowdsourcing can result in impressive cost savings for businesses using this model. Firms also benefit from the additional publicity involved. In addition, because crowdsourcing provides firms with access to future customers, they can make more accurate market predictions and adjust their strategies to crowd expectations.

Crowdsourcing gained significant popularity during the last decade. Although it is a relatively new trend, it has already received attention in the literature. The literature review under this project revealed that crowdsourcing is used by firms operating in almost all industry sectors, but mostly by firms in the consumer goods industries.

Because the literature on crowdsourcing was sparse with respect to empirical evidence of the impact of crowdsourcing on firms' business and innovation strategies, the general objective of this study was to assess the impact of implementing crowdsourcing into the business and innovation strategies of a company. The research was also particularly aimed to study the implementation of crowdsourcing in a firm representing a non-consumer goods industry. Bombardier Transportation (BT), Germany was chosen because it met the criteria for selection of a firm for the case study, but also because the preliminary researches showed that this company had used both internal and external crowdsourcing for several innovation initiatives since 2009.The intention was also to examine whether or not crowdsourcing can change a firm's culture, to analyze the technological settings that support crowdsourcing, to identify obstacles to crowdsourcing implementation, and to understand the limitations of the model, and thus to contribute to the empirical knowledge on these topics.

Based on the research goals and the extent of the current knowledge on crowdsourcing, a qualitative, exploratory, and descriptive case study was deemed an appropriate research strategy. An inductive data analysis approach was used as it is not based on a pre-existing theoretical framework that shapes the research process. Instead, theories emerge in light of the collected data and the data analysis.

This study makes a substantial contribution to the theoretical knowledge on crowdsourcing by examining the use of crowdsourcing as a business and innovation approach in a non-consumer goods industry such as railway manufacturing. The research also contributes to the theoretical knowledge by describing and analyzing BT's three crowdsourced initiatives that present examples of successful implementation of crowdsourcing, including creative, problem-solving, and collaborative elements of both internal and external crowdsourcing. The study examines the real-life impact of crowdsourcing on a firm's business and innovation strategies in terms of strategic foundations, processes, and the business and innovation benefits.

In practical terms, the results of this study can help managers identify successful practices and processes for implementing both internal and external crowdsourcing as a firm innovation and collaboration method. Moreover, managers, especially those working in other or similar non-consumer goods industries, may be encouraged to give crowdsourcing a try, as they would be able to learn from the experience of a leading multinational organization, such as Bombardier Transportation. The study results and comparative analyses can also help managers identify, lessen, mitigate, or avoid the negative and non-constructive effects of inappropriate crowdsourcing practices, and can help them achieve their innovation and collaboration goals more efficiently and effectively.

CONDENSÉ EN FRANÇAIS

Le *crowdsourcing*[1] est un modèle de collaboration et d'innovation fondé sur l'usage intensif de technologies web, et qui offre aux entreprises la possibilité de recevoir beaucoup plus d'apports externes comparativement aux pratiques traditionnelles dites "fermées" où la plupart des idées innovantes proviendraient de l'interne, notamment d'entités dédiées comme les services de recherche et développement.

Ce phénomène gagne en popularité depuis une dizaine d'années. Les entreprises y voient plusieurs avantages : évolutivité et flexibilité de la main-d'œuvre en fonction des besoins de l'entreprise, diversité des contributeurs possédant un large éventail de compétences et d'expériences, variété de nouvelles idées et de solutions rapides, économies substantielles et visibilité importante liée à la présence sur Internet.

La revue de littérature réalisée dans le cadre de ce projet confirme que le crowdsourcing est une pratique couramment utilisée dans plusieurs secteurs industriels, principalement dans les industries liées aux biens de consommation. Toutefois, à ce jour, très peu de cas ont été suffisamment documentés pour comprendre les implications de ce modèle d'affaires sur le fonctionnement des entreprises, notamment en termes de gestion de l'innovation.

Afin de contribuer à l'enrichissement des connaissances et de la littérature sur le crowdsourcing, ce projet de recherche fut mis sur pied avec comme objectif général d'évaluer l'impact de la mise en œuvre de cette approche sur les stratégies d'affaires et d'innovation d'une grande entreprise, Bombardier Transportation (BT).

Les objectifs spécifiques du projet furent d'identifier les stratégies, les processus et les outils que BT a mis au point et utilisé pour mettre en œuvre, soutenir et évaluer trois initiatives de crowdsourcing internes et externes, appelées respectivement *Innovation Express*, *YouRail* et *YouCity*. De façon complémentaire, la recherche examine également : i) la façon dont le crowdsourcing peut influencer la culture organisationnelle; ii) les paramètres technologiques qui

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[1] Bien que certaines appellations aient déjà été proposées en français (ex : externalisation ouverte), le terme est encore largement utilisé sous cette forme dans la langue courante, même en français. Aux fins de ce condensé, le terme anglais est conservé.

soutiennent la mise en œuvre de crowdsourcing; et finalement, iii) les obstacles et limites de la mise en ouvre du crowdsourcing.

L'intérêt d'une telle étude tient également au fait que le cas étudié provient d'un secteur produisant des biens industriels (équipement ferroviaire de transport) contrairement aux études existantes portant sur des biens de consommation. De ce fait, l'étude permet de diversifier les perspectives sur les différents usages et impact du crowdsourcing.

REVUE DE LITTÉRATURE

La revue de littérature effectuée dans le cadre de cette étude fournit une synthèse des principales contributions scientifiques et professionnelles sur le crowdsourcing et ses applications.

Les technologies web 2.0 ont radicalement changé la façon dont les gens communiquent sur Internet; la première apparition du terme crowdsourcing s'inscrit justement dans ce changement de communication. Le terme crowdsourcing a été inventé et utilisé pour la première fois par un utilisateur anonyme sur un forum Internet, il y a une dizaine d'années. Après sa première apparition, le terme a été popularisé par le journaliste Jeff Howe en 2006 dans son article publié dans le magazine en ligne *Wired*.

Le terme crowdsourcing combine les mots *crowd* et *outsourcing*. Il décrit certaines pratiques liées à l'externalisation de processus d'affaires sous la forme d'appels d'offres ouverts, destinés à la « foule » (crowd), et supportés par des plate-forme web. L'originalité de ce modèle de collaboration réside dans le fait qu'il ne se limite pas à des communautés ou des individus ayant un statut légal ou contributeurs présélectionnés par les firmes. Généralement, tout le monde peut participer à ce type d'activités.

Malgré le fait que les formes contemporaines de crowdsourcing soient essentiellement basées sur les technologies web, on trouve des applications de ce concept bien avant l'avènement de l'Internet, le web 2.0 et les outils des technologies d'information. Aussi, l'histoire suggère de nombreuses découvertes importantes dont l'origine s'assimile à des variantes du crowdsourcing (comme la découverte des conserves, la création du dictionnaire anglais Oxford, la margarine etc.). Mais le progrès technologique, et surtout l'avènement des technologies web 2.0, ont considérablement changé la façon dont le crowdsourcing est utilisé aujourd'hui. Les formes modernes de crowdsourcing impliquent habituellement trois composantes: une plateforme web servant à afficher certaines tâches adressées à la « foule »; des entreprises qui diffusent ces

tâches, et des contributeurs provenant de la « foule » qui participent, produisent et soumettent leurs solutions. Précisons que dans plusieurs cas, les entreprises qui cherchent des solutions générées par la « foule » ne sont pas les propriétaires de la plate-forme utilisée pour l'affichage des tâches.

La littérature présente aussi plusieurs types de crowdsourcing. Une première classification définit les pratiques de crowdsourcing comme étant soient explicites (par exemple: voter sur Amazon, poster des commentaires sur YouTube, Twitter, et Flickr) et implicites (comme résolution de CAPTCHA tests, recueillir de l'information et du contenu des utilisateurs à partir de sites Web de tiers etc.). Une autre classification définit les types de crowdsourcing selon la finalité: la création (*crowdcreation*), la consultation (*crowdvoting*), ou le financement (*crowdfunding*). Beaucoup d'autres classifications sont décrites dans la littérature.

Une part importante de la revue de littérature de ce mémoire présente des cas d'entreprises utilisant cette approche. L'intention fut d'identifier des types d'entreprises pour qui le crowdsourcing apparaît comme un modèle d'affaires attrayant, puis d'identifier leurs motivations à l'exploiter. Les classifications et l'analyse des cas identifiés révèlent que les entreprises qui utilisent le crowdsourcing représentent presque tous les secteurs industriels définis par le Système de classification des industries de l'Amérique du Nord (SCIAN) Canada 2012. Les classifications présentées dans le cadre de cette recherche ont également montré que le crowdsourcing est utilisé principalement dans les industries de biens de consommation, et que les trois utilisation les plus fréquentes sont: la co-création, la collecte des propositions de tiers (licence, développement coopératif, acquisition), et le brainstorming et/ou ciblage de domaines potentiels d'innovation et de nouvelles idées de projets. Les classifications et les analyses de la littérature ont également permis d'identifier des domaines liés au crowdsourcing qui n'ont toujours pas été explorés à ce jour; ce constat a d'ailleurs permis d'établir la base sur laquelle le design méthodologique fut construit.

MÉTHODOLOGIE DE RECHERCHE

Les objectifs de recherche présentés ci-dessus et l'étendue des connaissances actuelles sur le crowdsourcing ont mené à la sélection de l'étude de cas qualitative, exploratoire et descriptive comme la principale stratégie de recherche pour ce projet, et qui allait permettre de recueillir les données nécessaires à l'atteinte des objectifs visés.

En effet, malgré les apports de la littérature pour comprendre le concept et les applications du crowdsourcing, il existe encore très peu d'études empiriques touchant l'impact du crowdsourcing sur les stratégies d'innovation et d'affaires des entreprises, les stratégies technologiques ainsi que sur la culture organisationnelle. La stratégie de l'étude de cas unique s'est donc avéré particulièrement propice à générer ce type de connaissances. Cette approche permet d'examiner en profondeur des situations complexes en utilisant de multiples sources d'information. Elle permet également d'obtenir une vision d'ensemble et une compréhension détaillée sur les questions examinées.

La mise en œuvre du crowdsourcing est une tâche complexe impliquant de multiples activités, processus, et parties prenantes; elle exige des changements technologiques et stratégiques importants dans les pratiques d'une entreprise. Du point de vue du chercheur, il faut donc avoir recours à plusieurs dispositifs de collecte de données. Dans le cas présent, le chercheur a notamment utilisé des entrevues semi-structurées, la consultation de la documentation de l'entreprise visée, puis des recherches complémentaires sur le web afin de documenter les trois initiatives de crowdsourcing de BT. L'instrument principal de cette étude fut une série de rencontres auprès de professionnels de BT, représentant divers niveaux hiérarchiques et ayant différents domaines d'expertise. Ces professionnels étaient en charge de la planification, l'exécution, l'évaluation et le suivi des initiatives de crowdsourcing chez BT. Les entrevues furent réalisées à l'aide d'un questionnaire semi-structuré, composé de questions ouvertes et portant sur les trois initiatives de crowdsourcing l'entreprise. Ce type de collecte de données a permis une plus grande souplesse dans le processus de recherche étant donné que la séquence, les types des questions et les thèmes abordés variaient en fonction de la personne interviewée et le flux de la conversation. Toutes les entrevues furent enregistrées numériquement, transcrites et codifiées. Les données recueillies furent analysées en utilisant une approche d'analyse inductive.

RÉSULTATS ET CONCLUSIONS

Le présent mémoire présente les résultats de la recherche selon trois initiatives distinctes de crowdsourcing que Bombardier Transportation a entrepris depuis 2009 : *Innovation Express*, *YouRail* et *YouCity*. Les stratégies d'innovation et d'affaires de BT sont décrites en termes de prestations ciblées par l'entreprise, stratégies de publicité, politiques de gestion de la propriété intellectuelle (PI) et approches d'évaluation. L'étude évalue aussi la façon dont la mise en œuvre

de crowdsourcing influence les besoins technologiques de l'entreprise, ainsi que l'impact de crowdsourcing sur la culture organisationnelle.

Au chapitre des résultats, l'étude de cas de BT fournit plusieurs pistes de comparaison avec la littérature existante. Cette comparaison permet d'évaluer si les résultats de l'étude de cas sont en ligne avec les résultats d'autres études sur le crowdsourcing. Finalement, les contributions spécifiques de cette étude à la littérature sont présentées.

A. Prestations d'innovation ciblées et crowdsourcing

Les résultats de l'étude de cas sur les initiatives de crowdsourcing interne et externe de BT ont confirmé qu'un des avantages les plus attrayants pour les entreprises utilisant ce modèle est la flexibilité en termes de main-d'oeuvre, permettant ainsi de faire varier plus facilement le nombre de contributeurs en fonction des besoins actuels de l'entreprise. Tel que décrit dans la littérature, et démontré également dans le cas de BT, les initiatives de crowdsourcing interne et externe ont nécessité peu d'administration de personnel ou de dépenses de recrutement; les coûts de transaction étaient alors minimisés et les problèmes logistiques rares, en raison de l'anonymat des interactions et de l'environnement de travail basé sur une plateforme web. En outre, et en accord avec les recherches antérieures sur crowdsourcing, BT a grandement bénéficié de la diversité des contributeurs, possédant un large éventail d'expériences et des compétences, tant pour les initiatives de crowdsourcing internes qu'externes.

Les initiatives de crowdsourcing de BT suggèrent que ce type de collaboration et d'innovation peut apporter des solutions rapides aux défis que souhaite relever l'entreprise. Dans le cas de BT aussi, l'utilisation de crowdsourcing réduit considérablement le risque d'une impasse grâce à la connaissance collective et l'éventail de compétences et d'expériences d'un très grand nombre de contributeurs. Les deux compétitions de crowdsourcing externe de BT (YouRail et YouCity) ont confirmé que crowdsourcing apporte des effets positifs de publicité et de marketing pour l'entreprise, et que les initiatives de crowdsourcing ont le potentiel d'attirer l'attention des médias. De plus, le concours de design d'intérieur de trains YouRail a permis de meilleures prévisions du marché et l'ajustement des stratégies de l'entreprises en fonction des préférences des contributeurs (utilisateurs éventuels).

Malgré le fait que les initiatives de crowdsourcing de BT se rapprochent de plusieurs autres pratiques documentées dans la littérature, le cas de BT présente des particularités intéressantes à relever.

Premièrement, même si le crowdsourcing a gagné en popularité grâce à sa capacité de fournir des solutions à faible coût et de mener à des économies impressionnantes pour les entreprises, ces critères ne figurent pas dans les critères de décision de BT d'implanter cette pratique. Deuxièmement, dans le cas de BT, l'utilisation de crowdsourcing n'avait pas pour objectif de réduire la dépendance de l'entreprise vis-à-vis ses fournisseurs mais bien d'accroître la diversité des contributions à une étape précise du processus d'innovation. Cela peut s'expliquer par le fait que BT opère dans une industrie très mature et traditionnelle où l'innovation radicale requiert des efforts de R & D importants et spécialisés, du temps et des investissements significatifs. Les résultats de l'étude montrent aussi que les initiatives de crowdsourcing de BT ont permis de recueillir des idées d'innovations qui ne pourraient pas être appliquées directement aux futurs produits de la firme, sans améliorations et développement additionnel important au sein même de la firme. Par exemple, les dessins recueillis dans le cadre du concours de design YouRail ne pouvaient pas être directement appliquées à la conception de trains réels; ils pourront ultérieurement être utilisés comme source d'inspiration par les designers de BT lorsqu'ils seront à la recherche de nouvelles tendances et des solutions potentielles.

B. Stratégies publicitaires et crowdsourcing

Les stratégies publicitaires des initiatives de crowdsourcing des entreprises dépendent du type utilisé (interne vs. externe, rémunéré ou non, etc.), des objectifs des initiatives, et des préférences des organisations. La revue de littérature fournit des exemples d'initiatives de crowdsourcing initiées pour répondre à des besoins différents, et donc organisées de différentes façons. Néanmoins, certaines caractéristiques communes des stratégies publicitaires des entreprises peuvent être identifiées. Ils comprennent l'utilisation des médias sociaux comme Facebook et Twitter pour les initiatives de crowdsourcing externe et l'utilisation de canaux de communication internes tels que l'Internet et Intranet pour les campagnes publicitaires de crowdsourcing interne.

Les résultats de l'étude de cas montrent que BT a eu recours à différentes stratégies publicitaires pour ses initiatives de crowdsourcing interne et externe, ce qui est également le cas pour les pratiques de d'autres entreprises. La comparaison entre les résultats de l'étude et la littérature sur

les stratégies publicitaires des entreprises montre qu'il est très difficile de comparer et de généraliser ces stratégies car elles peuvent varier considérablement en fonction des circonstances particulières et des objectifs des initiatives.

C. Gestion de la propriété intellectuelle et crowdsourcing

En termes de gestion de propriété intellectuelle, les observations faites chez BT ne peuvent être facilement comparées aux politiques de d'autres entreprises.

De façon générale, la littérature suggère que les entreprises ayant recours au crowdsourcing gèrent la PI de façon très diverse, en fonction du type de crowdsourcing, des objectifs poursuivis, des préférences de l'organisation, des préoccupations juridiques, etc. Dans le cas de BT, certains rapprochements peuvent être faits avec les pratiques de Cisco Systems Inc. Tout comme Cisco, BT encourage ses employés à déposer des brevets et à protéger leur propriété intellectuelle créée dans le cadre des initiatives de crowdsourcing interne. Pour ce qui est des initiatives de crowdsourcing externe, BT revendique la propriété de la PI seulement pour le matériel retenu comme méritoire (gagnant), et la possibilité d'acquérir la PI pour d'autres idées d'intérêt, en échange de rémunération financière pour une période de 12 mois après la fin des concours. Les raisons derrière cette politique de gestion de PI sont que BT estime que les contributeurs seraient plus motivés et créatifs s'ils retiennent la propriété intellectuelle de leurs idées. En outre, BT s'abstient de revendiquer les droits de PI pour tout matériel généré par la « foule » afin de se protéger contre d'éventuels litiges liés à la PI.

D. Principes d'évaluation et de gestion de la communauté et crowdsourcing

Les approches d'évaluation et de gestion de la communauté web participant aux initiatives de crowdsourcing de BT se sont avérées similaires aux pratiques de British Telecommunicions dans le cadre de son projet « New Ideas Scheme » (crowdsourcing interne). Tout comme cette firme britannique où un un groupe d'évaluateurs, experts dans différents domaines et travaillant dans différentes unités de l'organisation, examinent les soumissions, BT propose un tel processus. De même, les idées qui passent la phase d'évaluation d'experts sont ensuite préparées pour des phases ultérierues d'adoption et de lancement. De manière similaire à l'outil de crowdsourcing interne de BT, les employés de British Telecom communiquent avec la communauté web impliquée afin de maintenir l'intérêt et l'engagement envers les initiatives de crowdsourcing internes de

l'entreprise. De plus, les deux organisations mènent des campagnes de résolution de problèmes qui sont habituellement réservées à un nombre limité de collaborateurs qui sont des experts dans un domaine spécifique.

Les principes d'évaluation et les stratégies de gestion de la communauté web engagée dans les initiatives de crowdsourcing externe des entreprises diffèrent encore plus que les stratégies internes, car ces pratiques d'innovation ouverte sont généralement beaucoup plus créatives, et les objectifs ont souvent des implications sur le marketing et la publicité de l'entreprise. Les résultats de l'étude de cas suggèrent que BT a utilisé une combinaison des stratégies déjà documentées dans la littérature. Les spécificités de ces approches répondent aux besoins particuliers et la vision de BT pour ses initiatives de crowdsourcing. Les résultats de l'étude de cas et la revue de littérature montrent clairement qu'une comparaison directe entre les principes d'évaluation et les stratégies de gestion de la communauté de participants au crowdsourcing est difficile, étant donné que chaque cas est unique et spécifique.

E. Stratégies technologiques et crowdsourcing

La revue de littérature a montrée que d'habitude, les entreprises qui recherchent des solutions générées par la « foule » ne sont pas les propriétaires des plateformes web utilisées pour l'affichage, en particulier pour le crowdsourcing externe. Lorsqu'il s'agit de crowdsourcing interne, les solutions technologiques appartiennent plus généralement aux entreprises pour des raisons de sécurité et de confidentialité.

Les résultats de l'étude de cas sur les stratégies technologiques de BT révèlent une solution typique des besoins technologiques des entreprises utilisant le crowdsourcing interne et externe. La plateforme de crowdsourcing interne de BT (Innovation Express) fut construite par une firme partenaire; en revanche, pour des raisons de sécurité et confidentialité, BT est resté le propriétaire de cette plateforme et des serveurs hébergeant l'outil. Dans le cas des deux concours externes YouRail et YouCity, les plateformes de crowdsourcing furent également été construites par une firme partenaire, mais cette dernière est demeurée propriétaire et responsable des serveurs, logiciels, et de la gestion de la communauté web.

BT a donc utilisé les services de deux firmes partenaires différentes pour la construction et la mise en œuvre de ses trois initiatives de crowdsourcing puisque ces deux firmes possédaient des

compétences et des solutions technologiques proposant des avantages différents pour chacun des deux types d'initiatives.

F. Culture organisationnelle et crowdsourcing

La mise en œuvre de crowdsourcing comme processus d'affaires et d'innovation introduit des changements importants dans les pratiques de collaboration, de R&D et d'innovation des entreprises. De même, dans plusieurs cas documentés, les employés d'entreprises peuvent considérer que le crowdsourcing menace des emplois. Les résultats de cette recherche confirment cette perception chez certains employés de BT par rapport aux initiatives de crowdsourcing externes de l'entreprise. D'autres exemples de résistance culturelle décrits dans la littérature ont été observés dans le cas BT : i) l'attitude « *not invented here* » selon laquelle les employés d'une entreprise n'acceptent pas les idées extérieures et considèrent le matériel générée par la « foule » comme de mauvaise qualité et non-professionnelle du simple fait qu'elle provient de l'externe; ii) l'attitude « *I don't have time for this* » selon laquelle les employés d'une entreprise refusent d'accepter le contenu généré par la « foule » en le traitant comme du travail supplémentaire, et iii) l'effet « *pocket veto* » où l'équipe de gestion de l'innovation d'une entreprise peut avoir identifié un besoin et une solution potentielle, mais où les autres unités de l'entreprise ne sont pas intéressées par cette solution, simplement parce qu'elles n'ont pas encore identifié le besoin en question.

L'importance du soutien et de l'attention de la direction en tant que facilitateur de changement culturel au sein de la société a été confirmée par les résultats de l'étude de cas et par la littérature. Par ailleurs, des recherches antérieures corroborent que l'acceptation du matériel généré par des contributeurs externes dépend fortement de l'habitude de l'entreprise de collaborer avec ceux-ci.

CONTRIBUTIONS DE L'ÉTUDE

Cette étude contribue de façon significative aux connaissances actuelles sur le crowdsourcing et ce, à plusieurs niveaux. Premièrement, elle constitue l'une des toutes premières études en profondeur d'un cas provenant d'un secteur de produits industriels. Le crowdsourcing étant encore surtout utilisé dans les industries de biens de consommation, ce mémoire consitue un moyen d'élargir les connaissances sur ce genre de pratiques.

Deuxièmement, cette recherche contribue à une meilleure compréhension du phénomène en analysant trois initiatives complexes et distinctes (interne et externe). Plus précisément, les initiatives de BT présentent des exemples de mise en œuvre réussie du crowdsourcing où se combinent des aspects de créativité, de résolution de problèmes, et de collaboration.

De plus, l'étude de cas examine l'impact réel de crowdsourcing sur les stratégies d'innovation et d'affaires d'une entreprise, en termes de fondements stratégiques, processus et avantages pour l'organisation. L'analyse des stratégies technologiques de BT révèle que la firme traite de manière différente les nouveaux besoins technologiques provenant de l'utilisation du crowdsourcing; ces choix varient selon les types de crowdsourcing, les objectifs des projets, les préférences, et les préoccupations de sécurité et confidentialité de la firme. L'étude examine aussi les obstacles à la mise en œuvre de crowdsourcing et les limites du modèle, les impacts sur la culture organisationnelle et en particulier, la résistance culturelle liée à l'acceptation du contenu généré par la « foule ».

En termes pratiques, les résultats de cette étude peuvent aider les gestionnaires d'entreprises à identifier des pratiques et des processus efficaces de mise en œuvre de crowdsourcing interne et externe comme méthode de collaboration et d'innovation. De plus, comme cette étude analyse l'utilisation de crowdsourcing dans un secteur hors biens consommation, les gestionnaires et professionnels de ces milieux peuvent être encouragés à lancer des initiatives de crowdsourcing. Ils peuvent bénéficier de l'information présentée dans le cadre de cette recherche et sont en mesure d'apprendre de l'expérience d'une organisation multinationale, leader de son domaine comme Bombardier Transportation. Les résultats de l'étude et les analyses comparatives peuvent aussi aider les gestionnaires à identifier, réduire, atténuer ou prévenir les effets néfastes et non-constructifs des pratiques de crowdsourcing, et peuvent leur aider à atteindre leurs objectifs d'innovation et de collaboration d'une manière plus efficace.

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LIST OF ACRONYMS

BMW	Bayerische Motoren Werke AG
BRIC	Brazil, Russia, India, and China
BT	Bombardier Transportation
CAPTCHA	Completely Automatic Public Turing Test to Tell Computers and Humans Apart
CEO	Chief Executive Officer
CIO	Chief Innovation Officer
CSR	Corporate Social Responsibility
CTO	Chief Technology Officer
DB	Deutsche Bahn AG
HIT	Human Intelligence Task
IP	Intellectual Property
IT	Information Technology
OCR	Optical Character Recognition
R&D	Research and Development

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INTRODUCTION

Crowdsourcing is an online model of innovation and collaboration that provides businesses with the opportunity to receive more inflow from the firms' internal and external environment compared to traditional "closed" innovative and collaborative practices. It is not limited to companies or individuals with legal status: anyone wishing to use an open tender process via a Web platform can use crowdsourcing.

Crowdsourcing gained significant popularity during the last decade thanks to the multiple advantages it can offer businesses. Some of the most important are substantial work force scalability, depending on the firm's current needs, diversity of contributors with a wide range of skills and backgrounds, a variety of novel ideas, and rapid solutions, all of which can lead to impressive cost savings and additional publicity for any business using this model.

Despite the fact that crowdsourcing remains underexplored, it has been described from various perspectives in multiple studies. These studies propose different taxonomies of the types of crowdsourcing, which clearly show that crowdsourcing is also characterized by an enormous flexibility of applications that can serve all kinds of business needs. Some authors have also analyzed the negative aspects of crowdsourcing, as well as the benefits and risks for crowd contributors, and more.

The literature review under this project revealed that crowdsourcing is used by firms operating in almost all industry sectors, but mostly by firms in the consumer goods industries. These preliminary results allowed identifying crowdsourcing topics that have been underexplored to date and merit further investigation.

Because the literature on crowdsourcing is spare with respect to empirical evidence of the impact of crowdsourcing on firms' business and innovation strategies, the general objective of this research project was to assess the impact of implementing crowdsourcing into Bombardier Transportation's (BT's) business and innovation strategies. The specific aims were to identify the strategies, processes, and tools that BT has developed and used to implement, support, control, and assess its three internal and external crowdsourcing initiatives. The intention was also to examine whether or not crowdsourcing can change a firm's culture, to analyze the technological settings that support crowdsourcing, to identify obstacles to crowdsourcing implementation, and

to understand the limitations of the model, and thus to contribute to the empirical knowledge on these topics.

This study was also initiated to specifically document and analyze the implementation of crowdsourcing in a non-consumer goods industry sector such as railway manufacturing, to describe the specifics of crowdsourcing use in this type of industry, and to complement the existing theoretical and practical knowledge on crowdsourcing, which has focused to date mainly on the use of crowdsourcing in consumer goods industries.

The abovementioned research objectives and the extent of the current knowledge on crowdsourcing led to the selection of a qualitative, exploratory, and descriptive case study as the research strategy of choice for this project, in order to allow collecting sufficient data and to meet the research objectives.

The lack of empirical knowledge on the impact of crowdsourcing on firms' business, innovation, and technology strategies as well as organizational culture pointed to the use of a single case study as the primary research strategy. This approach allowed examining understudied concepts and complex situations from different perspectives using various information sources. It also allowed obtaining a holistic picture and a detailed understanding of the investigated issues.

The implementation of crowdsourcing as a business and innovation approach is a complex and societal endeavor involving multiple activities, processes, participants, and technology and business strategy changes. Accordingly, several research instruments were required, including semi-structured interviews, analyses of the firm's documentation, and additional Web research on aspects of BT's internal and external crowdsourcing initiatives. The primary research instrument for this study was a set of semi-structured interviews conducted with professionals at various hierarchical levels and having different fields of expertise. They were responsible for planning, execution, assessment, and control of the crowdsourcing initiatives at BT. The interviews were based on a semi-structured questionnaire, consisting of general and open-ended questions addressing the firm's crowdsourcing practices. This approach allowed greater flexibility of the research process, as the sequence and type of questions and the addressed themes varied depending on the interviewee and the conversational flow. All interviews were digitally recorded, transcribed, and coded. The collected data were analyzed using an inductive data analysis

approach. Based on the case study findings, conclusions are drawn and explanations are formulated.

***

The present document includes four chapters. The first chapter presents the literature review, including a detailed overview of the scientific and professional literature on crowdsourcing and its applications, definitions of the crowdsourcing concept, and a comparison of crowdsourcing with other similar innovation and collaboration approaches. Special emphasis is placed on the current knowledge of business uses of crowdsourcing. In addition, crowdsourcing issues that have been underexplored to date are identified. The second chapter includes two major parts: the first provides a detailed discussion of the motivations for conducting this case study and the research objectives, and the second provides a detailed description of the research methodology used. The third chapter is also divided into two sections: the first provides a historical perspective on the company (BT) and highlights some of the significant milestones in its development, and the second presents the research findings on BT's three internal and external crowdsourcing initiatives, focussing on business and innovation strategies, technology strategies, and the impact of crowdsourcing on the organizational culture. Chapter four discusses the research findings and presents comparative analyses of BT's three crowdsourcing initiatives, the case study results are compared also with the results in the literature. The theoretical and managerial contributions of the study are then discussed as well as the study limitations, and avenues for future research are proposed.

CHAPTER 1 LITERATURE REVIEW

The following literature review provides an overview of the scientific and professional literature on crowdsourcing and its applications. The chapter comprises three parts. The first part introduces and gives definitions of the term crowdsourcing.

The second part provides a comparative analysis between crowdsourcing and similar innovation and collaboration approaches, along with an historical overview of the crowdsourcing model. The various types and taxonomies of crowdsourcing practices are then discussed. The goals were to highlight the aspects of crowdsourcing that qualify it as a distinct practice and to help the researcher identify valuable research avenues.

The third part presents the benefits and negative aspects of crowdsourcing for both firms that use it and crowd contributors. Because the aim of this study was to investigate the implementation of crowdsourcing for business and innovation purposes, the literature review focuses on the current knowledge of business uses of crowdsourcing in particular, and sheds light on the kinds of firms that use crowdsourcing today, as well as the reasons why organizations find crowdsourcing attractive. This phase of the research also allowed identifying additional aspects of crowdsourcing that have been underexplored to date, and which merit further investigation.

1.1 Definition of Crowdsourcing

In order to understand crowdsourcing as a “new online distributed problem-solving and production model” (Brabham, 2008; Vukovic, 2009) and to examine its various forms and potential applications, a definition of the term is needed.

As the Web 2.0 technologies radically changed how people communicate on the Internet, the first appearance of the term crowdsourcing is also a result of this change in communication-the term crowdsourcing was first coined by an anonymous user on an Internet forum (Schenk & Guittard, 2009).

Crowdsourcing is a compound word that combines the words “crowd” and “outsourcing”. This new term describes any activity that includes outsourcing which is not limited to companies only, but is addressed to the crowd as an open tender or an “open call” (Howe, 2006b; Schenk & Guittard, 2009) , via an Internet Web platform. The uniqueness of this model lies in the fact that

it is not limited to communities or individuals with legal status or preselected contributors only. Generally speaking, anyone can participate.

After it first appeared, the term crowdsourcing was popularized by the journalist Jeff Howe in 2006 in his article in the online magazine *Wired* (Howe, 2006b). He gives the following definition of crowdsourcing:

> *"Simply defined, Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the wide network of potential laborers."* (Howe, 2006a)

Later, Howe (2008) gives another definition of the term in his book *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business*:

> *"Crowdsourcing is the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call"* (Howe, 2008)

1.2 Comparison between Crowdsourcing and Related Innovation and Collaboration Concepts

Crowdsourcing is a relatively new practice that has developed considerably during the last decade. Nevertheless, as a concept, it is still considered "under construction" (Schenk & Guittard, 2009), and as such, it remains underexplored. The following section analyzes and compares crowdsourcing with other innovation and collaboration practices such as outsourcing, open innovation, open source software, user innovation, and cloud computing. The specific characteristics of crowdsourcing are outlined, and some valuable research questions are identified.

1.2.1 Crowdsourcing versus Outsourcing

Given that the term crowdsourcing is a combination of the words "crowd" and "outsourcing," the most logical first step is to compare crowdsourcing and outsourcing. Outsourcing, which stands

for outside resource using, or the use of external resources, is the practice of taking a company's internal functions and making them available for execution by an external organization. Outsourcing includes a contractual agreement with a third party, for example, for the development and production of a product or service. Outsourcing also involves the transfer of management and execution of all daily business functions to the external contractor. The typical business segments that are most commonly outsourced are information technology, human resources, facilities, property management, and accounting. Many companies also use outsourcing for customer services and for implementing IT functions such as telemarketing, market research, design, Web design, production, engineering, and others (Municipality of Tzarevo, 2009) [Our translation].

Based on the above definitions, one may conclude that the main difference between crowdsourcing and outsourcing is the fact that outsourcing is a firm-to-firm (or firm-to-firms) business model that includes a limited number of preselected participants. In contrast, crowdsourcing allows a much more open type of contributions, characterized by the "open call" (Howe, 2006b) form of interactions, which allows anyone to participate. Crowdsourcing is not limited to professionals or contributors with legal status only. However, for some crowdsourcing practices, the contributors are preselected if more specialized knowledge and skills are needed to perform a specific task.

Another important difference between the two practices is the collaborative environment. Whereas outsourcing generally requires more traditional firm interactions, crowdsourcing in its current form relies exclusively on the Internet and Web 2.0 technologies.

There are also many similarities between the two practices. Both outsourcing and crowdsourcing allow significant work force scalability and include contractual agreements—in the form of a "clickwrap" (Felstiner, 2010) agreement in the case of crowdsourcing—to regulate the exchange of services and payments. Both lead to impressive cost savings for businesses in terms of labor, regulatory, and training costs. Both are ways to deal with a shortage of skills and expertise within the organization, allowing firms to concentrate on their core competencies. Moreover, both methods give firms access to external intellectual property as well as broader experience and knowledge. As a result, crowdsourcing and outsourcing enhance the innovative capacity of firms, and are catalysts for organizational change. The two models provide faster and cheaper services

and products to consumers, and at the same time they increase firms' margins of profit (Municipality of Tzarevo, 2009) [Our translation].

Crowdsourcing and outsourcing also share similar risks. These include intellectual property risks when firm information is shared with external contributors, low-quality work, and the need to invest in quality assurance mechanisms and to assess the capabilities of providers. The risk for firms of dependence on external providers should also be taken into consideration. Last but not least, both crowdsourcing and outsourcing are considered an important threat to employment security in many countries (Felstiner, 2010; Krugman, 2006; Municipality of Tzarevo, 2009) [Our translation].

1.2.2 Crowdsourcing versus Open Innovation

The open innovation model created by Henry Chesbrough acknowledges the fact that not all good ideas and technologies can be created internally within a given company, relying only on the firm's own R&D capabilities. Furthermore, not all good innovative ideas can be marketed successfully by the organization that invented them (H. Chesbrough & Crowther, 2006; H. W. Chesbrough, 2007).

H. Chesbrough and Crowther (2006) classified open innovation practices according to the direction of the openness, distinguishing two directions for open innovation:

- **Inbound Open Innovation** – the type of innovation which involves "leveraging the discoveries of others" (H. Chesbrough & Crowther, 2006). This type of openness consists of "technological acquisition, where new ideas flow into the organization" (De Massis, Lazzarotti, Pizzurno, & Salzillo, 2012).
- **Outbound Open Innovation -** outbound innovation means that, "rather than relying entirely on internal paths to market, companies can look for external organizations with business models that are better suited to commercialize a given technology" (H. Chesbrough & Crowther, 2006). Stated differently, it involves "technological commercialization, where unused technologies can be acquired by external organizations with business models that are better suited to commercialize a given technology" (De Massis et al., 2012).

Research shows that companies tend to use inbound open innovation much more frequently than the outbound type, and to search for new innovation ideas outside their own boundaries. In contrast, outbound open innovation is rarely used. De Massis et al. (2012) conclude that "there are many unused patents and companies are not even aware of their potential of external exploitation" (De Massis et al., 2012).

Other important aspects of open innovation include the organizational form of acquisition or commercialization (contractual agreements, patents, licenses, joint ventures); the phase during which open innovation takes place (exploration, development, or commercialization phase); and the governance of the innovation network, which may be "hierarchical, in which anyone can offer ideas but only one company defines the problem and chooses the solution; or a flat model, in which anyone can generate ideas, and no one has the authority to decide what is or is not a valid innovation" (De Massis et al., 2012).

Both crowdsourcing and open innovation rely on distributed knowledge outside the boundaries of an organization, and both generate competitive advantage (Schenk & Guittard, 2009). Furthermore, both open innovation and crowdsourcing may take place during different phases of the innovation and/or collaboration process (e.g. exploration, development, or commercialization phase). However, certain differences distinguish crowdsourcing and open innovation as two separate practices. Open innovation is exclusively innovation-oriented, whereas crowdsourcing is not used solely for innovation purposes. A second, more important difference is that open innovation can be based on firm-to-firm(s) interactions, whereas crowdsourcing is based solely on firm-to-crowd interactions. Moreover, open innovation is a two-way process that includes buying and selling knowledge between firms (inbound and outbound open innovation), whereas crowdsourcing is a one-way process, where companies only buy external knowledge (Schenk & Guittard, 2009).

1.2.3 Crowdsourcing versus User Innovation

The lead user innovation method was first introduced by Eric von Hippel in 1986. It is used to generate innovative ideas, and particularly ideas for breakthrough innovations that are inspired or created by so-called "lead users." von Hippel defines lead users as "companies, organizations, or individuals that are well ahead of market trends and have needs that go far beyond those of the average user" (Von Hippel, Thomke, & Sonnack, 1999). The user innovation method is based on

the systematic identification of lead users in a specific field and continuous learning from them. Lead users face problems that require the development of new products and technologies in a much more extreme form. They also need innovative solutions that the average consumer will need only months or years later. This extreme setup motivates lead users to innovate by themselves and continuously seek solutions for their current needs. Lead users are usually found in similar fields of application, and not in the industry itself. Moreover, lead users have often already developed a solution to a problem that firms can use and commercialize for the mass market (Mohr, Sengupta, & Slater, 2009).

Whereas both crowdsourcing and user innovation rely on external contributors from various professional fields, a number of differences define crowdsourcing and user innovation as two separate concepts. User innovation is a user-driven innovation process, whereas crowdsourcing is a firm-initiated process. User innovation is limited to innovation purposes only, unlike crowdsourcing. In addition, user innovation addresses contributors who will use the final products, whereas crowdsourcing addresses much broader groups of contributors through the "open call" (Howe, 2008) crowd-oriented format (Schenk & Guittard, 2009).

1.2.4 Crowdsourcing versus Open Source Software

The open source software model refers to the collaborative development of software solutions. This type of software allows access to the source code and free redistribution. The open source software license must allow modifications, derived works, and their distribution under the same licensing conditions as the original software. In addition, the open source software model does not discriminate between persons and groups: anyone is allowed to use it, distribute it, modify it, and even market it (Krishnamurthy, 2005; Open Source Initiative, n.d.).

The similarities between crowdsourcing and open source software lie in the fact that both methods involve user-generated content, and both depend on information technology tools and the Internet. Furthermore, participants in crowdsourcing and open source software projects usually have similar motivations, including monetary incentives, technological interests, a sense of self-achievement, and the like. Both models may or may not offer financial rewards to contributors. However, crowdsourcing is not limited to just software development. Another important difference between the two concepts is that companies that use crowdsourcing protect their intellectual property, which is not the case for open source software. Schenk and Guittard

(2009) conclude that “open source is an application of the crowdsourcing production mode rather than a similar concept. Open source also borrows from the user innovation approach” (Schenk & Guittard, 2009).

1.2.5 Crowdsourcing versus Cloud Computing

Cloud computing refers to the customizable, flexible use of hardware and software resources delivered as a service, typically over the Internet. Cloud computing gained popularity thanks to the increasing Internet penetration (both mobile and fixed), and the significant price drop for data transfer, making it useful and advantageous for many businesses, educational institutions, and individual customers. The idea behind cloud computing is to allow businesses and other consumers to use software and hardware resources as much as they need, and allowing for possible fluctuations in these needs. Cloud computing stores customer data and software on remote servers, which service users can access via a Web browser or mobile apps. There are various types of cloud computing, the three main categories are infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) (CloudSigma, n.d.) [Our translation].

Despite the fact that cloud computing is a purely technology-oriented term, cloud computing and crowdsourcing have a lot in common. Or even “...crowdsourcing and cloud computing are actually just the same approach to two different areas of business—nothing is novel or groundbreaking about the idea or the activity of crowdsourcing” (Jason, 2012).

This conclusion is based on the following factors: both crowdsourcing and cloud computing have appeared due to inefficiencies of prior business and technology models; both methods create substantial resource scalability and efficiency, improve productivity (of people in the case of crowdsourcing and of technology in the case of cloud computing), and allow remote participation from anywhere over the Web; and both can be a temporary solution due to their on-demand model and flexibility (Jason, 2012). Moreover, both crowdsourcing and cloud computing allow businesses to concentrate on their core competencies, and to pay only for what they need and use (Champion, 2009). Last but not least, both models depend on the Internet and information technology tools.

However, even though cloud computing and crowdsourcing have some characteristics in common, they remain two separate concepts. Cloud computing is actually a service that a firm provides to its customers, whereas crowdsourcing is a "distributed problem-solving and production model" (Brabham, 2008) that firms use for various purposes, such as cost reduction, efficiency, or marketing. Nevertheless, crowdsourcing and cloud computing can successfully complement each other, resulting in very efficient resource usage (Champion, 2009).

1.3 The History of Crowdsourcing

1.3.1 Early Forms of Crowdsourcing

Despite the fact that the modern forms of crowdsourcing are dependent and build on the Internet, the literature on crowdsourcing shows that the crowdsourcing model was used long before the advent of the Internet, Web 2.0, and information technology tools. Thus, "the web didn't invent crowdsourcing, it just made it easier" (Thomas, 2011a).

Examples of pre-Web crowdsourcing are suggested by the journalist Thomas (2011a) in the online magazine *Memeburn*. They align with Howe's contemporary definitions of crowdsourcing, and show that the statement that crowdsourcing is a new paradigm deserves discussion.

The suggested examples show that many important discoveries for humanity owe their existence to crowdsourcing types of activities. Some of these discoveries are outlined below.

1.3.1.1 The Longitude Prize

In 1714 the British government launched a prize competition open to anyone who wished to participate. The aim was to find a practical method for determining a ship's longitude. There was no official prize winner, but many contributors were rewarded for their ideas.

1.3.1.2 The Oxford English Dictionary

The history of the creation of the Oxford English Dictionary can be regarded as a pre-Internet version of Wikipedia. The Oxford University professor James Murray led a literary project in the late-nineteenth century that aimed to collect the definitions and origins of every English word. The data collection relied entirely on volunteer work, which consisted in copying passages from books onto quotation slips and illustrating word

usage and meanings. The project took 70 years to complete and gathered the contributions of tens of thousands of volunteers (Lanxon, 2011; Thomas, 2011a).

1.3.1.3 Canned Food

In the early nineteenth century, the government of France launched a competition with a prize of 12,000 francs to anyone who could invent an inexpensive and effective method of preserving food. The need to preserve food arose because Napoleon's armies needed extensive food supplies that could be stored and would be suitable for army needs. Peter Durant proposed a solution whereby food could be preserved in glass jars. Later, a similar technique was used to preserve food in tin or iron canisters.

1.3.1.4 Margarine

Initiated by Emperor Louis Napoleon III in 1869, this competition called for anyone who could invent a satisfactory substitute for butter. France could not meet its demand for butter at the time, which caused butter prices to rise. The new product had to meet the needs of the army and the lower classes. The French chemist Hippolyte Mège-Mourès patented an invention called "oleomargarine." The name was later shortened, and the product became popular under the trade name "margarine."

1.3.1.5 Mathematical Tables Project

The Mathematical Tables Project was launched during the Great Depression in 1938 as part of a Depression Relief Program. It put 450 unemployed clerks to work tabulating higher mathematical functions. The result of their efforts was the *Handbook of Mathematical Functions*, published 16 years later. This project is considered one of the largest and most sophisticated computing organizations before the invention of the computer.

1.3.1.6 Zagat Survey

The Zagat Survey is the ancestor of user reviews such as *Trip Advisor* and *Amazon*. Launched in 1979 by Tim and Nina Zagat, the Zagat guide collected ratings of restaurants by diners. The first contributors were the Zagats' friends. By 2005, the Zagat Survey included information on more than 70 cities and reviews based on the input of 250,000 contributors.

1.3.1.7 The Mass Observation Movement

> The Mass Observation Movement took place from 1937 to 1960. The aim was to study everyday habits and life in Great Britain. Some of the investigators were paid, but most of the information was actually collected by volunteers, who kept records about people's daily life, habits, behavior, conversations, and so on. The collected data were used for various purposes, such as gauging public opinions or arguing for tax policy changes.
>
> (Thomas, 2011a)

Nevertheless, the cited examples of pre-Web application of the crowdsourcing model do not suggest that all prize competitions could be considered as forms of crowdsourcing. These examples are given in order to provide an exhaustive representation of the literature on crowdsourcing to date.

1.3.2 Modern Forms of Crowdsourcing

Although these early forms of crowdsourcing show that the crowdsourcing model has been around for a long time, the technological progress, and more particularly the advent of the computer, the Internet, and especially the Web 2.0 technologies, have significantly changed how crowdsourcing is used today.

First, the Web 1.0 technology (the ancestor of Web 2.0) made the Internet user a passive observer. Web 1.0 allowed users only to search for and find information on the Internet. The appearance of the Web 2.0 technology fuelled changes in many standards and in how the existing standards were used. The network now serves as a platform for application development. It can be likened to a universal operating system that provides access to various applications and services, where new generations of programs require only a Web browser and Internet access (P. Graham, 2005). The advent of the Web 2.0 technology brought us Facebook and Myspace, blogging, Flickr, YouTube, Wikipedia, the wikis, tagging (folksonomy), syndication, and many other tools for online participation and communication (O'Reilly, 2005).

The term Web 2.0 was coined in January 1999 by DiNucci (1999), an electronic information design consultant, in her article "Fragmented Future." She describes Web 2.0 as a place where "interactivity happens" (DiNucci, 1999). Web 2.0 gained popularity in 2004 following a conference held by O'Reilly Media and MediaLive, where the ideas of "harnessing the collective

intelligence" (O'Reilly, 2005) and the value of the user-generated content on the web were introduced (P. Graham, 2005; O'Reilly, 2005).

Contemporary forms of crowdsourcing rely exclusively on these new technologies, which make the "open call" (Howe, 2006b) format of crowdsourcing possible. The modern forms of crowdsourcing usually include three components: a crowdsourcing Web platform, where the tasks that are outsourced to the crowd are posted; the companies that broadcast their tasks; and the crowd workers, who agree to participate and who produce and submit their solutions. Often, companies that seek crowd-generated content do not own the crowdsourcing platform they use for posting. Therefore, the most popular modern crowdsourcing model includes the use of "an intermediation platform building a link between the crowd and client companies" (Schenk & Guittard, 2009). These three components are described by various terms in the literature and on the Web. Generally, because the crowdsourcing platform owners dictate the terms of use for both the companies that post the tasks and the crowd workers, the names for the participants vary across platforms. For example, the following terms are used on Amazon's Mechanical Turk: "vendor" for the platform owner, "requester" for a firm that posts a task and "provider" for a crowd worker on the platform. The posted challenges are called "human intelligence tasks" or (HITs) (Felstiner, 2010). Other practices exist as well- some firms host their crowdsourcing activities on their own company Web platforms, and still others use both options (the company platforms and third-party crowdsourcing platforms) to access crowds.

The first crowdsourcing platform was launched in 2001 by the American multinational pharmaceutical company Eli Lilly. The platform is called InnoCentive, and is dealing with problem solving and innovation projects (Schenk & Guittard, 2009).

1.4 Types of Crowdsourcing

The literature contains various taxonomies of the types of crowdsourcing. This section provides definitions and some typical examples of the types of crowdsourcing.

A more general taxonomy of the modern forms of crowdsourcing distinguishes between explicit and implicit crowdsourcing (Doan, Ramakrishnan, & Halevy, 2011).

1.4.1 Explicit Crowdsourcing

This includes all crowdsourcing activities that Internet users perform deliberately. The contributors are fully aware that they are creating user-generated content on the Web. Some examples of explicit crowdsourcing are reviewing and voting at Amazon, forum participation, and posting comments on YouTube, Twitter, and Flickr.

1.4.2 Implicit Crowdsourcing

Implicit crowdsourcing refers to activities that contributors perform as a side effect of their actual activities on the Web. Generally, these crowd contributors are not aware that they are creating content on the Internet, and that their content is being used by a third party. There are two types of implicit crowdsourcing:

1.4.2.1 Standalone Implicit Crowdsourcing

Standalone implicit crowdsourcing creates content as a side effect of users' main activities on the Internet. Some examples are applications such as so-called "games with a purpose" (L. Von Ahn, 2006), in which useful content is created based on people who play computer games. Two such games, the ESP Game and Peekaboom, developed at the Carnegie Mellon University, use gamers' activities to solve complex tasks that contemporary computers still cannot solve as well as humans can. For example, the ESP game (www.espgame.org) is an online game in which players label images in a competition. Later, these names are used for tag labels for online applications such as search engines and programs for the visually impaired (L. Von Ahn, 2006).

Other examples include the CAPTCHA tests on the web, or the "Completely Automated Public Turing test to tell Computers and Humans Apart" (Luis Von Ahn, Maurer, McMillen, Abraham, & Blum, 2008). These are screening devices to prevent abuse of online services by distinguishing humans from virtual robots. CAPCHAS require Internet users to type a sequence of distorted letters that they see on the computer screen. The method, developed by Luis Von Ahn et al. (2008) at Carnegie Mellon University, takes advantage of the fact that virtual robots cannot recognize distorted characters as well as humans can. Subsequently, von Ahn extended the CAPTCHA method and introduced the reCAPTCHA, which asks Internet users to type in two

words in order to prove that they are humans. The first word is a well-known word and the second is a word that is rejected by an OCR[2] software, which is presented as part of a CAPTCHA to be solved. When the OCR-rejected word is decoded in the same way by multiple users, the CAPTCHA solution is used for text digitization. A well-known application of this digitization approach is the Google Books scanning project (Schenk & Guittard, 2009; Luis Von Ahn et al., 2008).

1.4.2.2 Piggyback Implicit Crowdsourcing

Piggyback implicit crowdsourcing includes Web activities such as gathering information and retrieving users' content from third-party Web sites. Many piggyback crowdsourcing activities support major search engines such as Google, Microsoft, and Yahoo!. The crowd-generated content is used for spelling correction, finding synonyms, keyword generation, customized product recommendations, adaptive presentation of Web sites, and so on (Doan et al., 2011).

In his book, Howe (2008) proposes another classification of the crowdsourcing types, distinguishing between collective intelligence or crowd wisdom, crowd creation, crowd voting, and crowdfunding.

1.4.3 Collective Intelligence or Crowd Wisdom

Based on the idea that a group of people is smarter than single individuals, this form of crowdsourcing aims to gather input from large groups of people with different backgrounds. Howe compares this collective intelligence approach to a "suggestion box" (Howe, 2008), a model that many companies have used as a basis for their crowdsourced "idea jams" (Howe, 2008).

1.4.4 Crowd Creation

This model taps into the creative potential of crowds. Multiple successful co-creation projects initiated by firms from different industries have demonstrated that the crowd creation model not only benefits from fresh new ideas from the crowd, it also leads to faster introduction of new

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[2] Optical Character Recognition

products to the market, faster customer adoption, and better sales results (Bartl, Jawecki, & Wiegandt, 2010; Bilgram, Bartl, & Biel, 2011; De Massis et al.).

1.4.5 Crowd Voting

This model is based on "the crowd's judgment to organize vast quantities of information" (Howe, 2008) that result from the "open call" (Howe, 2008) format of crowdsourcing. Often cited by scholars, Threadless.com (http://www.threadless.com/) is a good example of a company that has crowdsourced the entire design and selection process for its products. Not only is the design of its T-shirts crowd-created, but Threadless.com also relies on the crowd to vote on and select the best designs, which are then printed and offered for sale (Brabham, 2008).

1.4.6 Crowdfunding

Crowdfunding is a fundraising method for projects and ventures whereby small amounts of money are collected from large groups of people via the Internet. This practice is considered beneficial for businesses, entrepreneurs, and the economy as a whole, because it generates revenue and increases the customer base (Prive, 2012). Moreover, crowdfunding allows groups of contributors to replace traditional funding institutions (Howe, 2008). Nevertheless, crowdfunding is still regarded as a highly unregulated fundraising method, and it carries the risk of fraud (Gladstone, 2012).

Another taxonomy of the types of crowdsourcing distinguishes between external and internal crowdsourcing:

1.4.7 External Crowdsourcing

The external crowdsourcing initiatives source knowledge and ideas from organizations' external environment. External crowdsourcing includes all crowdsourcing activities that are addressed to the crowd as an open tender, and generally allow anyone to participate. However, in some cases firms searching for crowd-generated content can use preselection criteria for participants. External crowdsourcing is the most popular and studied type of crowdsourcing to date.

1.4.8 Internal Crowdsourcing

Internal crowdsourcing or "Intra-Corporate Crowdsourcing (ICC) refers to the distributed organizational model used by the firm to extend problem-solving to a large and diverse pool of self-selected contributors beyond the formal internal boundaries of a multi-business firm: across business divisions, bridging geographic locations, leveling hierarchical structures" (Villarroel & Reis, 2010).

Many other taxonomies of crowdsourcing can be found in the literature. For example, Frei (2009) identifies four types of paid crowdsourcing: micro tasks, macro tasks, simple projects, and complex projects. Schenk and Guittard (2009) distinguish between the following types of crowdsourcing: integrative and selective crowdsourcing (depending on the preselection criteria for crowd workers) and crowdsourcing for routine tasks, complex tasks, and creative tasks.

Despite the various classifications of the different crowdsourcing models, they all share a common characteristic: they depend on contributions from the crowd (Felstiner, 2010). What differentiates them is the nature of these contributions, which can vary significantly across models (Howe, 2008).

1.5 The Crowdsourcing Industry

The following section provides an overview of the current knowledge on crowdsourcing, presented as two main topics: firms and crowdsourcing, and crowds and crowdsourcing. The aim is to describe the benefits for crowdsourcing adopters as well as the negative aspects of crowdsourcing. Because the purpose of this study was to examine crowdsourcing as a business method, the literature review presented below focuses on the current knowledge on the business use of crowdsourcing in terms of business and innovation benefits for the firms using crowdsourcing, advertisement strategies, evaluation and community management approaches, technology strategies supporting crowdsourcing implementation, and the impact of crowdsourcing on the organization's culture.

The expansion of crowdsourcing during the last decade is remarkable. As could be expected in an Internet-dependent industry, crowdsourcing in its modern form first appeared in online-exclusive sectors of the economy, such as Web content creation, advertising, audio and video transcription,

software development, database building, digitization, and market research. The first adopters of crowdsourcing were small firms with limited resources. Later, as crowdsourcing models developed, crowds grew, and crowdsourcing platforms became more sophisticated, medium and large firms also entered the industry (Felstiner, 2010).

According to Frei (2009), just the paid crowdsourcing labor market alone contains more than 1 million workers worldwide. These workers earned over $1–2 billion in the last decade, and paid crowdsourcing vendors currently earn about $500 million annually.

1.5.1 Firms and Crowdsourcing

1.5.1.1 Business and Innovation Benefits and Risks

Crowdsourcing thrives thanks to the multiple advantages it offers to firms. The most significant advantages are work force scalability and low labor costs, which can result in impressive cost savings for businesses. On-demand crowd labor allows the workforce to grow and shrink over time, depending on the company's changing needs. Crowdsourcing also means little or no personnel administration costs or recruitment expenses, low transaction costs, and fewer logistics issues due to the anonymity of interactions and the Web-based work environment (Felstiner, 2010).

Companies also benefit from the diversity of crowd workers. Demographic surveys on Amazon's Mechanical Turk platform show that crowdsourcing gives firms immediate access to crowds with widely varying backgrounds and skills, located literally all over the planet (Ipeirotis, 2010; Ross, Zaldivar, Irani, & Tomlinson, 2009).

The openness of the firm-to-crowd relationship also creates additional publicity for any business using this model. The fact that crowdsourcing gives firms access to their future clients also allows better market predictions and adjustment of firm strategies according to the crowd's expectations (Bartl, Jawecki, & Wiegandt, 2010; Bilgram, Bartl, & Biel, 2011). Crowdsourcing also reduces a firm's dependence on its providers, because the tasks are not outsourced to a single or a limited number of subcontractors. By the same token, it minimizes the risk of not obtaining a solution to a given problem (Schenk & Guittard, 2009).

All these great advantages of crowdsourcing are of course accompanied by certain risks. First, the anonymity of the crowdsourcing labor model allows little or no accountability on the part of crowd contributors, compared to typical contractual employment relationships between employers and employees. This lack of responsibility often results in low-quality work (Felstiner, 2010). Thus, "low quality or unexpected results are the single biggest factor in companies choosing to abandon paid crowdsourcing as a viable outsourcing option" (Frei, 2009). Moreover, although many businesses are interested in starting using crowdsourcing, when the results fall below their expectations, they are no longer willing to give it another try (Frei, 2009).

The low quality of submitted materials is actually the reason that the terms of use on paid crowdsourcing platforms usually stipulate that firms have the right to reject unsatisfactory work without payment. Moreover, in cases where quality really matters, companies must invest in quality assurance mechanisms, which results in less cost savings from crowdsourcing. To improve the quality of submissions, firms usually apply qualification restrictions or preselection criteria for contributors, or else they use multiple crowd workers to solve the same task in order to verify the solution (Felstiner, 2010).

Other risks for firms that use crowdsourcing include intellectual property risks due to sharing firm information with large groups of anonymous Internet users (Felstiner, 2010). Neither should the risk of a firm's dependence on a crowdsourcing platform be neglected, including the strategic decisions made by platform owners. Furthermore, just like outsourcing, the use of crowdsourcing may also result in "unlearning and brain drain" for the firm (Schenk & Guittard, 2009).

1.5.1.2 Advertisement Strategies

The literature review on firms' crowdsourcing practices reveals that organizations advertise their crowdsourcing initiatives in various ways, depending on the type of crowdsourcing (e.g., internal, external, paid or unpaid), the firm's specific needs, and the goals of the initiatives. For internal crowdsourcing, some preferred advertisement strategies include the use of internal communication channels such as email and an Intranet to inform employees about crowdsourcing campaigns. Meanwhile, some of the most popular advertisement approaches for firms' external crowdsourcing initiatives include the use of social media such as Facebook, Twitter, LinkedIn etc., to attract and inform external contributors.

The literature contains examples of effective advertisement strategies for the crowdsourcing initiatives of British Telecommunications plc. Their internal crowdsourcing initiatives have been advertised to employees via internal printed and online versions of a firm magazine intended to encourage employee innovation. In addition, employees regularly receive "top-down communications" (APQC, 2013) describing the firm's innovative efforts, emphasizing management support for innovation-related endeavors. A similar advertisement approach for internal crowdsourcing is Cisco's strategy for its internal crowdsourcing platform I-Zone. At Cisco, senior executives are in charge of promoting new ideation challenges by sending out broad communications to the firm's employees (APQC, 2013).

Among the variety of possible advertisement approaches for crowdsourcing initiatives is the advertisement strategy of the external crowdsourcing innovation portal G-WIN (General Mills Worldwide Innovation Network) of General Mills Inc. The firm took part in various events across the globe, including trade show booths, conferences, and "town hall meetings" (APQC, 2013) with preselected organizations. At these events, General Mills explained the firm's need for innovative ideas, the potential benefits of partnering with the firm, and the goals of the G-WIN innovation program (APQC, 2013).

1.5.1.3 Intellectual Property Management

The analysis of the literature on intellectual property (IP) management of firms' crowdsourcing practices shows that many organizations initiate various internal and external crowdsourcing initiatives, and that firms may frequently handle IP in different ways depending on the type of crowdsourcing, project goals, and the firm's preferences, legal concerns, and other specific circumstances.

For external crowdsourcing, a firm's IP management policies are usually set forth in the terms and conditions of the "clickwrap" (Felstiner, 2010) participation agreements that the contributors have to accept in order to participate in the initiatives. For paid external crowdsourcing, the terms of use for the crowdsourcing Web platforms usually require crowd workers to waive any IP rights arising from the employment relationship. By submitting a solution to a problem, the contributors transfer the IP rights of their work to the requesting firms in return for a monetary reward. The participation agreements usually also give firms the right to reject unsatisfactory work without paying the contributor, and at the same time without necessarily relinquishing the

right to use the rejected work. This means that firms retain the IP rights of all submitted materials, and can use all of them even if they pay a reward only for the winning solution (Felstiner, 2010).

A study conducted by APQC (2013) concludes that firms' IP management approaches depend to a great extent on organizations' experience with open innovation methods. Whereas firms that use external crowdsourcing usually seek IP ownership for all submitted materials, only half of the best-practice firms identified by APQC (2013) actually claimed IP ownership for crowd-generated content. The motivation behind this decision is that best-practice firms believe that crowd contributors would be more motivated and creative if they retain the IP of their ideas. In addition, such IP management policy protects firms from IP-related disputes in cases of infringement (APQC, 2013).

A good example of firm IP management policies for externally and internally generated innovative ideas is Cisco Systems Inc.'s case. Cisco encourages its employees to file patents and to protect the IP of their patent-relevant ideas. For external crowdsourcing initiatives (the I-Prize global innovation contest), Cisco's IP management policy has evolved considerably over time: from claiming all IP for all submissions to claiming broad licenses for crowd-generated materials and finally to the possibility of future licensing for only some ideas of interest for the company. Moreover, Cisco also attempts to protect its IP interests by excluding participants from some countries and regions due to local legal restrictions, which would affect its IP acquisition opportunities. Cisco also conducts strict IP risk assessments of all submitted materials (APQC, 2013).

Lessl, Bryans, Richards, and Asadullah (2011) describe another interesting IP management policy for external crowdsourcing for drug discovery at MRC Technology (MRCT), the technology transfer arm of the Medical Research Council (MRC), UK. For the crowdsourcing initiative Call for Targets "no transfer of IP rights is required—any IP that is developed as part of the collaboration is jointly owned and any revenue that is generated is split between the two parties under the terms of a pre-negotiated agreement" (Lessl et al., 2011).

The above-described intellectual property policies show that, at this development stage of the crowdsourcing labor model, there are no commonly established practices or regulations for intellectual property rights, such that firms deal with IP in a variety of ways.

1.5.1.4 Evaluation and Community Management

The review of the literature on crowdsourcing shows that the evaluation and community management principles of firms' crowdsourcing initiatives differ widely depending on the type of crowdsourcing (e.g., internal, external, paid, unpaid) and the specific circumstances, such as a firm's goals and preferences.

An instructive example for evaluation and community management of internal crowdsourcing is British Telecommunications plc's internal crowdsourcing portal New Ideas Scheme. This initiative aims to gather employees' suggestions on how to run the business more efficiently and effectively as well as ideas for new products and improvements to existing products (APQC, 2013).

At British Telecommunications, the evaluation and community management of internal crowdsourcing is handled by designated staff members who review the submissions and remove duplicates, which comprise from 40 to 50% of the submitted materials. After the initial evaluation, a group of about 100 firm evaluators, who are experts in different fields and from different organizational units, review the submissions. Ideas that pass the expert evaluation are then prepared for adoption and launch by assigned product or operational managers. At British Telecommunications, only about 3% of the submitted ideas end up being adopted. British Telecommunications has also assigned specific employees to communicate with participants and maintain employees' interest in and engagement with the firm's internal crowdsourcing initiatives. In addition, they keep contributors informed about the status of their submissions. These employees also initiate and manage problem-solving campaigns that are restricted to a limited number of contributors who are experts in specific fields. In order to facilitate the evaluation of submitted ideas, the New Ideas Scheme platform also includes features that allow employees not only to submit ideas but also to vote and comment on others' submissions (APQC, 2013).

The evaluation and community management strategies of firms using external crowdsourcing for business and innovation purposes comprise a range of original and creative evaluation approaches. For example, Cisco's runs its external crowdsourcing initiative I-Prize as regional contests in different countries. The evaluation approach for the I-Prize contest in Russia, seeking crowd-generated investment ideas for the development of a planned high-technology business

area near Moscow, included an expert jury evaluation. Most of the jury members were Russian entrepreneurs and government representatives, and the only Cisco representative was Cisco's general manager in Russia. Another example of an external crowdsourcing evaluation strategy is the G-WIN innovation portal of General Mills Inc. Submissions were evaluated by internal and third-party external evaluators from the partnering firm YourEncore Inc. (APQC, 2013).

1.5.1.5 Technology Strategies

In order to obtain a comprehensive understanding of crowdsourcing as a business and innovation method, it is also important to consider the technology settings that support its implementation. The analysis of the literature on the subject shows that firms that seek crowd-generated content are usually not the owners of the Web platforms they use for posting. However, a more detailed investigation of firms' technology strategies for crowdsourcing suggest that this is typically the case only for external crowdsourcing initiatives, and when it comes to internal crowdsourcing, for security and confidentiality reasons, firms tend to own the platforms, servers, and other technology solutions that support their initiatives. For example, Cisco uses different technology strategies for its internal and external crowdsourcing initiatives, as described in an APQC (2013) study. Cisco's technology strategies include the use of its "homegrown" (APQC, 2013) tools to support innovation, as well as commercially available crowdsourcing and innovation management tools provided by Brightidea[3] and Spigit[4] for external crowdsourcing initiatives (APQC, 2013).

1.5.1.6 Firm Culture

The implementation of crowdsourcing introduces changes to firms' traditional closed innovation, collaboration, and R&D processes. These changes "rarely occur within an organization without some cultural resistance" (APQC, 2013). Therefore, it is important to consider the effects of crowdsourcing as a business approach on the organizational culture.

Studies have investigated the impact of open innovation methods on firms operating in different industrial sectors. The open innovation team at Amway promoted the benefits of open innovation

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[3] A San Francisco-based innovation management software provider.

[4] A Pleasanton, California-based innovation management software provider.

practices to firm employees via a presentation that explained the need for changes to existing innovation methods. Amway also emphasized the management support of such changes in order to facilitate acceptance of new innovation approaches and to lessen cultural resistance within the company. Despite these efforts, Amway experienced multiple cultural resistance effects resulting from the implementation of open innovation practices. These included the "not invented here" attitude, whereby employees do not accept external ideas and consider externally generated input as low-quality and non-professional; the "I don't have time for this" effect, whereby employees refuse to accept externally generated material and regard it as additional work; and the "pocket veto" effect, whereby the firm's open innovation team identifies a potential new technology but the rest of the firm's units are not interested because they have not yet identified the need for it. Other cultural resistance effects at Amway included the "my needs are secret" effect, which occurs when the various units cannot articulate or communicate their needs to the open innovation team; the "deep pockets, short arms" effect, whereby the marketing and product development units refuse to fund the development of a new technology that they were previously interested in; and the "speed waiting" effect, whereby the product development and marketing units cannot decide whether or not they are interested in a proposed solution (APQC, 2013).

Finally, it is important to note that a considerable source of cultural resistance to the use of crowdsourcing for business purposes is the fact that modern forms of crowdsourcing are considered an employment threat by employees in many countries (Felstiner, 2010; Howe, 2008).

1.5.2 Crowds and Crowdsourcing

There is little doubt that crowdsourcing offers more advantages to businesses than to crowd workers. Nevertheless, it is a quite attractive occupation for crowds, thanks to its exceptional flexibility: no other employment model offers such independence and freedom in terms of choosing one's working hours, type of work, and workspace. Crowdsourcing allows increasing one's knowledge in a specific area, because workers can select the types of tasks they want to work on. It can also convert one's "spare cycles – periods when the brain is operating but not producing anything of value" (Felstiner, 2010) into useful content (Felstiner, 2010; L. Von Ahn, 2006). Moreover, the entry barriers for this labor market are usually very low: the micro task type of crowdsourcing requires contributors to have only basic qualifications, and all that workers need to get started is an Internet-connected computer. Crowdsourcing also has a beneficial impact

on communities, as it can generate revenue for people in rural areas and in developing countries (Felstiner, 2010; Ipeirotis, 2010; Ross et al., 2009).

The benefits that workers can obtain from crowdsourcing vary depending on individual needs and motivations. Contributors who work on crowdsourced tasks can earn money and/or increase their knowledge, whereas others benefit from the social connections and interactions on the Internet, the fun they have while working on a task, or simply the personal satisfaction they derive (Ipeirotis, 2010).

Nevertheless, the unique flexibility of the crowdsourcing labor model comes with a price. A major disadvantage of this type of work is the generally very low remuneration. Although the financial incentives vary widely depending on the type of crowdsourcing, the most popular and accessible type-the micro tasks, offer extremely low pay per task (as little as 1 cent on Amazon's Mechanical Turk). This is why some authors compare crowdsourcing platforms to "digital sweatshops" (F. Graham, 2010; Zittrain, 2009). In addition, crowd workers operate in a fully unregulated labor market: they have no defined employment status, no minimum wage, no health or retirement benefits, no child labor protection, no job security, and so on. For example, the crowdsourcing labor model allows firms to reject submitted materials without payment, even though they can still use all the submissions (Felstiner, 2010; Zittrain, 2009). Another risk for crowd participants is the information asymmetry typical of crowdsourcing platforms: workers usually have no information about their actual employer, and very limited information about the tasks themselves. This allows fraud and privacy violations, as there is no guarantee of confidentiality or responsible use of personal data, by either the firms or the crowdsourcing platform owners (Felstiner, 2010).

1.5.3 Unethical Use of Crowdsourcing

Most studies on crowdsourcing focus on the potentially positive effects of crowdsourcing on businesses and communities. Although these positive aspects should not be underestimated, in order to gain a broader understanding of this phenomenon, one must consider the negative aspects of crowdsourcing as well.

As suggested by Harris (2011), before discussing the unethical uses of crowdsourcing, it is important to note that the definitions of ethical and unethical behavior differ across cultures and

communities. Moreover, because crowdsourcing crosses cultural and geographic boundaries, it becomes challenging or even impossible to apply common laws and ethical policies to this model. In addition, besides the variety of ethical norms across social groups, one must consider the openness of the crowdsourcing model. When these factors are combined with the anonymity of the Internet, the result is that just about every crowdsourced task will find people willing to handle it (Harris, 2011).

Some of the unethical techniques used by crowdsourcing task providers include social engineering, which manipulates Internet users to share confidential information, which is then used for identity theft or illicit financial gains; human computation tests, which are used for password and CAPTCHA test cracking; and the "identity-relaxed websites" (Harris, 2011), which are used to construct false Internet identities. Other unethical uses of crowdsourcing include review manipulation, information gathering, and even personal surveillance (Harris, 2011).

Unethical uses of crowdsourcing are greatly facilitated by the information asymmetry on crowdsourcing platforms. Typically, crowd workers have no idea who their actual employer is or what the tasks they are working on will be used for. This lack of information prevents crowd workers from making objective judgments about the morality or real purpose of crowdsourced tasks (Felstiner, 2010; Zittrain, 2009).

1.6 Who Uses Crowdsourcing and Why

Before examining an actual case of crowdsourcing implementation for business and innovation purposes, it would be useful to know what kinds of firms use crowdsourcing today and for what reasons.

In summer 2012, the researcher conducted a preliminary study in order to identify companies that have used or still use crowdsourcing, and attempted to draw conclusions about the industry sectors that find this method attractive and the general reasons for firms to use crowdsourcing. During this phase, documented cases of firm crowdsourcing initiatives were identified in the literature. However, the majority of the firms' crowdsourcing practices were identified through Web searches of specialized Web sites, blogs dedicated to crowdsourcing and open innovation practices, and firms' Web sites.

As a result, more than 80 firms that use crowdsourcing were identified in only a two-week period. Moreover, these firms represent almost all industry sectors according to the North American Industry Classification System (NAICS) Canada 2012, and various types of crowdsourcing were used. This confirms Thomas (2011a) claim that "Crowdsourcing is the new black. Everyone's doing it" (Thomas, 2011a).

The limited timeframe for identifying firms that use crowdsourcing nevertheless allowed various examples of crowdsourcing initiatives to be gathered. However, these examples do not include all possible crowdsourcing practices: the identified cases of firms that use crowdsourcing represent only a fraction of the actual number. Therefore, the cases presented here should not be regarded as an exhaustive classification of firms' crowdsourcing practices.

The first two classifications of the identified crowdsourcing initiatives are grouped by industry sector and subsector according to the North American Industry Classification System (NAICS) Canada 2012. The detailed classification by industry sector and subsector of the identified cases of firms' crowdsourcing initiatives is presented in Appendix 2.

Table 1-1: Classification by Industry Sector

NAICS CODE	INDUSTRY SECTOR	FIRMS USING CROWDSOURCING
21	**Mining, quarrying, and oil and gas extraction**	Goldcorp
22	**Utilities**	E.On, Orange UK, British Telecommunications
31–33	**Manufacturing**	Nivea (Beiersdorf), L'Oreal, Henkel, Colgate, Johnson & Johnson, Unilever, John Fluevog Boots & Shoes, Converse, Adidas, Swarovski Ducati Motor Holding, BMW, Audi, Fiat, Chrysler, Chevrolet, Citroen IBM, LG, Philips, Dell, BASF, Life Technologies, Microsoft, Sony, Siemens, Cisco, Kraft, Unilever, General Mills, Sara Lee, Starbucks, Pepsi Canada, Big Al's kitchen, McDonald's Procter & Gamble, Unilever, Johnson & Johnson, Clorox, Henkel, Newell Rubbermaid, Stanley, Colgate, BASF, 3M, Sony, Syngenta Thoughtseeders, Newell Rubbermaid, GlaxoSmithKline, 3M, Pfizer, Life Technologies, Roche, Johnson & Johnson, DuPont, Amway, Bombardier Transportation, Boeing

Table 1-1: Classification by Industry Sector (con't and end)

44–45	**Retail trade**	Swarovski, McDonald's
48–49	**Transportation and warehousing**	American Airlines, Air France, British Airways, Estonian Air, Finnair+ Helsinki Airport, KLM, Lufthansa Cargo, Ryanair, SAS Scandinavian, Westjet, NASA
51	**Information and cultural industries**	Chicago Sun-Times, Popular Science Magazine, The Economist, Orange UK
52	**Finance and insurance**	Kickstarter, Indiegogo, RocketHub, Rock The Post
54	**Professional, scientific and technical services**	PwC Canada, KPMG
55	**Management of companies and enterprises**	PwC Canada, KPMG
61	**Educational services**	Oxford University
62	**Health care and social assistance**	WWF-Switzerland, Rockefeller Foundation
72	**Accommodation and food services**	Starbucks, McDonald's
91	**Public administration**	Government of Iceland, US Government, Canadian Government

Table 1-2: Classification by Industry Subsector

NAICS CODE	**INDUSTRY SECTORS AND SUBSECTORS (NAICS 2012)**	**FIRMS USING CROWDSOURICNG**
21	**Mining, quarrying, and oil and gas extraction**	
212	Mining and quarrying (except oil and gas)	Goldcorp
22	**Utilities**	E.On, Orange UK, British Telecommunications
31–33	**Manufacturing**	

Table 1-2: Classification by Industry Subsector (con't)

311	Food manufacturing	Kraft, Unilever, General Mills, Sara Lee, Starbucks, Big Al's kitchen, McDonald's
312	Beverage and tobacco product manufacturing	Pepsi Canada
315	Clothing manufacturing	John Fluevog Boots & Shoes, Converse, Adidas
325	Chemical manufacturing	Procter & Gamble, Unilever, Clorox, Henkel, Colgate, BASF, Syngenta Thoughtseeders, Newell Rubbermaid, GlaxoSmithKline, 3M, Pfizer, Life Technologies, Roche, Johnson & Johnson, DuPont, Nivea (Beiersdorf), L'Oreal, Henkel, Colgate, Johnson & Johnson, Unilever, DuPont, BASF, Amway
326	Plastics and rubber products manufacturing	Newell Rubbermaid, Henkel, DuPont, BASF
333	Machinery manufacturing	BASF, Stanley
334	Computer and electronic product manufacturing	Philips, Dell, BASF, Life Technologies, Microsoft, Sony, Siemens, Cisco
335	Electrical equipment, appliance and component manufacturing	Philips, BASF, Sony, Stanley
336	Transportation equipment manufacturing	Ducati Motor Holding, BMW, Audi, Fiat, Chrysler, Chevrolet, Citroen, Bombardier Transportation, Boeing, BASF
44–45	**Retail trade**	
445	Food and beverage stores	McDonald's, Starbucks
453	Miscellaneous store retailers	Swarovski
48–49	**Transportation and warehousing**	
481	Air transportation	American Airlines, Air France, British Airways, Estonian Air, Finnair+ Helsinki airport, KLM , Lufthansa Cargo, Ryanair, SAS Scandinavian, Westjet, NASA
482	Rail transportation	Bombardier Transportation
51	**Information and cultural industries**	

Table 1-2: Classification by Industry Subsector (con't and end)

511	Publishing industries (except internet)	Chicago Sun-Times, Popular Science Magazine, The Economist
517	Telecommunications	Orange UK, Cisco
52	**Finance and insurance**	
522	Credit intermediation and related activities	Kickstarter, Indiegogo, RocketHub, Rock The Post
541	**Professional, scientific and technical services**	PwC Canada, KPMG
551	**Management of companies and enterprises**	PwC Canada, KPMG
611	**Educational services**	Oxford University
62	**Health care and social assistance**	
624	Social assistance	WWF-Switzerland, Rockefeller Foundation
722	Food services and drinking places	Starbucks, McDonald's
91	**Public administration**	
911	Federal government public administration	Government of Iceland, US Government, Canadian Government

Table 1-3: Classification by Crowdsourcing Purpose

№	PURPOSE	FIRMS USING CROWDSOURCING
1	**Co-creation**	Nivea (Beiersdorf), John Fluevog Boots & Shoes, Converse, Adidas, Swarovski, Ducati Motor Holding, BMW, FIAT, Audi, Bombardier Transportation E.ON, American Airlines, McDonald's, Chevrolet, Citroen, Clorox
2	**Gathering third-party proposals** **(licensing, cooperative development, acquisition)**	Procter & Gamble, Boeing, Unilever, LG, Syngenta Thoughtseeders, Henkel, Newell Rubbermaid, Stanley, Faultless Inventors, General Mills, GlaxoSmithKline, BASF, Colgate, 3M, Sara Lee, Johnson & Johnson Consumer Products, Pfizer, Air France, Bombardier Transportation, Life Technologies, DuPont

Table 1-3: Classification by Crowdsourcing Purpose (con't and end)

3	**Brainstorming and/or targeting potential areas for innovation and new project ideas**	IBM, Philips, Dell, IDEAnet, Orange UK, PwC, NASA, Roche, The Economist, Goldcorp, Sony, Bombardier Transportation, Government of Iceland, US Government, Canadian Government, Amway, Cisco, British Telecommunications
4	**Social action**	Pepsi, WWF-Switzerland, Oxford University, Chicago Sun-Times, McDonald's, Rockefeller Foundation, Popular Science Magazine, Sony
5	**Internal collaboration and idea management**	IBM Data Governance Council, KPMG, 3M, Bombardier Transportation
6	**Surveys, ranking activities, and discussions**	Starbucks, Big Al's kitchen, Microsoft
7	**Contests and events as marketing tools**	L'Oreal, Sony, Chrysler, Chevrolet, Siemens, Bombardier Transportation

The classification by industry sector (according to the North American Industry Classification System (NAICS) Canada 2012) shows that most firms that use crowdsourcing operate in the manufacturing sector, followed by transportation and warehousing and information and cultural industries.

The distribution by subsectors of the economy shows that the vast majority of firms using crowdsourcing in sector manufacturing belong to subsector chemical manufacturing followed by subsectors transportation equipment manufacturing, computer and electronic product manufacturing, and food manufacturing. The sector transportation and warehousing includes firms using crowdsourcing especially in subsector air transportation, while the publishing industries (except Internet) are the subsector most actively using crowdsourcing in sector information and cultural industries.

It is important to note that many of the firms that use crowdsourcing operate in more than one industry sector, especially the big multinational companies. Therefore, it was not possible to specifically classify the firms by industry sector and subsector. The same problem occurs in attempting to construct an exhaustive classification framework for the crowdsourcing purpose. In fact, firms use crowdsourcing for many reasons. For example, they may use it for idea generation, crowdvoting, and as a marketing tool at the same time. It is also worth mentioning that each

crowdsourcing activity has an impact on publicity and marketing due to word-of-mouth effects and Internet communications, which raise customer awareness of the firm's products and initiatives.

In this study, crowdsourcing uses are classified according to the following purposes: co-creation; gathering third party proposals (licensing, cooperative development, acquisition); brainstorming and/or targeting potential areas for innovation and new project ideas; social action; internal collaboration and idea management; surveys; ranking activities and discussions; and contests and events as marketing tools.

Some examples of each purpose are discussed below:

1.6.1 Co-creation

A successful co-creation crowdsourcing project in the automotive industry is the Co-creation Lab of BMW Group, launched in 2010. The Lab is a place where car enthusiasts can share and discuss ideas about the automotive world of the future. The Web platform offers various co-creation contests to crowd contributors, user toolkits, virtual concept tests, innovation research studies, and lead user application forms (Bartl, n.d.). BMW Group's innovation challenge attracted more than 500 participants from all over the world in only six weeks. They submitted more than 300 ideas under the different categories (Bartl et al., 2010).

According to Bartl et al. (2010), co-creation should be viewed as "a strategic program rather than as a 'just in time' outsourcing of innovation tasks." Moreover, "a co-creation programme supports the idea of a continuously learning organization by expansion of its boundaries and should not be narrowed down to single project outcomes" (Bartl et al., 2010).

1.6.2 Gathering Third-party Proposals

Gathering third-party proposals includes licensing, cooperative development, acquisition, and commercialization of market-ready, patented, or patent-pending products and ideas. Howe (2006b) likens this crowdsourcing approach to a more sophisticated form of a "suggestion box."

Many companies in the manufacturing industry sector use this method to get shovel-ready ideas for innovation. A typical example of gathering third-party proposals for new product development is Henkel AG & Co. KGaA's Innovation Partnership Program:

> "*Do you have a granted patent, a published patented application, or a registered and published utility model or design? If you can answer "yes" to any of these questions, you are eligible to participate in the Henkel Innovation Partnership Program.*
> *We are looking for patented ideas for products, processes and designs that relate to our three business areas. If you have invented something that fits our criteria, we would like to know more about it!"* (Henkel, n.d.).

Henkel also hosts on its firm Web site a partnership innovation program called "Partnerships – Quest for the Best":

> *"In our initiative we tell you what we are looking for, which technical problems we have and would like to solve, with your help. Do you have a technical solution to our formulation, packaging or process challenges? We are looking for the best partner having a solution to our challenges."* (Henkel, n.d.).

1.6.3 Brainstorming and/or Targeting Potential Areas for Innovation and New Project Ideas

A compelling example of crowdsourcing, cited often in the literature, is the Goldcorp Challenge launched in March 2000 by Goldcorp Inc., a Canadian mining company (Brabham, 2008; Ideaconnection, n.d.). The Goldcorp Challenge "triggered a new gold rush" (Ideaconnection, n.d.) by sharing all Goldcorp's geological data with anyone around the world. The goal was to increase the gold production of the underperforming Red Lake gold mine. Participants were asked to identify potential gold targets and to locate the next 6 million ounces of gold. The Goldcorp Challenge offered more than US$500,000 in prize money and attracted a crowd of more than 1,400 participants from 51 countries and various backgrounds—from geologists to mathematicians, military officers, consultants and students. The winning submission was a collaborative effort by two groups from Australia. The Goldcorp Challenge identified 110 sites, 50% of which were previously unknown by the company. In addition, 80% of the new targets contained substantial gold ledges (Brabham, 2008; Ideaconnection, n.d.). This fascinating case of crowdsourced gold mining was inspired by the successful creation of the Linux operating system, which used the Internet as a collaboration enabler (Ideaconnection, n.d.).

1.6.4 Social Action

An example of the combined use of crowdsourcing and crowdfunding for philanthropic purposes is the Global Giveback Challenge Series launched in 2012 by the Rockefeller Foundation and GlobalGiving.[5] The project was rolled out in three phases: identification of dire problems faced by vulnerable communities that can be solved by the InnoCentive Global Solver Community; selection of four water-related challenges from the submissions and posting on the InnoCentive Challenge Platform; and crowdfunding implementation of the solutions supported by GlobalGiving (InnoCentive, n.d.).

The four selected projects were the following: design of an easy-to-use method to purify water from Lake Victoria in Uganda, making it safe to drink; a sunlight/UV-light dose indicator; design of a low cost rainwater harvesting storage tank for a wetland region in Kerala, India; and small-scale river turbines for communities along the Amazon River (InnoCentive, n.d.).

1.6.5 Internal Collaboration and Idea Management

Crowdsourcing is usually regarded as a business model that brings in ideas from outside organizations. In fact, the evidence shows that many companies use crowdsourcing for internal purposes as well. Typically, these internal practices are designed to integrate employees into business decision-making processes. 3M's Web-based forum InnovationLive is an example of the internal use of crowdsourcing for strategic planning processes for sales, marketing, and R&D. The InnovationLive initiative attracted more than 1,200 employees from 40 countries, that generated more than 700 ideas, and identified nine new future markets (McKendrick, 2012).

1.6.6 Surveys, Ranking Activities and Discussions

Building Windows 8 was Microsoft's blog for crowdsourcing the development of the Windows 8 operating system. The Windows 8 crowdsourced initiative was inspired by the success of a prior crowdsourcing Microsoft blog, The Engineering of Windows 7. Both blogs served as communication and discussion tools linking the Microsoft software developers and the operating

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5 A charity fundraising Web site for social entrepreneurs and non-profit organizations searching for funding to improve their communities (GlobalGiving Foundation, n.d.).

systems' future users. They collected suggestions for design choices, real world usage, and new ideas for development (Thomas, 2011b).

Microsoft also crowdsourced the making of Microsoft Office 2010. Nine million users downloaded, tested, and gave feedback on the beta version of MS Office 2010 months before its official launch, and Microsoft collected more than 2 million comments. In addition, the crowdsourcing of MS Office 2010 included 600 selected beta testers who participated in Microsoft's Virtual Research Lab. The participants were asked to perform tasks such as formatting a section of a document or changing the background color of a presentation. Researchers observed and analyzed these actions in order to identify users' "unarticulated needs" (Chen, 2010).

1.6.7 Contests and Events as Marketing Tools

L'Oréal's crowdsourced advertisement is an example of crowd-generated content for marketing purposes. It also demonstrated the enormous cost-saving potential of crowdsourcing. L'Oréal's ad was created under a partnership between L'Oréal and Current TV, a cable TV channel showing user-generated content. Current TV includes a social network that lets viewers create and upload short video clips, comment on videos, and vote on them. The TV channel also posts assignments for ads for crowd contributors to work on. Using this "open call" (Howe, 2006b) model for ad creation, L'Oréal paid only $1,000 for a crowd-generated ad instead of $164,200 for a professional one (Businessweek, 2006).

In conclusion, in order to obtain a complete and realistic picture of firms' crowdsourcing practices, and after citing the above-described success stories of crowdsourcing campaigns, it is worth mentioning some failures. The following examples show that poor design and execution can ruin any crowdsourcing initiative. Some instructive cases are Coca Cola's decision, influenced by crowd opinion, to introduce the name "New Coke" and to attempt to abandon its legendary main brand. There is also the case of the low-cost airline carrier Ryanair, which, in an effort to find additional revenue options, decided to ask the crowd to submit ideas for new extra fees. The flood of droll solutions showed that the crowd has a very good sense of humor (SimplyFlying, 2011). And even famously, US President Barack Obama launched a crowd

campaign that was initially intended to collect questions for a press conference, but which ended up being overtaken by questions about the legalization of marijuana (Crowdsouricng.org, n.d.).

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The studies examined in this literature review addressed many aspects of crowdsourcing and its applications. First, a comparative analysis of crowdsourcing and other innovation and collaboration concepts was presented, underscoring the specific characteristics of crowdsourcing and defining it as a unique business method. The historical overview of the development of the crowdsourcing model over time and the discussion of various taxonomies and types of crowdsourcing identified in the literature allowed a better understanding of the practice of crowdsourcing.

The literature review placed particular emphasis on the business applications of crowdsourcing. It revealed that companies used various types of crowdsourcing, for which the targeted benefits and goals differed significantly. Therefore, it was difficult to generalize the benefits of crowdsourcing for firms' businesses and innovation efforts or their IP management policies, advertisement strategies, and evaluation and community management approaches concerning crowdsourcing, or how they solved new technology requirements for implementing crowdsourcing. The impact of crowdsourcing on organizational culture was also discussed, along with some examples of unethical uses of crowdsourcing.

Much of this literature review was devoted to an analysis of firms that use crowdsourcing. The idea was to identify the kinds of firms that found crowdsourcing attractive and what motivated them to practice it. The classifications of the identified cases revealed that these firms represented nearly all the industry sectors according to the North American Industry Classification System (NAICS) Canada 2012. The classifications also showed that crowdsourcing was used mainly in the consumer goods industries, and that the three main purposes for crowdsourcing use were co-creation, gathering third-party proposals (licensing, cooperative development, acquisition), and brainstorming and/or targeting potential areas for innovation and new project ideas.

Despite the fact that the literature review under this study provided a broader view on firms' crowdsourcing practices to date, there is still not enough knowledge on the impact of adoption of crowdsourcing as a business approach. This conclusion allowed identifying areas related to crowdsourcing that have been underexplored to date, it also served as a basis for selection of

promising cases of firm crowdsourcing practices for the case study that would allow in depth understanding of the phenomenon under study and expansion of the existing theoretical and practical knowledge on the subject.

CHAPTER 2 RESEARCH DESIGN

2.1 Research Objectives

The literature review reveals that crowdsourcing is an emerging model of innovation and collaboration. This type of innovation provides an opportunity for open innovation by allowing more inflow from outside the firm compared to traditional closed innovative practices.

Crowdsourcing provides firms with multiple advantages, notably work force scalability and diversity of contributors. Demographic surveys show that crowdsourcing gives firms immediate access to populations with widely differing backgrounds and skills, located across the planet (Ipeirotis, 2010; Ross et al., 2009).

Thanks to the continuous growth of the Internet and its numerous technological ramifications, firms can use crowdsourcing as a source of novel ideas and rapid solutions (Felstiner, 2010). Firms also benefit from the additional publicity and positive marketing due to the word-of-mouth effect of online communities. In addition, because crowdsourcing gives firms access to more potential customers, especially when used for co-creation purposes, they can more accurately predict markets and adjust their strategies to customer expectations (Bartl et al., 2010; Bilgram et al., 2011).

Although crowdsourcing is a relatively new trend, it has already received attention in the literature. The types of crowdsourcing have been classified by different authors from different perspectives. In addition, past research has investigated the IP related issues arising from the use of crowdsourcing; the different crowdsourcing labor models; the demographics of the crowd workers; the benefits, the risks and the motivations of both the firms and the crowd contributors. Even the negative sides of crowdsourcing have also been a subject of several research works. Nevertheless, the current knowledge on crowdsourcing does not include extensive empirical research on the impact of crowdsourcing on firms' business and innovation strategies.

The aim of this study was therefore to document crowdsourcing as an innovation strategy and to contribute to the empirical knowledge on this topic. More specifically, the research objectives were:

- To document and describe real-life crowdsourcing initiatives in terms of strategic foundations, processes, and technologies
- To assess the impact of crowdsourcing on firms' business and innovation strategies
- To identify obstacles to crowdsourcing implementation and to understand the limitations.

Through these research objectives, this study aimed to examine whether or not crowdsourcing can change a firm's innovation culture. The research intended to observe if there is indeed a tangible change in firm's typical closed collaboration and innovation models resulting from the use of crowdsourcing.

Moreover, the aim was also to examine the technological settings that support crowdsourcing. As indicated in Chapter 2, crowdsourcing requires the Internet and certain information technology tools such as a Web platform in order to connect the firm with crowd contributors. However, firms that seek crowd-generated solutions do not always own their own Web platform(s), suggesting that crowdsourcing may or may not have a direct impact on a firm's technology needs and strategies. Therefore, the researcher also wanted to investigate how the implementation of crowdsourcing as a business approach changes firms' technology needs and strategies, and how the firms meet these new technology needs.

2.2 Methods

2.2.1 General Research Approach

The research strategy must allow collecting sufficient data to meet the research objectives. Based on the research goals and the extent of the current knowledge on crowdsourcing, a qualitative, exploratory, and descriptive case study was deemed an appropriate research strategy. The next section presents the motivation for selecting this research strategy.

2.2.1.1 Qualitative Study

A qualitative research approach appeared to be a suitable choice for this project because it focuses on description, discovery, and an in-deep understanding of the phenomenon under study. Qualitative research aims to describe the context, processes, activities, and participants' behaviors and motivations; it also takes into account organizational and societal aspects. Qualitative approaches are generally associated with inductive theory building. A qualitative

approach would therefore be particularly relevant in this case, because the notion of crowdsourcing as a social fact remains underdeveloped to date (Moses & Knutsen, 2012).

Qualitative research also provides considerable flexibility. Researchers can readily adjust the research direction, concepts, and data collection tools and methods according to the setting and as the understanding of the phenomenon evolves. Qualitative research is based on fieldwork, firsthand experience, personal contact with the people involved in their natural surroundings, and truthful representation of events (California State University Long Beach, n.p; Saunders, Saunders, Lewis, & Thornhill, 2011).

2.2.1.2 Exploratory and Descriptive Study

The exploratory and descriptive approaches also allow meeting the project goals. A primary motivation for conducting this research project was the lack of knowledge and theories about crowdsourcing as a collaborative and innovation strategy.

Unlike standard experimental or quasi-experimental approaches (i.e., hypothesis testing), this study aimed to collect and analyze data from multiple sources, including fieldwork, in order to develop empirical knowledge on crowdsourcing. An exploratory study allows clarifying, gaining a detailed understanding, and assessing an organizational (or societal) phenomenon. The main elements of exploratory research have been used: a literature review and in-depth interviews with experts on the subject. Exploratory research also allows inductive theory building, as “the focus of the research is initially broad and becomes progressively narrower as the research progresses” (Saunders et al., 2011). Descriptive research provides a useful methodological complement, as it allows developing a clearer picture of the phenomenon under study, and it can act as a “forerunner” (Saunders et al., 2011) to the exploratory aspect of the research.

2.2.2 The Case Study as an Empirical Research Method

The case study is the main research strategy for this project. The motivation for this choice is supported by authors such as Yin (1984), who claims that (p. 1) “the case study is the preferred strategy when ‘how’ or ‘why’ questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context.” Other authors such as Stake (1978) recommend the case study as a realistic means to represent societal phenomena such as complex organizational settings.

Similarly, Merriam (1998) contends that the case study can provide a holistic picture and explanation of investigated phenomena. Moreover, the descriptive case study allows examining complex situations from different perspectives using various information sources. Examples of this include Brown (2008) who has used the case study approach for her doctoral project.

Thus, the case study was selected as the primary research strategy because the implementation of crowdsourcing as a business and innovation strategy is a highly complex and societal endeavor involving multiple activities, processes, participants, and technology and business strategy changes. Accordingly, various data collection techniques would be required, including semi-structured interviews, analysis of firms' documentation, and additional Internet research.

Furthermore, the case study provides universality, according to Yin (1994). Thus, case studies can be used to present individual cases as well as more broadly generalized case study findings. This would not only allow drawing conclusions about the impact of crowdsourcing on an individual firm's business and innovation strategies, it would also advance the overall knowledge on potential crowdsourcing applications for high-tech firms.

Yin defined four case study research strategies: single, multiple, holistic, and embedded case studies (Yin, 1994). According to the research objectives of this project, the most suitable research strategies would be the single and embedded case study. Saunders et al. (2011) suggest that a single case study is particularly relevant for examining understudied phenomena, which is the case for crowdsourcing. The embedded case study strategy was also considered relevant because it allows examining a single organization at the department and/or workgroup level, which would yield more detailed information about the firm's structure, its crowdsourcing practices, and the strategy and technology changes involved.

Last but not least, it is important to note some limitations of the case study research strategy. The main limitations are related to the case itself: the scope of the research project, the limited number of people interviewed, time and resource constraints, and other issues, hypotheses, and concerns (Brown, 2008; Merriam, 1998). Other disadvantages are the "more episodic, subjective procedures, common to the case study" (Stake, 1978), which are considered less reliable than experimental and co-relational approaches. Brown (2008) concludes that case study research has limited scope, and the findings usually cannot be generalized. Nevertheless, case studies are an effective means for exploring events and behaviors.

2.2.3 Data Collection

Based on the research objectives, the multi-method qualitative study (Saunders et al., 2011) was deemed the most appropriate data collection technique for this project, as it allowed collection of data from various sources, and better validation of the collected information. The data collection process included the following phases:

2.2.3.1 Literature Review and Internet Research

This phase provided an overview of the extant scientific and professional literature on crowdsourcing and its applications. The aim was to identify how this phenomenon is described in the literature and to examine the most important studies. This phase also allowed identifying areas related to crowdsourcing that have been underexplored to date, and which merit further investigation.

2.2.3.2 Identification of Firms that Use Crowdsourcing

Firms that use crowdsourcing were identified based on the literature review and additional Internet research. Over a two-week period, more than 80 firms from different industry sectors and countries and using various types of crowdsourcing were identified. Thus, potential organizations to contact were identified for the formal case study.

2.2.3.3 Selection of a Firm for the Case Study

The firm for the case study was selected from a list of firms identified as using crowdsourcing. Bombardier Transportation, Germany was chosen because the preliminary research results showed that this firm had used crowdsourcing for several innovation initiatives since 2009.

Another important reason for selecting Bombardier Transportation was the type of industry the firm represents. The researcher was particularly interested in studying the implementation of crowdsourcing in a non-consumer goods type of industry. The reason for this is the fact that the preliminary researches showed that crowdsourcing is used mostly in the consumer goods industries, and past research works have already described such crowdsourcing applications. This is why a case study research focused on the use of crowdsourcing in a mature and traditional industry like railway manufacturing, where real breakthrough innovation requires a lot of time, investments and R&D efforts seemed a very original and promising scientific endeavor.

A further selection criterion was the complexity of the crowdsourcing initiatives. Bombardier Transportation's initiatives would allow examining both internal and external use of crowdsourcing, and more particularly, the external crowdsourcing initiatives YouRail and YouCity, two highly complex and ambitious projects involving partnering firms, complex community management skills, software and hardware solutions, broad online communities, expert assessments, and more.

The first contacts with Bombardier Transportation, Germany were initiated thanks to previous contacts by the research team with its sister company, Bombardier Aerospace, Montreal, Canada.

2.2.3.4 Selection of Participants

The intention was to interview professionals at various hierarchical levels and with different fields of expertise who were responsible for planning, execution, assessment, and control of crowdsourcing initiatives at Bombardier Transportation. For each of the three initiatives (Innovation Express, YouRail and YouCity), the researcher wanted to interview at least one key individual in each of the following categories:

- Chief innovation officer
- Innovation manager
- Program and/or project manager
- Jury member
- R&D manager related to the crowdsourcing projects
- IT professional related to the crowdsourcing projects.

The only investment required by the participants was time (60 minutes per interview on average).

A champion within the company was available to help liaise between the research team and key individuals at Bombardier Transportation. This liaison person acted as an intermediary to help identify potential respondents and plan interviews with key individuals involved in the crowdsourcing projects.

2.2.3.5 Research Instruments

The research instruments for this project included semi-structured interviews, analyses of the firm's documentation, and additional Internet research on the three crowdsourcing initiatives

(Innovation Express, YouRail, and YouCity) that Bombardier Transportation has undertaken since 2009.

- **Semi-structured Interviews**

The semi-structured interviews, also called "non-standardized" (King, Cassell, & Symon, 2004) or qualitative research interviews, were most suitable for the case study research strategy in this qualitative, exploratory, and descriptive study. These interviews allowed addressing themes and questions that varied across interviews according to the context and the interviewee. Furthermore, the sequence and type of questions could vary according to the conversational flow. The semi-structured interview allows the researcher to inquire into the reasons behind a decision, attitude, or opinion. It is a highly flexible tool that includes open-ended and more general questions so that interviewees can explain and elaborate on their answers (Saunders et al., 2011).

The semi-structured questionnaire was the primary data collection instrument for this study. The questionnaire was developed based on the literature review and the research objectives. It includes open-ended questions addressing crowdsourcing in general and the three crowdsourcing initiatives at Bombardier Transportation, Germany in particular. The questionnaire is presented in Appendix 1.

- **Firm Documentation**

The firm's documentation was examined as part of the data collection process in order to provide a more detailed understanding of the context of the crowdsourcing projects, the organizational structure, the firm's processes and policies, and the project team structures and roles.

The firm documentation includes:

- Internal BT documents explaining the firm's structure and history
- Bombardier YouCity Innovation Project Executive Summary
- Bombardier YouRail Train Interior Design Contest 3D presentation
- Bombardier Transportation's company website.

2.2.3.6 Interview Process

The interviews were conducted at Bombardier Transportation's offices in Berlin and Henningsdorf, Germany in June 2013. The researcher had the opportunity to meet and interview three high-level BT managers who had multiple roles in planning, execution, assessment, and control of the three crowdsourcing initiatives at Bombardier Transportation. The interviews with these key professionals lasted from 60 minutes to two hours each, and were conducted at their place of work, at their convenience.

Using a semi-structured interview questionnaire, the interviewer asked individual participants to respond to a series of questions concerning Bombardier Transportation's three crowdsourcing initiatives (Innovation Express, YouRail, and YouCity). All interviews were digitally recorded. All information gathered from the interviews is held in strictest confidence, and respondents' anonymity is protected according to the terms set out in the Consent Form signed by the interviewees and the researcher prior to each interview.

Table 2-1: Key professionals interviewed at Bombardier Transportation, Germany

	Chief Innovation Officer	**Innovation Manager & Champion**	**R&D Manager & Jury Member**
YouRail	✓	✓	✓
YouCity	✓	✓	
Innovation Express	✓	✓	

2.3 Data Analysis

In the data analysis phase, the researcher seeks to understand the meaning of the data and consequently to draw conclusions and develop scientific theories. The data analysis phase begins with the start of the data collection process and continues thereafter (Saunders et al., 2011).

In the present study, the data analysis process included the following phases:

2.3.3 Transcription of Qualitative Data

The data transcription was a time-consuming process, as the researcher wanted to transcribe not only the respondents' words but also the way they expressed themselves, including intonation and other non-verbal cues. The interviews therefore took more than 34 hours to transcribe (one audio-recorded interview hour took approximately six hours to transcribe).

2.3.4 Data Analysis and Interpretation

An inductive data analysis approach was used. Inductive analysis is not based on a pre-existing theoretical framework that shapes the research process. Instead, theories emerge in light of the collected data and the data analysis. Based on the collected data, the researcher formulates explanations and draws conclusions. The data analysis technique used in this study is called "template analysis" (King et al., 2004). It consists of developing a list of codes and categories (template) and determining their association with relevant units of collected research data. Template analysis is a flexible analysis tool that combines both inductive and deductive principles with qualitative analysis. Predetermined codes are amended and reorganized as the research progresses, allowing exploration of research themes, patterns, and their relationships (Saunders et al., 2011).

2.3.5 Data Coding

The data were categorized and coded in an iterative and hierarchical process, which was an important step towards the phase of data analysis and generation of explanations of the phenomenon under study. Data coding is the process of developing codes and labels and assigning them to appropriate data units. Data categorizing and coding allow the research findings to be sorted, grouped, and further analyzed. The codes consist of certain key words related to the study purpose, study objectives, and various study themes and subjects. For the exploratory research, the codes were derived from the collected data, the terms used by the interviewees, and the literature review (Saunders et al., 2011).

2.4 Ethical Considerations

All data collected as part of this study are held in strictest confidence according to the terms of the Certificate of Ethical Acceptability approved by the Research Department of École Polytechnique de Montréal.

The number of the Certificate of Ethical Acceptability for this research project is CÉR-11/12-29.

Participation in this study was voluntary, and participants were able to withdraw from the study at any time, for any reason, with no penalty of any kind. Consent forms were signed by each participant prior to each interview in conformance with the Certificate of Ethical Acceptability.

The interviewees were able to ask questions about the consent form and the research methodology.

CHAPTER 3 RESULTS

The empirical results section presents a synthesis of the data collected from internal firm documentation, interviews with key professionals, and additional Web research on Bombardier Transportation, Germany. The first section provides a historical perspective on the company and highlights some of the significant milestones in its development. Section 3.2 presents the research findings, with a focus on business and innovation strategies, technology strategies, and the impact of crowdsourcing on BT's organizational culture.

3.1 The Firm

3.1.1 History of Bombardier Transportation

Bombardier Transportation, one of two subsidiaries of Bombardier Inc., is a world leading provider of rail equipment and solutions ranging from complete trains, sub-systems, system integration and signalling, and maintenance services. Its sister company, Bombardier Aerospace, is a global leader in the design, manufacturing, and support of business, commercial, specialized, and amphibious aircrafts. The successful combination of various fields of expertise and manufacturing capabilities makes Bombardier Inc. the only manufacturer in the world of both trains and aircrafts (Bombardier, 2013a, 2013b).

Bombardier Inc. has shown steady development since its humble beginnings in rural Quebec in the 1940s. In 1941, Joseph-Armand Bombardier founded a company called *L'Auto-Neige Bombardier* in Valcourt, Quebec, Canada, and started to produce snowmobiles for the Canadian market. The firm was a very successful snowmobile manufacturer known for the outstanding quality of its products. Nevertheless, multiple setbacks impacted the business over the years. For example, during the Second World War, the Canadian government issued war-time restrictions that required snowmobile buyers to prove that snowmobiles were essential for their livelihood. In 1948, in addition to very mild Canadian winters, the Quebec government passed a law requiring all highways and roads to be cleared of snow, which also impacted snowmobile sales. In the 1960s, the low entry barriers to the snowmobile manufacturing business allowed many suppliers to enter the industry. Furthermore, during this period, Joseph-Armand's patents expired, which also oiled the wheels of the competition. In the 1970s, the abandonment of the fixed exchange

rate between the US and the Canadian dollar and the appreciation of the Canadian dollar reduced exports of snowmobiles to the United States. Later, the oil crisis also dramatically impacted the snowmobile market (Bombardier Museum, 2008; MacDonald, 2002).

During these turbulent periods, Bombardier learned to spread its risk, and since that time, it has placed strong emphasis on diversification and innovation. In 1971, the company redeployed its excess manufacturing capacities by acquiring mass transit technologies so it could enter the rolling stock manufacturing business. In 1974, after acquiring licenses and know-how from the French manufacturer CIMT-Lorraine, Bombardier won its first railway contract. It delivered 423 cars to the city of Montreal for its subway system.

Bombardier continued to grow quickly, mainly through acquisitions (see Figure 3-1). In 1976, Bombardier acquired the Montreal locomotive maker MLW-Worhingon Ltd. Thanks to its acquisitions, Bombardier gained valuable know-how in the intercity rail transportation field and further developed its skills and resource base.

In 1982, owing to designs licensed from the Japanese company Kawasaki, Bombardier won a $1 billion US contract to deliver 825 subway cars to the New York City Transit Authority. This contract made Bombardier the North American leader in rail transit. In the same vein, Bombardier acquired 45% of the Belgian manufacturer BN Constructions Ferroviaires et Métalliques S.A. in 1986, and three years later, the company won parts of a contract for supplying to the Channel Tunnel (Eurotunnel) project. It also acquired the second-largest French provider of rail equipment, ANF-Industrie. More acquisitions followed, and in 2001, the acquisition of Adtranz (DaimlerCrysler Rail Systems) added electrical and propulsion know-how to Bombardier's fields of expertise, making Bombardier Transportation a fully integrated producer of rail equipment (Bombardier, 2013c; Innovation Manager, 2013) .

Today, Bombardier Transportation offers the broadest portfolio in the railway industry including:

- **"Rail vehicles** – automated people movers, monorails, light rail vehicles, advanced rapid transit, metros, commuter/regional trains, intercity/high-speed trains, and locomotives

- **Propulsion and controls** – a complete product portfolio for applications ranging from trolley buses to freight locomotives

- **Bogies** – a product portfolio for the entire range of rail vehicles

- **Services** – fleet maintenance, operations and maintenance (O&M), vehicle refurbishment and modernization, and material management
- **Transportation systems** – customized "design-build-operate-maintain" transportation system solutions
- **Rail control solutions** – advanced signalling solutions for mass transit and mainline systems" (Bombardier, 2013a).

Today, Bombardier Transportation is a global leader in the railway sector, with 64 production and engineering sites and 19 service centers in 26 countries and a global headquarters in Berlin, Germany. Bombardier Transportation has six divisions and 36,000 employees, and it generated revenues of $8.1 billion in 2012 (Bombardier, 2013b).

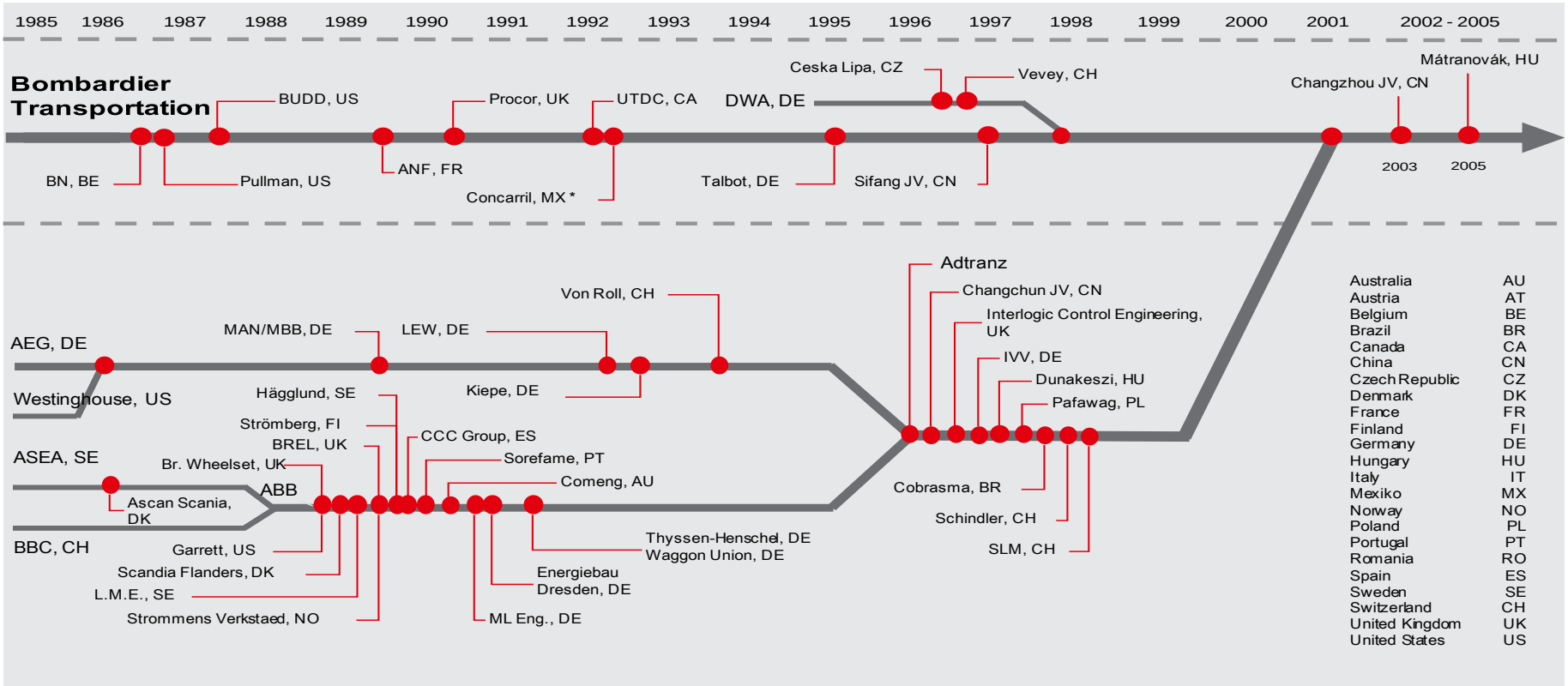

Figure 3-1: Acquisition history of BT Copyright 2013 by Bombardier Inc.

3.1.2 Structure of Bombardier Transportation

The current structure of Bombardier Transportation reflects the firm's acquisition history. The multiple acquisitions over the years have led to a decentralized firm structure, comprising six independent organizational units, or the BT divisions, which are based on the firm's product portfolio. BT's current (as of 2013) divisions are Systems, Rail Control Solutions, Rolling Stock Atlantic and Services, Rolling Stock Central & Northern Europe and Asia, Locomotives, Light Rail and Equipment, and BT North America. They are headquartered in various European countries (except for BT North America, based in St. Bruno, Canada)[6] (see Table 3-1).

A Berlin-based group headquarters, which includes central departments for each function (e.g., procurement, engineering…) governs, coordinates, and aligns the group of divisions to group-wide guidelines (Bombardier, 2013b). Each BT division (see Figure 3-2) is "a small company" (Innovation Manager, 2013), with its own budget, cars, and profit and loss responsibilities (Innovation Manager, 2013).

[6] BT's organizational structure was about to change during the data collection phase of this research project. Therefore, the data presented here on the firm structure must be considered a snapshot of BT's structure at the time of the data collection, June 2013. [6]

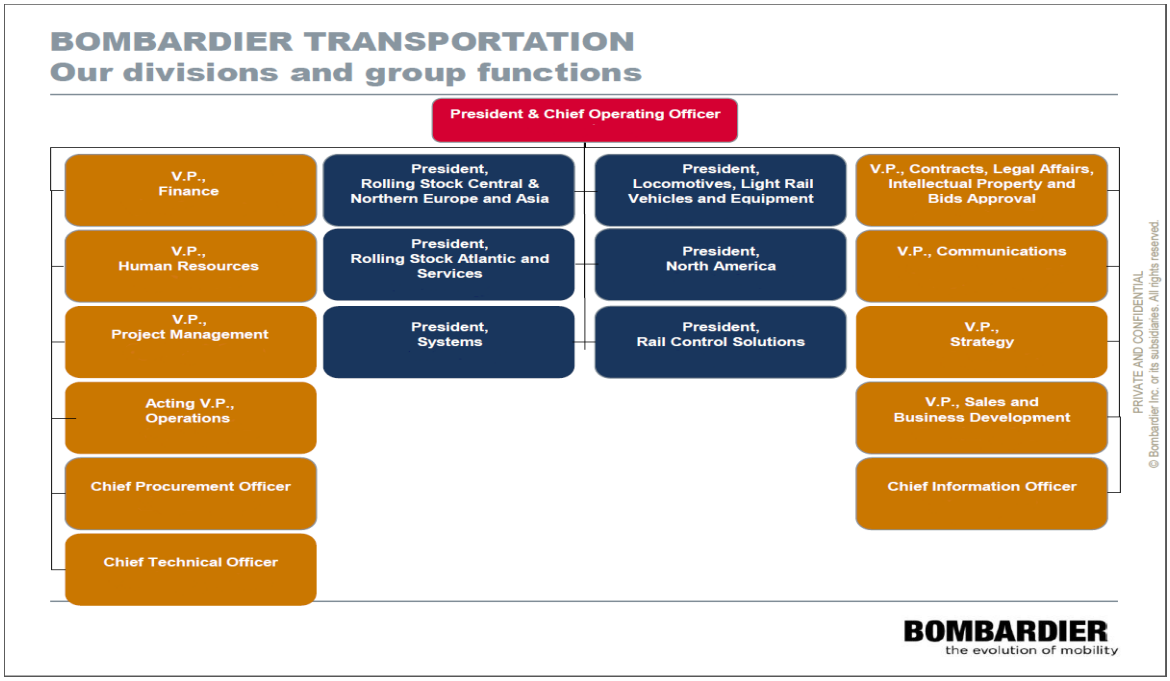

Figure 3-2: BT Organizational Structure (as of 2013) Copyright 2013 by Bombardier Inc.

BT's group Innovation Management and Project Management is part of the Project Management & CTO[7] Department, headquartered in Berlin, Germany. BT Innovation Management is responsible for managing innovation as a business process at the group level to ensure uniformity of command, profitability, and sustainable economic growth. It coordinates and defines the firm's strategies, tools, and processes. It also identifies new business opportunities and new technological trends related to innovation. The head of BT Innovation Management is the Chief Innovation Officer, who is accountable for BT's innovation programs at the executive level (Koetzier, 2009).

In addition, each BT division has one innovation manager who is responsible for all innovation management activities in his/her division, and who also reports to the group Innovation Management. The innovation managers from all the divisions are the "ambassadors"(Innovation Manager, 2013) of BT's group Innovation Management for each of the company's fields of activity (Innovation Manager, 2013).

[7] Chief Technology Officer

Table 3-1: Divisions of Bombardier Transportation (as of 2013)

Acronym	Division (and Business Units, respectively)	Based in
BTNA*	BT North America	St. Bruno, Canada
LLE	Locomotives, Light Rail and Equipment	Berlin, Germany
	BOG – Bogies **LOC*** – Locomotives **LRV*** – Light Rail Vehicles **PPC** – Propulsion & Controls	Siegen, Germany Kassel,Germany Vienna, Austria Zurich, Switzerland
REA*	RS Central & Northern Europe and Asia	Hennigsdorf, Germany
RSAS*	RS Atlantic and Services	Paris, France
RCS	Rail Control Solutions	Stockholm, Sweden
SYS*	Systems	Berlin, Germany

*** producing rolling stock (incl. trains, locomotives, turnkey transportation systems)** Copyright 2013 by Bombardier Inc.

More details about Bombardier Transportation are given in Appendix 3.

Because BT Innovation Management aims to identify promising new business and innovation methods, crowdsourcing and the multiple benefits it brings to businesses rightly appeared to be a useful development. The following section presents BT's internal and external crowdsourcing initiatives in detail.

3.2 Crowdsourcing at Bombardier Transportation: a Look at Three Initiatives

The following section presents the research findings on three crowdsourcing initiatives (Innovation Express, YouRail, and YouCity) that Bombardier Transportation has undertaken

since 2009. BT's business and innovation strategies are described in terms of targeted benefits for the firm, advertisement strategy, IP management policies, and evaluation and community management approaches for each of the three initiatives. In addition, an investigation is conducted into how the implementation of crowdsourcing as a business approach changes a firm's technology needs and strategies, as well as the impact of crowdsourcing on the organizational culture.

3.2.1 Innovation Express

The current Chief Innovation Officer first introduced the Web 2.0 approach for idea management at Bombardier Transportation. Drawing on his previous experience in crowdsourcing at BMW,[8] he came up with the idea to create a company-wide network for innovation that "breaks the silos and the silo-thinking" (CIO, 2013) within the company and radically changes traditional innovation approaches (CIO, 2013; Head of Industrial Design, 2013; Innovation Manager, 2013).

Innovation Express is BT's internal crowdsourcing Web platform for innovation, problem-solving, and collaboration. It is a full platform that can manage innovative ideas from the moment a proposal is submitted on the platform to the moment it is applied to an R&D project or is stored as an archive. The pilot phase of Innovation Express was introduced in 2009, and the platform was officially launched at the end of 2010 (Innovation Manager, 2013).

Innovation Express is BT's tool for "guided ideation" (Innovation Manager, 2013). The platform has three main "focus areas" (Innovation Manager, 2013) for innovation, in line with BT's innovation strategies: simplicity, energy efficiency, and customer/user delight. Employees can submit ideas and suggestions related to these three characteristics of products and internal processes. These three focus areas are always open for submission of new proposals. The platform also hosts more targeted ad-hoc problem-solving campaigns that usually last from four to six weeks.

BT's employees can use the platform in various ways: they can post ideas and browse proposals that have been posted by others; they can also create communities on the platform, which function like discussion and problem-solving forums. Since currently not all BT employees have

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[8] Bayerische Motoren Werke AG a German automaker, based in Munich, Bavaria.

access to computers, the platform also allows submitting ideas on behalf of someone else by indicating the name of the person making the submission and the name of the author of the idea. This approach gives blue-collar workers access to the innovation platform as well (because they always are in contact with someone who has access to a computer, e.g., a team leader, engineer, or innovation manager) (Innovation Manager, 2013).

Innovation Express is an internal idea management crowdsourcing tool that does not offer any monetary incentives to participants. The only incentive for participants is to gain recognition within the company.

At present, BT is seeking ways to improve the functionalities of the platform. Ideas for future improvements include direct access to the platform for blue-collar workers, community voting and ranking of ideas, and opening up the internal crowdsourcing tool to allow input and collaboration by suppliers, customers, and academia (Innovation Manager, 2013).[9]

3.2.1.1 Business and Innovation Strategies

- **Targeted Business and Innovation Benefits**

The targeted business and innovation benefits for BT from the introduction of the internal crowdsourcing platform can be summarized as recognition of the innovative potential of all BT employees, broader innovative input, and better firm collaboration for innovation.

  - **Recognition of the Innovative Potential of All BT Employees**

As a firm active in a mature industry (rolling stock manufacturing), BT has long been structured such that idea generation is mainly the purview of the R&D departments, where engineers and designers feed the product development process. By introducing an internal crowdsourcing platform such as Innovation Express, the company is attempting to go beyond this traditional view, as mentioned by an innovation manager:

> *"When you have ten people in a department that are responsible for being innovative, like an R&D department, and you ask them to be creative and*

[9] For confidentiality reasons, examples of Innovation Express proposals and more details about the platform features cannot be presented here.

> *innovative for the rest of the company, you are saying to everybody else: "Just do what you have to do, as fast as possible, as cheap as possible; that is all we ask from you. The people who will come with fresh ideas are those people; they are identified, and it is them, so you don't need to be creative." This doesn't work anymore. Now every individual in the company is a potential innovator."* (Innovation Manager, 2013)

Through Innovation Express, BT recognizes the "sleeping innovative potential" (Innovation Manager, 2013) of all its employees, and the internal crowdsourcing platform is the means to access all of them, regardless of their status within the company, field of expertise, or geographic location.

- **Broader Innovative Input**

Another compelling motivation for introducing an internal crowdsourcing tool is the fact that, for BT, the term "innovation" has a much broader meaning than just product innovation. Both the interviewed BT innovation manager and the CIO defined "innovation" also as process innovation, service model innovation, technology innovation, business model innovation, and more (CIO, 2013; Innovation Manager, 2013). Based on this logic, by launching Innovation Express, BT is trying to "kill the bias of the company, which is very engineering-oriented, and try to get a much broader input" (Innovation Manager, 2013).

The firm's need for broader and more complex innovative solutions is explained by an innovation manager, as follows:

> *"In today's world and in our complex industry, one single person doesn't usually have enough knowledge to really make an innovation. They can have a nice idea, they can have a nice continuous improvement idea, but real innovation requires more people working together, adding their knowledge—somebody from Finances working with someone from Engineering—and little by little, building on an idea to make it really an innovation."* (Innovation Manager, 2013)

- **Better Firm Collaboration for Innovation**

The web-based Innovation Express platform links all BT's employees, despite the global dispersion of the firm's facilities. It acts as a collaboration enabler by connecting people from different divisions and functions, and it helps them solve professional problems more efficiently. Thanks to Innovation Express, BT benefits from the collective knowledge of its employees. As the CIO explains, "there must be someone that has the same problem or has already had the same problem that I am having right now. Rather than wasting my time in reinventing the wheel, there must be a different way" (CIO, 2013).

The BT innovation managers were quite confident about the success of the internal crowdsourcing platform, because the company has "a lot of curious people that like to exchange"(CIO, 2013), and because Innovation Express "is answering a need" (Innovation Manager, 2013) within the firm. Since the official launch of Innovation Express in 2010, more than half of BT's employees have been using the platform (Innovation Manager, 2013).

- **Advertisement Strategy**

The advertisement strategy of Innovation Express includes the use of virtual communication, such as the Internet and Intranet to increase employees' awareness of the platform, its features, and campaigns. It also includes the use of more traditional communication and advertisement tools such as posters and other printed material, including napkins to promote Innovation Express, which are usually placed in the firm's canteens.

According to BT's innovation managers, the use of printed advertisement material related to Innovation Express in the firms' canteens is a very effective way to access and inform all BT's employees, and especially the blue-collar workers that do not have access to computers. Another positive effect of this approach is that the use of traditional advertisement in the canteens creates also word-of-mouth effects and stimulates employees' creativity and collaboration, even during their break and meal periods (Innovation Manager, 2013).

- **Intellectual Property Management**

BT strongly encourages its employees to file patents whenever they have an innovative idea that could be patent-relevant, and to "use the Bombardier power and its legal department" (Innovation Manager, 2013) to help them protect their IP (CIO, 2013; Innovation Manager, 2013).

Innovation Express includes IP management features that allow platform users to decide before submitting it whether their idea is IP-relevant or not. At the submission stage, the patentability of ideas is based only on the employee's own judgment. If the employee thinks the idea is patentable, the submission remains confidential, and is forwarded to the BT patent officers for further examination. If the patent officers find that the idea is not patentable, they change the status of the proposal, and it becomes visible to everyone on the platform (like all other non-patentable ideas submitted by other users). If the submitted idea is assessed as patentable, the patent officer and its author can file a patent. Once this is done, the idea is submitted on the platform with the status "patentable idea." It now becomes visible to everyone on the platform, because the IP rights have been protected (Innovation Manager, 2013).

- **Evaluation and Community Management**

What the BT's Chief Innovation Officer defines as a "must have" (CIO, 2013) for the success of the internal crowdsourcing platform is management support and attention: this is why Innovation Express was created, to provide "clear mandated campaigns and boundaries" (CIO, 2013).

Only BT's innovation managers are authorized to initiate problem-solving campaigns on the platform. They are also responsible for moderating, filtering, and assessing the submissions on the platform. Ordinary employees do not have the right to initiate Web campaigns on their own, and they need the approval of their innovation manager.

The targeted ad hoc problem-solving campaigns on Innovation Express usually last from four to six weeks, because BT's experience shows that after this period of time, the participants' interest drops significantly and the quality of the input suffers. According to BT's policy, Innovation Express can host up to three problem-solving campaigns simultaneously. This decision is based on the logic that too many campaigns running at the same time would have a negative effect on the users' attention and motivation to participate (Innovation Manager, 2013).

On the other hand, platform users can always submit innovative ideas in the three focus areas (simplicity, energy efficiency, and customer/user delight) that are always open. In contrast to the problem-solving campaigns, there is no clearly delegated responsibility for the moderation and community management of the focus areas. All BT's innovation managers are moderators. As a result, the quality of the input is generally lower compared to the results of the strictly managed campaigns. As a rule, in case none of the platform moderators evaluates an idea submitted in the

focus areas, the innovation manager of the idea's owner becomes responsible for the evaluation of the submission (Innovation Manager, 2013) (see also 3.2.5).

3.2.2 YouRail Train Interior Design Contest

On October 26, 2009, BT's Innovation Management launched the first external crowdsourced contest of Bombardier Transportation with the theme "Your personal vision of modern transportation"(Bombardier Inc., 2009). The purpose of the contest was to allow people from all over the world to share their ideas and designs with the railway manufacturer along with their vision of the trains of the future. The YouRail design contest was addressed to anyone interested in the topic, and was not limited to professionals or design students only. The submitted proposals had to show the participants' preferences about how the modern train interior should look, and what new features, in any aspect of the train's interior, should be integrated in it. The designs could be submitted as freehand drawings, computer-generated illustrations, or simply written explanations of the design ideas. In addition, the YouRail platform allowed users to submit seat upholstery designs created with the help of a platform-embedded configuration tool. All designs were submitted via the contest Web platform (Org-2, 2009a).[10]

The participants were asked to develop train interior design proposals in the following three categories:

- The Leisure Passenger: innovative design ideas targeting the needs of families and passengers travelling to recreational destinations.
- The Business Traveler: innovative train designs targeting passengers on their way to work or back home, including workplace essentials and a modern office space.
- The Everyday Passenger: new design ideas to attract passengers to use public transport by providing a comfortable, homey atmosphere.

(Org-2, 2009a).

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[10] Org-2: a German idea management software and service provider, and BT's partnering firm for the YouRail and YouCity external crowdsourcing contests.

Examples of submitted designs are presented in Appendix 4.

In order to participate, users had to register on the YouRail platform. The only mandatory registration requirement was login information and agreement with the terms and conditions of the competition. Optional registration information included personal information and recommendation of the competition to the participant's networks and friends (Org-2, 2009a).

The online community members could use the platform in various ways. They could submit designs and evaluate others' proposals by assigning 1 to 5 points for an idea or simply by liking or disliking the submission. In addition, participants could comment on submitted designs, reply to others' comments, and leave public messages on other participants' profiles on the platform. All these user activities supported the jury members in choosing the winners, and also increased participants' activity counters (Org-2, 2009a).

The YouRail contest offered monetary prizes (ranging from €200 to €2000) and netbooks to the winners. The winners were announced in March, 2010, and BT presented the results of the competition at the world's leading trade fair for the rail industry, InnoTrans 2010, in Berlin, Germany (Org-2, 2009a).

The YouRail open innovation design contest was a one-time event. It attracted 2,486 participants from 102 countries, who submitted 4,239 designs (3,807 configured designs and 432 freely created designs), 25,979 evaluations, 8,565 comments, and 3,445 messages (Bombardier Inc., 2009; Org-2, 2009b).

The project team of the YouRail contest included project leaders from BT (Chief Innovation Officer and Director R&D Program Management, Group Engineering) and project leaders from the partnering firm Org-2 (CEO[11] of Org-2 and Project manager of the YouRail Design Contest).

Detailed statistics about the YouRail contest and examples of submitted designs are presented in Appendix 4.

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[11] Chief Executive Officer

3.2.2.1 Business and Innovation Strategies

- **Targeted Business and Innovation Benefits**

The YouRail train interior design contest was BT's next step, after the launch of the Innovation Express platform, towards opening up the firm's innovation processes, not only at the firm level but to the entire world. The targeted business and innovation benefits from the YouRail contest can be summarized as shaping a unique look for BT products, a positive marketing effect, and attractiveness as an employer of choice.

  - **Shaping a Unique Look for BT Products**

BT's Innovation Management describes the background of the YouRail design contest as follows:

- "BT innovation strategy and technology program has a focus on customer/passenger delight
- BT innovation strategy aims to position BT as a provider of sophisticated and cool mobility solutions with functional but aesthetic designs as one of the key elements
- BT president deliberately required an approach towards aesthetic design
- BT products are currently not easily recognizable or explicitly attractive for average passenger, thus no halo effect on company (i.e. brand value and attractive employer)
- BT design language to a very large extent not recognizable for customer/passenger as BT products have been designed more for operator needs and less for passenger needs in the past
- DB[12] innovation management strongly encourages BT engagement towards emotional aspects in products." (Bombardier Inc., 2009)

BT's motivation to launch the crowdsourced train interior design contest is based on the logic that every individual is a passenger of BT trains, and the railway manufacturer wanted to

[12] Deutsche Bahn-German railway operator, headquartered in Berlin, Germany

"*understand what does a commute or a trip look like from a passenger perspective, and see where the shortcomings are, the parts of the travel that are complicated, that makes it inconvenient, all the factors that finally count into a choice of rather taking a car or an alternative means of transportation, than the rail transportation*"(CIO, 2013).

BT's innovation managers acknowledge the fact that BT's traditional design processes are strongly biased by the company's engineering orientation, and mainly by the fact that the railway design professionals' creative thinking is limited by the their knowledge of the existing technological constraints (CIO, 2013; Innovation Manager, 2013). As explained by the CIO, the outcomes of any design workshop strongly depend on the kind of community being invited:

> *"If it is like "the usual suspects", and this is what happens a lot in this company, you always invite "the usual suspects" to any kind of creativity workshop, you don't have to wonder that the results are always the same. On the other hand, if you ask an expert community, of course the quality will be significantly higher than a general community -hopefully, that is why they are experts. But chances are that you most likely will get a lot of what you already know. Chances are that you get a lot of filtered and biased proposals: due to the fact that I know about fire safety for example, there are things that I will never consider being possible."* (CIO, 2013)

The vision of BT's Innovation Management is to make public transportation "a premium choice" (Innovation Manager, 2013). BT's team was convinced that in order to motivate people to start using public transportation rather than their own cars, it is important to come up with totally new design solutions that take into consideration the "convenience factor and the emotional factor" (CIO, 2013) that is usually "totally disregarded" (CIO, 2013) by public transportation manufacturers (CIO, 2013). Therefore, the goal of the YouRail contest was to collect ideas from the crowd that give BT's products a distinctive image, a unique flair, and feeling of comfort, differentiating it from the usual very practical, unattractive, and "fact-based , vandalism-proof and easy-to-clean" (CIO, 2013) look of public transportation, which has nothing to do with how a car interior design looks (CIO, 2013).

At the same time, BT's innovation managers were aware that the crowd-generated proposals could not provide a direct substitute for professional designs, as explained by the CIO:

> *"When you look at YouRail and the designs, of course when you look at them from an engineering point of view, you instantly see: ok, this is not possible due to crash safety, this is not possible due to fire safety, this is not possible because it is too heavy, this is not possible because it is too expensive. And it is a very tough job to keep my engineers from thinking that way. It is more like "Don't you see the beauty in that solution?" This is not a blueprint for a one-to-one realization the next day, it is about what of those elements, what of those solutions can be maybe done in a different way with different materials, maybe functionally integrated, realized as an added value, as an added benefit for the operator and the passenger*." (CIO, 2013)

The designs collected from the YouRail contest provided not only multiple innovative and aesthetic ideas, but also plenty of ingenious detail solutions, which BT design professionals are using today as an inspiration when planning new trends and features to implement into BT's products (CIO, 2013).

- **Positive Marketing Effect**

Apart from the multiple inspiring high-quality ideas for designs of the trains of the future, the YouRail contest was also initiated to increase people's awareness of BT's products and activities thanks to the word-of-mouth effects resulting from the online communications before, during, and after the contest. The YouRail competition also garnered significant media attention and coverage: more than 150 articles about the contest were published, not only in Germany but throughout the world.

- **Attractiveness as an Employer of Choice**

The advertisement strategy of the YouRail competition was particularly targeted to attract design students from prestigious universities and design professionals from around the world (see the YouRail Advertisement Strategy). Therefore, other targeted benefits include increased awareness of Bombardier Transportation as a future employer of choice and direct recruiting possibilities. One of the participants in the YouRail contest was hired on a freelance basis thanks to the contest (Innovation Manager, 2013).

- **Advertisement Strategy**

The advertisement strategy of the YouRail contest included the use of social media before and during the contest (Twitter and Facebook). Many of the participants were attracted from the community of followers of the German innovation agency Org-2- BT's partnering firm for the YouRail contest. The contest was also banner-advertised in specialized industrial design blogs, websites, and reviews.

BT's project team was particularly interested in attracting industrial design students from prestigious universities. Students were the main target group because they usually have more time and are familiar with the new technologies and Web communication trends. Moreover, design students develop projects and theses as part of their studies, and these can be easily used, adapted and submitted to the YouRail competition. These participants are also more motivated to take part in online design contests such as YouRail, because the competition provides them with an opportunity to showcase their talent, apply their knowledge, and use their ideas for future employment opportunities. Therefore, the BT team also preselected certain prestigious design universities and design departments in Europe, Asia, the Middle East, North America, and South America. They contacted them and asked them to announce the YouRail contest to their students with posters and/or emails (CIO, 2013; Innovation Manager, 2013).

- **Intellectual Property Management**

The terms and conditions of the YouRail design competition did not require transfer of IP rights for submitted materials. The participants remained the owners of the IP of their ideas, unless they became winners. If selected as a winner, the participant had to transfer the IP of the proposal in exchange for the prize money. For non-winning ideas, BT reserved the right, within 12 months after contest completion, to acquire the IP of submissions in exchange for a remuneration of €1,000 for a free created design, or € 200 for a configured design. BT also had the exclusive right to claim any IP infringement from third parties for the winners' material, and the winners had no right to claim such infringement. Furthermore, BT claimed the right to use the submitted proposals for presentation and communication purposes such as visuals and advertisement material related to the contest.

BT's Innovation Management decided to apply this IP policy in order to stimulate the participants' creativity and motivation by letting them retain ownership of the IP of their ideas.

This policy also helped BT avoid any IP-related disputes in case of infringement (CIO, 2013; Innovation Manager, 2013; Org-2, 2009c).

- **Evaluation and Community Management**

The winner selection process of the YouRail design contest included the following phases: ranking by the online community on the platform, ranking by the internal BT expert jury, and final ranking by the design contest jury (Bombardier Inc., 2009).

BT's internal jury of experts included members of BT's design departments, sales staff, and an Innovation Management team (Bombardier Inc., 2009). The design contest jury included BT's President and Chief Operating Officer, Vice President Communications & Public Affairs, Vice President Project Management and Chief Technical Officer, Vice President Sales, Design Manager of Industrial Design Division Passenger/RS3, and a Designer and Consultant. The Head of CD & CI Konzern, Deutsche Bahn, the BT's Head of the Management Board, and a Core Interior Designer of Bombardier Aerospace were also included.

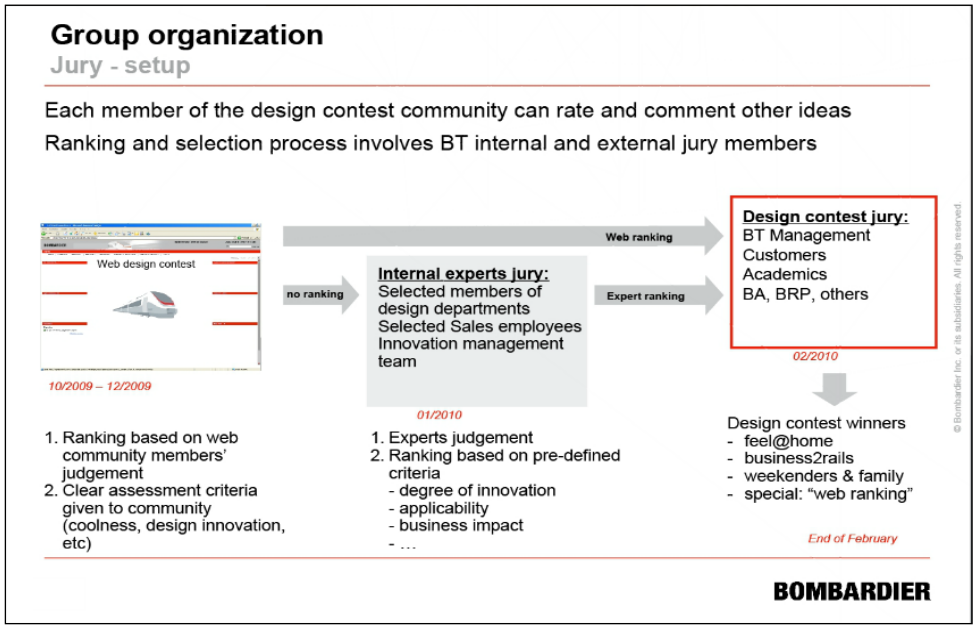

Figure 3-3: YouRail Contest: The evaluation process Copyright 2009 by Bombardier Inc.

The evaluation was based on the following criteria:

Figure 3-4: YouRail Contest: Criteria for expert evaluation Copyright 2009 by Bombardier Inc.

The community management of the YouRail design contests was the full responsibility of the German innovation agency Org-2, BT's partnering firm for the competition, which also provided the software solution, the hardware (the competition host servers) and built the Web platform for the contest. Org-2's employees were responsible for communication and community management during the competition. However, whenever a more serious issue arose related to platform community communication, the partnering firm contacted BT's project team, who resolved the problem. During the contest, there were several cases when BT's CIO personally took over communication with the participants on the platform (CIO, 2013).

The CIO explains the main issues and factors for success related to the community management of the external crowdsourcing initiatives of BT, as follows:

> *"I think the most difficult part is actually the start-up phase, until these is a critical mass in terms of sufficient content on the platform. Once you have enough content on the platform, and there is enough traffic, then it is a self-propelling system. People meet each other, they chat with each other, they comment on one or other design, and they give each other hints like "Hey check out this design." and so on. Then motivation is not that hard anymore. I mean, of course, you have*

to be very responsive, whenever there is an issue, whenever there is a question, I think it is very important to be very responsive, to be very clear from the beginning; not to play hide-and-seek games, but to be very transparent, very honest, and then it is hard to lose the community. But on the other hand if you just play the arrogant big international group, very soon you will have a cemetery rather than a platform." (CIO, 2013)

3.2.3 YouCity Multi-Disciplinary Innovation Contest

The YouCity urban mobility innovation contest was launched on March 1, 2012. The crowdsourced competition was open to students and professionals who wanted to share innovative ideas and their vision about the future of urban mobility in developed and emerging cities. BT selected three target cities that represented typical urban mobility markets: London, UK (mature market); Belo Horizonte, Brazil (BRIC[13] market), and Vientiane, Laos (emerging market).

The YouCity competition consisted of three tasks: the first asked participants to define current and upcoming issues related to urban mobility in their city of choice, analyze the situation, and develop solutions to the identified problems. The second task asked them to present a holistic proposal describing how their urban mobility solutions fit the global vision of the city of interest. The participants were expected to develop an urban mobility proposal that took into consideration engineering, business, and urban planning aspects of the idea. Figure 3-5 shows the tasks, the three streams, and the innovation fields for the contest.

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[13] BRIC is the acronym for Brazil, Russia, India, and China, which are considered to be at a similar stage of newly advanced economic development. The term is generally agreed to have been coined in a Goldman Sachs report in 2003, which speculated that "by 2050 these four economies would be wealthier than most of the current major economic powers." (Investopedia, n.d.)

Streams	Innovation field
Engineering Stream	Engineering students are given the challenge of coming up with an innovative and low-cost solution for the environment described in the business case
Business Administration Stream	Business, finance and economics students are proposed the challenge of coming up with a creative business model, business administration structure and project financing to maximize the potential of a "business" being successful, profitable and sustainable in the described environment
Urban Challenge Stream	Urban planning and architecture students are given the challenge of developing creative solutions to urban problems "encountered" in the chosen environment.

Figure 3-5: Innovation fields and streams of the YouCity contest Copyright 2012 by Org-2

For each task, the participants were asked to submit via the Web platform a one-page document (with no restrictions on page layout) containing their answers. Participants could attach additional documents to help illustrate their proposals. The community members could work on the tasks individually or as a team of up to five people.

The third bonus task was an offline workshop called "Innovation Workcamp" held in September 2012 in Berlin, Germany for the three winning teams from each stream (engineering, business, and urban planning). In addition, during the online competition phase, the teams could produce two-minute videos on the topic "Your vision of tomorrows' urban mobility." They could upload them on YouTube and link them to the crowdsourcing Web platform of YouCity. Based on votes by viewers and experts, the teams could earn additional bonus points.

The YouCity urban mobility innovation competition was a one-time event. It attracted 894 registered members (809 registered and activated members), who submitted 215 proposals in total (101 proposals for task 1, 87 for task 2, and 27 for the video challenge).The engineering stream accounted for 36.13% of the proposals, with 16.67% for the business stream, 18.07% for urban planning, and 29.13% "other." The contest attracted visitors from 129 countries and 2,000 cities, and participants from 74 countries. Thirteen finalists were selected and invited to the Innovation Workshop in Berlin. The Innovation Workcamp was attended by the contest finalists, three BT professionals, and five Org-2 professionals. The results of the workshop were presented at Bombardier's booth during the world's leading trade fair for the rail industry InnoTrans2012 in Berlin, Germany (Org-2, 2012c).

3.2.3.1 Business and Innovation Strategies

- **Targeted Business and Innovation Benefits**

The enormous success of the YouRail design contest in terms of participation, feedback from participants, and quality of designs motivated BT's Innovation Management to launch a second, even more ambitious external crowdsourcing competition: YouCity (Innovation Manager, 2013).

The targeted business and innovation benefits for BT from the YouCity contest can be summarized as new business ideas, positive marketing effect, and attractiveness as an employer of choice.

  - **New Business Ideas**

YouCity was not a typical "I–have-an-idea" (CIO, 2013) type of crowdsourced competition. It was a "business planning contest" (CIO, 2013) that considered the specific needs of different markets and the engineering, economic, and urban planning aspects of modern urban mobility development.

The need for innovative thinking about the mobility of the future derives from the expectation that by 2050, more than two-thirds of the world's population will be living in cities. These environments will require new approaches to urban mobility development to ensure improved mobility and sustainable economic growth (CIO, 2013; Org-2, 2012a).

For BT "just producing rolling stock is not good enough" (CIO, 2013), which is why the railway manufacturer wants to think holistically and systemically and to evolve its business strategies to consider all aspects of mobility development, including infrastructure, energy efficiency, and communication (CIO, 2013).

The reasons that BT decided to invite the entire world to submit fresh, innovative ideas for urban mobility solutions are explained by the CIO:

> *"If we talk about evolution of mobility, which is BT's claim, we have to think about what a mobility chain looks like for somebody who wants to get from A to B, not only as seamless as possible, but also as convenient as possible , as economic as possible, as thrilling as possible. And maybe going one step further and considering: "Getting from A to B is only a side-product, and maybe there is a*

> *different business model behind it and a different purpose, for these vehicles behind it*."" (CIO, 2013)

Although the YouCity contest was much more ambitious in terms of task complexity, the results far exceeded the initial expectations of BT's innovation managers (CIO, 2013; Innovation Manager, 2013).

Examples of proposals submitted by the participants are given in Appendix 5.

- **Positive Marketing Effect**

Similarly to the first external crowdsourcing initiative (YouRail), the YouCity contest was also meant to produce a positive marketing effect for BT. The competition was launched not only to collect new business and innovation ideas, but also to "raise brand awareness, generate publicity and to improve relationship with operators, cities, politicians etc." (Org-2, 2012c). The contest's goal was also "to produce public awareness of Bombardier as a proponent of CSR[14], and also of innovative thinking and a mobility driver" (Org-2, 2012c). The firm would also benefit from the word-of-mouth effects resulting from the online communications before, during, and after the contest, and from the significant media attention and coverage of the initiative.

- **Attractiveness as an Employer of Choice**

The advertisement strategy of YouCity was to attract students from prestigious universities and professionals with a vision of urban mobility development (see YouCity advertisement strategy). This is why other targeted benefits included increased awareness of BT as a future employer of choice and potential recruiting possibilities based on the contest outcomes (Innovation Manager, 2013).

- **Advertisement Strategy**

The advertisement strategy for the YouCity contest was similar to that for its forerunner, YouRail. It included the use of social media (Twitter and Facebook) before and during the contest and banners posted on urban mobility blogs, websites, and reviews.

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[14]Corporate Social Responsibility

The YouCity advertisement strategy was also particularly targeted at students, who are usually the most active participants in crowdsourced contests, have more spare time, and are familiar with new technologies and online communication trends. Moreover, students develop projects and theses as part of their studies (which can be used as contest proposals), are more motivated to showcase their talent and knowledge, and consider such online initiatives as potential employment opportunities.

Unlike the YouRail contest, which targeted design students and design professionals, the YouCity advertisement campaign was much broader. It targeted students from various scientific fields in line with the three contest streams (business, engineering, and urban planning). BT's project team identified reputable universities for each stream in different geographic regions: Europe, Asia, the Middle East, North America, and South America. They contacted the universities and asked the contact persons to advertise the YouCity contest to their students using posters and/or emails. Just as for YouRail, the partnering innovation agency Org-2 also attracted a large number of participants through its community of followers. The advertisement strategy of YouCity also included the use of traditional communication channels such press releases and so on (CIO, 2013; Innovation Manager, 2013).

- **Intellectual Property Management**

The same IP management policy was used for the YouCity competition as for the YouRail design contest:

The terms and conditions of the YouCity competition did not require transfer of IP rights for submitted materials, and participants retained ownership of the IP of their ideas unless they became winners. If selected as a winner, the participant had to transfer the IP of the idea in exchange for the prize money. For non-winning ideas, BT reserved the right, within 12 months after contest completion, to acquire the IP of submissions in exchange for a remuneration of €1,000 per proposal. BT also had the exclusive right to claim any IP infringement from third parties for the winners' material, and the winners had no right to claim such infringement. Furthermore, BT claimed the right to use the submitted materials for presentation and communication purposes such as visuals and advertisement material related to the contest.

Similarly to the YouRail contest, BT decided to apply this IP policy in order to stimulate participants' creativity and motivation by letting them retain ownership of the IP of their ideas.

This policy also helped BT avoid any IP-related disputes in case of infringement (CIO, 2013; Innovation Manager, 2013; Org-2, 2012d).

- **Evaluation and Community Management**

All submitted proposals were evaluated by a BT expert jury and were voted on by the online community on the platform and on social media. The YouCity platform allowed participants to evaluate the designs in the competition by assigning from 1 to 5 points or by liking or disliking submissions. Moreover, community members could comment on designs and reply to others' comments. They could also leave public messages on members' profiles posted on the platform. All user activities supported the jury members in selecting the winners, and also increased the participants' activity counters.

The evaluation criteria for both the expert jury and the online community evaluation included factors such as innovativeness, clarity of the proposal, feasibility, and so on. The expert jury selected three winning teams, one for each stream (engineering, business, and urban planning). They also selected the most active participant on the platform (based on the results of the participants' activity counters) and a winner (winning team) for the video challenge. The winners were invited to take part in a four-day workshop in Berlin, and each team was awarded €2,000. The most active community member and the winner (winning team) for the video challenge were also invited to the workshop and awarded €500. In addition, the winner (winning team) for the video challenge made a video document of the workshop.

The final jury members included BT's President and Chief Operating Officer, Vice President Project Management, Chief Technical Officer, Vice President Communications & Public Affairs, Vice President Strategy, and Senior Director Strategy & Sales, Systems Division. A professor from the Chair of Architecture and Urban Design, ETH DARCH Zurich, was also on the jury (Org-2, 2012a).

Similarly to the YouRail contest, the community management of the YouCity competition was handled by the German innovation agency Org-2 (Org-2, 2012d) (see 3.2.2.1-Evaluation and Community Management).

3.2.4 Technology Strategies

As mentioned in section 2.1, one of the purposes of this study was to investigate technological settings that support crowdsourcing. This part of the research shows how the implementation of crowdsourcing changed BT's technology needs and strategies, and how BT met the new technology needs arising from the use of crowdsourcing.

The findings are presented as a comparison between the technology strategies and solutions for the three crowdsourcing initiatives: Innovation Express, YouRail, and YouCity. The comparative approach allows a detailed explanation of the settings, motivations, and logic behind each technology strategy. It is also a good way to underscore the similarities and differences between the three cases.

BT used the services of two partnering firms to build the Web platforms and to provide the software, the hardware, and the community management skills needed for the successful implementation of its three crowdsourcing initiatives. BT's partner for the implementation of the Innovation Express platform was the German idea management software and service provider Org-1,[15] and for the YouRail and YouCity contests the partnering firm was the customer-centered innovation agency Org-2.[16] The community management of the YouRail and YouCity contests was fully handled by Org-2, while the community management of the internal platform Innovation Express is handled by BT's innovation managers (Innovation Manager, 2013).

The reason that BT partnered with two different firms for its three crowdsourcing initiatives is that the two competitors, Org-1 and Org-2, have different strengths in terms of idea management software and services (Innovation Manager, 2013). Org-1 was chosen to build the Web platform and to provide the software solution for BT's internal crowdsourcing tool Innovation Express mainly due to the impressive flexibility and adaptability of its idea management software, which allows easy customization on the platform and by the customer, and rarely requires further

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[15] Org-1: A German idea management software and service provider, BT's partnering firm for the internal crowdsourcing initiative Innovation Express.

[16] Org-2: A German idea management software and service provider, BT's partnering firm for the YouRail and YouCity external crowdsourcing contests.

development or customization by the service provider. On the other hand, Org-2 was considered a more experienced community management service provider, especially for holistic initiatives such as YouRail and YouCity, which involve broad communities of people, complex designs, and skills in different areas. This is why BT contracted the innovation agency Org-2 as a software, hardware, and community management service provider for its external crowdsourcing contests YouRail and YouCity. Nevertheless, Org-2's software solution featured low customization. If the customer needed to change or add new features (e.g., colors, text) to the platform, he had to pay for each customization performed by the solution provider (Innovation Manager, 2013). Both the YouRail and YouCity open innovation contests are hosted on Org-2's servers, and are accessible via hyperlinks (Org-2, 2009c, 2012d). For security and confidentiality reasons, BT's internal crowdsourcing platform Innovation Express is hosted on servers owned by BT (Innovation Manager, 2013).

Although the three crowdsourcing platforms (Innovation Express, YouRail, and YouCity) were developed by BT's partnering firms, the problem of integrating external tools into BT's IT environment had to be solved internally. This is why BT assigned two of its IT professionals (one for Innovation Express and another for YouRail and YouCity) to be in charge of all IT-related aspects of the integration process. These IT professionals were responsible for communicating with the suppliers of the platforms and for the planning, execution, and control of all technological details in the integration of the new technology within BT's IT system (Innovation Manager, 2013).

The researcher's intention was to meet the two BT IT professionals and to interview them in order to get more information about the integration process and the technology needs and changes that resulted from the implementation of the three platforms. Unfortunately, during the data collection phase in June 2013, the researcher was unable to meet with these professionals, and some of the technology-related questions (especially those related to the internal crowdsourcing platform Innovation Express) remain unanswered.

3.2.5 Firm Culture

This part of the research attempts to identify changes in BT's traditional closed innovation and collaboration models resulting from the use crowdsourcing. Because BT's internal and external crowdsourced initiatives target/ed different audiences and had/have different goals, the findings

related to the impact of crowdsourcing on the firm's culture are presented as two distinct topics: external crowdsourcing and firm culture, and internal crowdsourcing and firm culture.

3.2.5.1 External Crowdsourcing and Firm Culture

As discussed in 3.2.3.3, one of the main reasons for selecting Bombardier Transportation, Germany for the case study was the type of industry the firm represents and the fact that the preliminary research showed that crowdsourcing is used as an innovative, collaborative, and co-creative approach mainly by the consumer goods industry. By implementing crowdsourcing into its business and innovation strategies, BT was "setting the pace" (Innovation Manager, 2013) in the railway manufacturing sector, which is a very traditional and conservative business, in which successful innovation requires a lot of time, investments, and R&D efforts. BT was actually the first railway manufacturer to launch a crowdsourced design competition, and the first one even across industries to initiate a holistic business planning contest with competitive and collaborative aspects, such as YouCity (Innovation Manager, 2013).

BT's innovation managers believe that there is an enormous potential in crowdsourcing, and the success of the two external initiatives YouRail and YouCity supported that position. However, despite the impressive quality and quantity of the crowd-generated ideas, for the time being, BT is "not harnessing the full potential" (Innovation Manager, 2013) of its external crowdsourcing. The reasons for this conclusion are explained by an innovation manager:

> "*We are maybe too advanced for our company. The company is not ready to follow and use the full potential of it*" (Innovation Manager, 2013).
>
> *"A benefit that is not fulfilled in our company, and it is very very big, is if you manage to answer a need. If you create or open the eyes of the company on a certain need and then you launch these contests to answer this need, then, I think there is an enormous potential, because the input is incredible in terms of quantity and quality of good input...it is incredible! If you have the budget, the resources, and particularly the motivation of the people, if it really solves the problem that they have, then of course, everybody will want to implement it...In our case, we (BT Innovation Management) created a solution, because we identified the problem, but nobody else had identified that problem yet. So when we came up*

> *with the solution it was not seen as a solution but as additional work that we were asking our employees to do."* (Innovation Manager, 2013)

Moreover, as is usually the case for crowdsourced inputs, the acceptance of crowd ideas was also considered as an employment threat by BT's employees. Therefore, when crowdsourcing is not providing solutions for the firm's immediate needs, the crowd-generated content provokes ""I-don't-have-time-for-this" effects (Innovation Manager, 2013), and the "not invented here" effect (Innovation Manager, 2013).

For BT's Head of Industrial Design for the Division Rolling Stock Central & Northern Europe and Asia, the YouRail design contest was BT's Innovation Management's response to the company's conservative innovation processes. He also acknowledges the fact that BT's Industrial Design Department is more open to accepting external ideas than other BT departments, mainly because BT's design specialists constantly collaborate with external consultants and students. Therefore, for the Industrial Design Department, the use of crowdsourcing was "just a different process and a different tool" (Head of Industrial Design, 2013) for innovation.

The Head of Industrial Design explains the resistance to accept crowd-generated ideas at BT:

> *"It was not that new for us- getting ideas from people outside the company, but I can imagine in the areas like technical engineering, sales or management, they will not be so happy with that, simply because they are not used to do that. And of course, it also created effort and additional work*." (Head of Industrial Design, 2013)

3.2.5.2 Internal Crowdsourcing and Firm Culture

BT's experience with the Innovation Express platform demonstrates that internal crowdsourcing is a very powerful method for problem-solving and collaboration, but in order to be successful and to be accepted as an innovation facilitator by employees, the internal crowdsourcing tool should be managed carefully.

The success of internal crowdsourcing campaigns depends to a great extent on how well the tasks have been specified, as explained by an innovation manager:

> *"In internal crowdsourcing it is incredible how much dependent it is on the input you give for a campaign- if you give a campaign first, or you just let them free to*

> *put in those focus areas that are always open, then no one is really responsible, and of course, you see low quality. When you create a campaign you see high-quality things…. very high-quality things, we see very good collaboration, but of course your campaign has to be very well defined. And my learning from this is: the quality of the output is so much dependent on the quality of the input."* (Innovation Manager, 2013)

Communication is another crucial factor for the success of any internal crowdsourcing campaign. Lack of communication about campaigns makes people forget about them, whereas appropriate and intensive communication makes people think about the problems. Thus, even if they do not have a solution right away, they will be thinking about the problem and will discuss it with peers. In the end, this will generate more input on the platform (Innovation Manager, 2013).

The focus of internal crowdsourcing campaigns is also an important factor that influences employees' behavior in Innovation Express. BT's experience shows that when it comes to real problem-solving, the best approach is to restrict the campaigns to only certain experts. This avoids potential negative effects, such as discouraging other BT employees from using the platform because the posted tasks are too complex and are not in their field of expertise.

A BT innovation manager explains that it is also good to initiate campaigns on a very broad topic that involve everybody in the company, for example "Travelling with children in the metro: how to make travelling better for these people" (Innovation Manager, 2013)). Such campaigns promote the platform within the company, motivate people to use it, and foster firm collaboration (Innovation Manager, 2013).

Giving feedback to participants in both internal and external crowdsourced initiatives about the outcomes and the application of their ideas maintains the crowd's interest, motivation, and creativity. It also fosters more participation and shows crowd contributors which types of ideas are of interest to BT. In opposition, maintaining confidentiality about crowd ideas that are seriously considered by the firm for further development or application is considered "counterproductive" (Head of Industrial Design, 2013; Innovation Manager, 2013).

CHAPTER 4 DISCUSSION

The following chapter includes six sections. Section 4.1 presents an overview of BT's three crowdsourcing initiatives (Innovation Express, YouRail, and YouCity) in the form of a comparative analysis of the three cases, highlighting their similarities and differences, and summarizing results that apply to all BT crowdsourcing initiatives. Section 4.2 presents the main discussion of the research findings and a comparison with the results of previous studies. Sections 4.3 and 4.4 outline the theoretical and managerial contributions of the present research. Section 4.5 discusses the limitations of the study, and section 4.6 suggests avenues for future research based on the case study findings.

4.1 Summary of Key Findings: Overview of BT's Crowdsourcing Initiatives

Section 4.1 presents an overview of BT's three crowdsourcing initiatives (Innovation Express, YouRail, and YouCity) in the form of a comparative analysis of the three cases, highlighting their similarities and differences. Such comparison does not serve to repeat the case study results- it is an important element of the discussion that summarizes the outcomes of the three BT initiatives in order to allow comparison with the existing knowledge found in the literature.

4.1.1 Business and Innovation Strategies

BT's business and innovation strategies for the three crowdsourcing initiatives differed significantly, depending on the type of crowdsourcing (internal or external) and the scope, theme, and goals of the projects. A comparative analysis of the business and innovation strategies for the three crowdsourcing initiatives follows.

4.1.1.1 Targeted Business and Innovation Benefits

The internal crowdsourcing platform Innovation Express was launched in order to facilitate firm collaboration and problem solving for innovation, and to ensure broader innovative input from all the firm's employees, in recognition of their "sleeping innovative potential" (Innovation Manager, 2013). The internal platform was the first step: it opened up BT's innovation processes at the firm level, which, in BT's case, also enabled worldwide firm collaboration.

The first external crowdsourcing initiative, the YouRail train interior design contest, was BT's next step toward opening up the firm's innovation processes, not just at the firm level, but to the entire world. The business and innovation goals of this initiative were to introduce considerable change into BT's traditional closed design and innovation approaches, which previously focused on railway operators' needs alone, and did not consider the passenger's perspective. In 2012, inspired by the enormous success of the first external crowdsourcing contest, YouRail, BT's innovation management launched a second and more ambitious crowdsourced competition: YouCity. The targeted business and innovation benefits from this contest included the gathering of fresh innovative business ideas for holistic urban mobility solutions "from developed to emerging cities of the future" (Org-2, 2012c) to ensure improved mobility and sustainable economic growth (CIO, 2013; Org-2, 2012a).

The two external crowdsourcing contests also aimed for a positive marketing effect on the firm, thanks to the online communication before, during, and after the contests, as well as the significant media attention and events coverage. Last but not least, BT's goals included raising public awareness of Bombardier Transportation as a future employer of choice, and using the outcomes of the crowdsourced contest for recruiting purposes.

4.1.1.2 Advertisement Strategies

The advertisement approaches for BT's three crowdsourcing initiatives differed, depending mainly on the type of crowdsourcing: internal or external.

The internal crowdsourcing platform Innovation Express was advertised at the firm level only, and the advertisement methods included the use of internal virtual communication channels such as the Internet and Intranet, as well as printed materials such as posters and napkins made available in the firm's canteens. These two methods served to inform all BT employees, even those that did not have access to computers, about the platform, its functionalities, and the campaigns.

Because the YouRail and YouCity crowdsourcing competitions aimed to attract external participants from around the world, they required different advertisement approaches to those used for the internal crowdsourcing platform. However, the advertisement strategies for the two external BT crowdsourcing contests shared many similarities. Both the YouRail and YouCity contests included the use of social media (Facebook and Twitter) before and during the

competitions. A large number of participants were attracted thanks to the community of followers for the German innovation agency Org-2, BT's partner for the two external crowdsourcing contests. In addition, the contests were advertised on specialized blogs, Web sites, and reviews. Both advertisement strategies specifically targeted students in a variety of scientific fields. Thus, BT's project teams preselected several prestigious universities in various geographical regions and advertised the contests to students via emails and posters.

The only differences between the advertisement strategies of the two external contests were the different themes of the competitions: BT adapted its strategies to specifically attract participants who were interested in the two contest topics: industrial design for YouRail and urban mobility development for YouCity. Accordingly, BT's project team selected prestigious universities to contact and advertised the two contests in blogs, reviews, and Web sites related to the two contest themes.

4.1.1.3 Intellectual Property Management

BT's IP management policies for the three crowdsourcing initiatives also differed, depending on the type of crowdsourcing. The internal crowdsourcing tool Innovation Express includes IP management features that allow BT's employees to decide before submitting their idea whether it is patent-relevant or not, and the IP of patentable ideas is managed by BT's patent officers. On the other hand, the IP management policies for the external crowdsourcing competitions were defined in the contest terms and conditions. Thus, neither the YouRail nor the YouCity contest required the transfer of IP rights for submitted materials, and participants remained the owners of the IP of their ideas, unless they became winners. If selected as a winner, the participant had to transfer the IP of the proposal in exchange for the prize money. In addition, for non-winning ideas, BT reserved the right, for a period of 12 months after the end of the contest, to acquire the IP of submissions of interest to the firm in exchange for remuneration. BT also claimed the right to use the submitted proposals as part of the external crowdsourcing initiatives for presentation and communication purposes, such as contest-related visuals and advertisements.

Based on this overview of BT's IP management policies, we may conclude that, in contrast to most other firms' crowdsourcing practices, all BT's crowdsourcing initiatives allowed the participants to remain the owners of the IP of their ideas. This approach was based on the

convictions of BT's innovation managers that allowing the participants to remain the owners of the IP of their ideas would motivate them and foster creativity.

4.1.1.4 Evaluation and Community Management

BT's evaluation and community management principles also differed, depending on the type of crowdsourcing (internal or external) and the themes of the initiatives.

The internal crowdsourcing platform Innovation Express has "clearly mandated campaigns and boundaries" (CIO, 2013): only BT's innovation managers can launch problem-solving campaigns on the platform, and they are also responsible for community management and screening submitted materials. Innovation Express also has rules governing the duration, the number of campaigns running at the same time, and the incentive policies that the innovation managers should respect. In addition to the ad hoc problem-solving campaigns, the platform also hosts three innovation focus areas, in line with BT's innovation strategies, which are always open to employees' ideas. Unlike the problem-solving campaigns, the focus areas are not strictly managed by clearly assigned innovation managers. As a result, the quality of the input is generally lower than that for the submissions to the problem-solving campaigns (Innovation Manager, 2013).

Community management for the two external crowdsourcing contests YouRail and YouCity was fully handled by BT's partnering firm Org-2. However, BT's employees also took part in the online communication with participants when more serious communication-related issues were raised on the platforms.

The evaluation processes for the two external crowdsourced initiatives shared many similarities. The winner selection processes for both YouRail and YouCity included evaluation and ranking by the online community on the platform, ranking by an expert jury, and selection of the most active community member based on the participants' activity counters. However, the YouRail contest also included a two-step expert jury evaluation: ranking by an internal BT expert jury, and final ranking by the design contest jury (Bombardier Inc., 2009), whereas the winner selection process for YouCity was based on only one expert jury evaluation. The evaluation criteria for online community evaluation and the expert evaluation also differed, and were based on the two contest themes.

Another interesting aspect of BT's crowdsourcing concerned the firm's reward and incentive policies for the three initiatives. The internal idea management platform Innovation Express does not offer monetary incentives to the participants, and the only reward for contributors is recognition within the company. In contrast, BT offered both monetary and non-monetary prizes to contributors under its external crowdsourcing competitions.

4.1.2 Technology Strategies

The implementation of crowdsourcing as a business and innovation method created new technology needs for BT. The firm had used the services of two partnering firms to build the Web platforms and provide the software for the three crowdsourcing initiatives, as well as the hardware and community management skills for YouRail and YouCity. In addition, BT's IT professionals were responsible for integrating the external Web platforms into BT's IT system.

BT partnered with two different firms to develop its internal and external crowdsourcing initiatives, benefiting from their different strengths in terms of idea management software and services. Org-1 was contracted to provide the software and to build the Innovation Express platform, mainly due to the great flexibility and adaptability of its idea management software, which allows easy customization by the customer and rarely requires additional development or customization by the service provider.

Because Org-2's community management services were considered better than those of its competitor, Org-1, BT contracted the innovation agency Org-2 as a partner for the implementation and community management of the external crowdsourcing competitions YouRail and YouCity. However, the software solution provided by Org-2 was found to be less flexible than that of its competitor Org-1: it had low customization possibilities—changes could be made to the platform only by the solution provider—and this incurred additional costs for BT (Innovation Manager, 2013).

4.1.3 Firm Culture

In order to assess the impact of crowdsourcing on the firm's culture, it would be important to differentiate between internal and external crowdsourcing, due to the differing goals and different groups of participants in BT's internal and external crowdsourcing initiatives.

BT's innovation managers believe that there is enormous potential in crowdsourcing and the quality and quantity of the crowd-generated ideas under the two external crowdsourcing contests YouRail and YouCity far exceeded their initial expectations. Nevertheless, BT does not benefit from the full potential of its external crowdsourcing. BT's experience demonstrates that BT's employees regarded crowd-generated input as additional work, and even a threat to their employment. The reason for such reactions is that the external crowdsourcing initiatives provided solutions for problems that the company had not yet identified (Innovation Manager, 2013). According to BT's innovation managers, only once the external crowdsourcing had provided solutions to the firm's immediate problems did the crowd-generated content stop provoking the usual "not invented here" effects. Then the solutions would be appreciated and applied as real innovations. The acceptance of external ideas also depends on employees' habit to collaborate with external contributors (Head of Industrial Design, 2013). A good example is BT's Industrial Design Department, for them crowdsourcing was "just a different process and a different tool" (Head of Industrial Design, 2013) for innovation, because BT's design professionals routinely collaborate with external consultants and students. (Head of Industrial Design, 2013)

In contrast to the external crowdsourcing initiatives, BT's innovation management was quite confident about the success of the internal crowdsourcing platform, because it was "answering a need" (Innovation Manager, 2013) within the company. Indeed, Innovation Express proved to be a very powerful tool for problem solving and

innovation. BT's experience demonstrated that the major factors for employee acceptance and successful internal crowdsourcing initiatives are the careful specification of tasks, appropriate definition of participant focus groups, and clear communication about the campaigns (Innovation Manager, 2013).

What BT's innovation managers and the Head of the Industrial Design Department define as a necessary element for every internal or external crowdsourcing initiative is the managers' commitment to provide feedback to participants about the outcomes of the initiatives and how their ideas are applied. This type of information increases participants' motivation and creativity, and shows them what kinds of ideas the company is looking for (Head of Industrial Design, 2013; Innovation Manager, 2013).

4.2 Analysis of the Case Study Results in Comparison with the Literature

This section compares the results of the case study with the findings of the literature review. This comparison allows an assessment of whether the case study results are in line with the results of other studies on crowdsourcing. In addition, the specific contributions of this study to the literature are outlined.

4.2.1 Business and Innovation Benefits Enabled by Crowdsourcing

As mentioned in 1.5.1, crowdsourcing offers multiple advantages to firms who adopt this model. The case study findings on BT's internal and external crowdsourcing initiatives also confirmed that one of the most attractive benefits for firms using this model is the on-demand labor that allows the workforce to grow and shrink depending on the company's current needs. Moreover, as suggested by Felstiner (2010), in BT's case, both the internal and external crowdsourcing initiatives required little or no personnel administration or recruitment expenses. Moreover, transaction costs were low and logistic issues were rare, due to the anonymity of interactions and the Web-based work environment. In addition, and in line with the research findings of Ross et al. (2009) and Ipeirotis (2010), BT also greatly benefited from the diversity of the crowd contributors, with their wide range of backgrounds and skills, for both the internal and external crowdsourcing initiatives.

BT's experience with both internal and external crowdsourcing also supports the argument that crowdsourcing can provide rapid solutions to a firm's problems (Felstiner, 2010). As suggested by Schenk and Guittard (2009), in BT's case too, the use of crowdsourcing greatly reduced the possibility of not obtaining a solution for a given problem, thanks to the collective knowledge and the range of skills and backgrounds of a large number of contributors.

BT's two external crowdsourced contests, YouRail and YouCity, also confirmed that crowdsourcing has a significant positive marketing effect on firms and attracts important media attention and coverage, as suggested by Bartl et al. (2010). In particular, the YouRail train interior design contest, which gave BT access to their train passengers, allowed better market predictions and adjustment of firm strategies according to the crowd's expectations (Bartl, n.d.; Bartl et al., 2010; Bilgram et al., 2011).

Despite the fact that the research results confirm that BT's targeted business and innovation benefits share many similarities with those documented in previous studies, BT's case features certain particularities.

First, whereas crowdsourcing has gained popularity as a business approach mainly for its ability to provide low-cost solutions and impressive cost savings (Felstiner, 2010; Howe, 2008), the study findings clearly show that low labor costs and cost savings did not feature in the targeted business and innovation benefits for BT. Second, in BT's case, the use of crowdsourcing did not reduce the firm's dependence on its providers, because the tasks were not outsourced to a single or a limited number of subcontractors, as suggested by Schenk and Guittard (2009).This can be explained by the fact that BT operates in a very mature and traditional industry sector—railway manufacturing—where innovation requires substantial and specialized R&D efforts, time, and investments. The study results show that BT's internal and external crowdsourcing initiatives collected ideas that could not be directly applied to future BT products without further professional improvement and development. Thus, in BT's case, the use of crowdsourcing did not lead to substantial cost savings from the acquisition of cheap or even free crowd-generated solutions. For example, the crowd-produced designs collected under the YouRail design contest could not be applied "one-to-one" to real train designs, and they could be used only as inspiration for BT's designers when they are looking for new trends and potential solutions (CIO, 2013; Head of Industrial Design, 2013). As a result, in BT's case the use of both internal and external crowdsourcing also cannot lead to "unlearning and brain drain" (Schenk & Guittard, 2009) for the firm, as suggested in the literature.

4.2.2 Advertisement Strategies and Crowdsourcing

The advertisement strategies of firms' crowdsourcing initiatives depend on the type of crowdsourcing (e.g., internal or external, paid or unpaid), the goals of the initiatives, and the organizations' preferences. The literature review provided examples of firms' crowdsourcing initiatives designed to meet different needs, and therefore organized in different ways. Nevertheless, some common characteristics of the advertisement approaches can be identified. They include the use of social media such as Facebook and Twitter for external crowdsourcing initiatives and the use of internal communication channels such as the Internet and Intranet for advertising internal crowdsourcing campaigns.

The case study results show that BT used different advertisement strategies for its internal and external crowdsourcing initiatives, which was also the case for other firms' internal and external crowdsourcing practices. The literature provides examples of effective advertisement strategies for internal crowdsourcing initiatives, such as British Telecommunications plc: similarly to BT's advertisement strategy for the internal platform Innovation Express, British Telecommunications used printed advertisement materials to encourage employee innovation and promote the firm's internal crowdsourcing (APQC, 2013). To advertise Innovation Express, BT also used internal communication channels such as the Internet and Intranet, like most of the internal crowdsourcing initiatives of firms identified in the literature.

However, unlike General Mills's case, described by APQC (2013), BT used Internet-based tools to access the crowds and advertise its external crowdsourcing contests YouRail and YouCity. YouRail and YouCity's strategy included the use of social media, posting of banners in specialized blogs, Web sites and reviews, and attracting participants from the community of followers of BT's partnering firms for the two contests. BT also contacted preselected universities in order to attract students as participants via email, and the contact persons at the universities were asked to advertise the contest to their students through the Internet.

This comparison between the study findings and the literature on firms' advertisement strategies for crowdsourcing practices shows that it is very difficult to compare and generalize these strategies, which vary widely depending on the particular circumstances and goals of the initiatives.

4.2.3 Intellectual Property Management and Crowdsourcing

The literature review on firms' crowdsourcing practices reveals that, for the time being, there are no common practices or regulation policies regarding intellectual property management, and consequently, firms manage IP in different ways. Past research concludes that firms' IP management approaches depend greatly on organizations' experience with open innovation methods (APQC, 2013). Usually, firms that use external crowdsourcing seek ownership of the IP for submitted materials. However, only half of the best-practice firms identified by APQC (2013) claimed ownership of the IP of crowd-generated content. The reasons for this decision are in line with the case study findings concerning BT's motivations to allow crowd contributors to remain the owners of the IP of their ideas. Best-practice firms believe that contributors would be more

motivated and creative if they retain the IP of their ideas. In addition, as the study findings also confirmed, best-practice firms refrain from claiming IP rights for crowd-generated material in order to protect themselves from IP-related disputes in case of infringement (APQC, 2013; CIO, 2013; Innovation Manager, 2013).

Comparing the case study findings with the literature, one can see that BT's IP management approaches for YouRail, YouCity and Innovation Express are quite similar to those of Cisco Systems Inc. described by APQC (2013). When it comes to internal crowdsourcing, similarly to Cisco, BT encourages its employees to file patents and to protect their IP. Whereas Cisco's IP management approaches for its external crowdsourcing initiatives have evolved over the years from claiming all IP for all submissions to claiming broad licenses for crowd-generated material, and ultimately to the possibility of future licensing of only certain ideas of interest to the company; for YouRail and YouCity BT claimed ownership of the IP for the winners' materials only, and the possibility of acquiring the IP of other ideas of interest to BT in exchange for financial remuneration for a period of 12 months after the end of its external crowdsourcing contests. Moreover, Cisco goes even further in its attempt to protect the firm's IP interests by excluding participants from certain countries and regions due to local legal restrictions, which would affect its IP acquisition opportunities. Cisco also conducts strict IP risk assessments for each submitted idea (APQC, 2013).

As suggested by Felstiner (2010), BT's IP management policies for YouRail and YouCity were described in the terms and conditions of the "clickwrap" (Felstiner, 2010) participation agreements that contributors had to accept in order to participate in the external crowdsourcing initiatives.

In conclusion, it is important to note that the case study findings on BT's crowdsourcing IP management for Innovation Express, YouRail and YouCity cannot be generalized or easily compared to other firms' IP management policies, because the literature review showed that many firms initiate various internal and external crowdsourcing initiatives, and a given firm deals with IP in different ways depending on the type of crowdsourcing, the goal of the projects, and the firm's preferences, legal concerns, and other specific circumstances.

4.2.4 Evaluation and Community Management and Crowdsourcing

The evaluation and community management principles of firms' crowdsourcing initiatives, as described in the literature, differ greatly depending on the type of crowdsourcing (internal or external), the goals of the initiatives, and the firms' preferences. Nevertheless, the review of the literature identified some similarities between BT's evaluation and community management approaches for its internal crowdsourcing tool Innovation Express and the evaluation and community management strategies of British Telecommunications' internal crowdsourcing portal New Ideas Scheme. Like Innovation Express, British Telecommunication's platform collects employees' ideas on how to run the business more efficiently and how to create innovative products or improve existing products. But unlike Innovation Express' case, at British Telecommunications, firm members are responsible for reviewing and removing duplicate ideas. Similarly to Innovation Express, where innovation managers from different divisions are responsible for evaluating and tweaking submissions, at British Telecommunications, a group of firm evaluators-experts in different fields, working in different units of the organization review the submissions. Ideas that pass the expert evaluation phase are then prepared for adoption and launching. In addition, and similarly to BT's internal crowdsourcing tool, British Telecommunications also has assigned employees to communicate with the participants and maintain their interest and engagement with the firm's internal crowdsourcing initiatives. Both organizations run problem-solving campaigns that are usually restricted to a limited number of contributors who are experts in a specific field. Unlike Innovation Express, however, the New Ideas Scheme platform allows employees to vote on submitted ideas (APQC, 2013; CIO, 2013; Innovation Manager, 2013).

The firms' evaluation and community management strategies for external crowdsourcing initiatives differ even more than the internal strategies, because these types of open innovation practices are usually much more creative, and their goals often include a positive marketing effect for the firm as well as broad media attention. The literature shows a variety of possible evaluation approaches for external crowdsourcing practices, such as Cisco's I-Prize initiative and General Mills Inc.'s innovation portal G-WIN (APQC, 2013). Similarly to Cisco's I-Prize, the evaluation strategy of BT's two external crowdsourcing contests YouRail and YouCity included expert jury evaluations. On the other hand, similarly to General Mills' external innovation portal G-WIN,

submissions to YouRail and YouCity contests were evaluated by internal and third-party external evaluators, including partnering firms (APQC, 2013; CIO, 2013; Innovation Manager, 2013).

Other evaluation approaches, which are applied mainly to the paid micro and macro task type of external crowdsourcing, include pre-selection criteria for participants, qualification restrictions, and the use of several crowd workers to perform the same task for verification purposes (Felstiner, 2010).

The case study findings show that BT used a combination of features found in various community management and evaluation approaches described in the literature. These features met BT's particular needs and vision for its crowdsourcing initiatives. The case study findings and the literature review clearly show that a direct comparison of firms' evaluation and community management strategies is impossible, given that each case is unique and specific.

4.2.5 Technology Strategies and Crowdsourcing

The literature review showed that firms seeking crowd-generated solutions are not usually the owners of the Web platforms they use for posting. However, this is generally the case only for firms' external crowdsourcing initiatives, and when it comes to internal crowdsourcing, for security reasons, the technology solutions typically belong to the companies, which use internal crowdsourcing to support their innovation practices.

In this respect, the case study findings on BT's technology strategies for Innovation Express, YouRail and YouCity reveal a typical solution to the technology needs of firms that use internal and external crowdsourcing. BT's internal crowdsourcing platform Innovation Express was built by a partnering organization (see 3.2.4), and for security and confidentiality reasons, BT is the owner of the platform and the servers hosting the tool. In contrast, the external crowdsourcing platforms for the YouRail and YouCity contests were also built by BT's partnering firm (see 3.2.4), but the servers, software, hardware, and community management on the platforms were the responsibility of and belong to BT's partner.

It is important to note that most firms that use crowdsourcing usually initiate multiple internal and external crowdsourcing initiatives, which have different goals and target different types of participants. This fact requires that companies accommodate and use different technology strategies depending on the specific needs and circumstances of the initiatives. A good example

found in the literature, comparable to BT's Innovation Express, YouRail and YouCity, is Cisco's technology strategy for its crowdsourcing initiatives which include the use of firm's "homegrown" tools supporting innovation, but also the use of commercially available crowdsourcing and innovation management tools of Brightidea[17] and Spigit[18] (APQC, 2013)

4.2.6 Firm Culture and Crowdsourcing

Past research has already investigated the impact of crowdsourcing, on firms' culture, an impact that varies depending on the type of crowdsourcing (e.g., internal, external, micro tasks, macro tasks) and the organization's experience to collaborate with external innovation sources (APQC, 2013).

According to the literature, some of the greatest advantages for firms that use crowdsourcing are the low labor costs of crowd work and the on-demand work force that can grow and shrink according to the firm's current needs. However, although businesses find crowdsourcing a profitable and inexpensive way to get the work done, employees in many countries consider crowdsourcing as a threat to their employment (Felstiner, 2010). The research findings also confirm this perception in BT's employees regarding the firm's external crowdsourcing initiatives YouRail and YouCity. Other examples of cultural resistance described in the literature and confirmed by the case study results for YouRail and YouCity include the "not invented here" attitude, where a firm's employees do not accept external ideas and consider crowd-generated input as low-quality and non-professional; the "I don't have time for this" effect, where a firm's employees refuse to accept crowd-generated material and regard it as additional work; and the "pocket veto" (APQC, 2013) effect, where a firm's innovation management team identifies a need and a potential solution to this need, but the firm's other units are not interested in it because they have not yet identified the need (APQC, 2013; Innovation Manager, 2013).

The importance of management's support and attention as a facilitator of cultural change within the company was confirmed by both the case study findings for Innovation Express, YouRail and

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[17] A San Francisco-based innovation management software provider

[18] A Pleasanton, California-based innovation management software provider

YouCity and the literature. Moreover, past research corroborated that the acceptance of crowd-generated input depends greatly on the firm's habit to collaborate with external contributors.

A recent study presents Cisco's philosophy for open innovation, according to which the primary thing a firm should do when looking for innovative input internally or externally is to identify the goals that the organization wants to achieve. Only after this is done should the firm select the appropriate innovation tools to help achieve these goals (APQC, 2013). In BT's case, the firm's external crowdsourcing provided solutions in advance to problems that the company had not yet identified. As a result, the crowd-generated input provoked the "not invented here" effect, and was regarded as additional work by BT's employees (Innovation Manager, 2013).

The comparative analysis of the case study results and the literature review findings highlighted some similarities and differences between BT's Innovation Express, YouRail and YouCity and other firms' internal and external crowdsourcing practices. The next sections discuss in detail the theoretical and managerial contributions of this study to the literature, the study limitations, and offer suggestions for future research.

4.3 Theoretical Contributions

In this case study, new empirical data were collected and analyzed. The results shed light on the business use of crowdsourcing for innovation purposes. The specific theoretical contributions of the research are presented below.

First, the study makes a substantial contribution to the theoretical knowledge on crowdsourcing by examining the use of crowdsourcing as a business and innovation approach in a non-consumer goods industry. It provides thought-provoking insights into an underexplored topic in the literature, as crowdsourcing is used mainly in consumer goods industries.

Second, this research contributes to the theoretical knowledge on crowdsourcing by analyzing three complex and ambitious initiatives involving both internal and external crowdsourcing. More specifically, BT's initiatives present examples of successful implementation of crowdsourcing, including creative, problem-solving, and collaborative elements of both internal and external crowdsourcing.

Last, but not least, the case study examines the real-life impact of crowdsourcing on a firm's business and innovation strategies in terms of strategic foundations, processes, and the business

and innovation benefits. The investigation of BT's technology strategies reveals various ways that the firm deals with new technology needs arising from the use of crowdsourcing, which depend on the type of crowdsourcing, project goals, the firm's preferences, and security concerns. The study also discusses the obstacles to the implementation of crowdsourcing and its limitations, the impact of crowdsourcing on the railway manufacturer's firm culture, and in particular, the cultural resistance related to acceptance of crowd-generated content, taking into account the specifics of the industry sector. Therefore, this research is a valuable source of novel empirical information which complements the current theoretical knowledge on crowdsourcing, a concept that is still considered "under construction" (Schenk & Guittard, 2009), and underexplored.

4.4 Managerial Contributions

In practical terms, the results of this study can help managers identify successful practices and processes for implementing both internal and external crowdsourcing. Moreover, because this research analyzes the use of crowdsourcing in a non-consumer goods industry, managers, especially those working in other or similar non-consumer goods industries, may be encouraged to give crowdsourcing a try. In addition, they can benefit from the presented information as they would be able to learn from the experience of a leading multinational organization, such as Bombardier Transportation.

Additionally, the fact that the research provides comparative analyses, first of the three crowdsourcing initiatives of BT, and second an analysis of the BT's crowdsourcing practices in comparison with the literature, comparing the targeted business and innovation benefits of firms using crowdsourcing, the advertisement strategies, the IP management approaches, the technology strategies and the impact of both internal and external crowdsourcing on firm's culture, will allow managers interested in implementing or improving their firm crowdsourcing initiatives to get a broader view of firms' crowdsourcing practices to date.

The conclusion of this study that the research findings, for most part of the studied aspects of BT's crowdsourcing practices, cannot be generalized or directly compared to other firm crowdsourcing initiatives draws managers' attention to the fact that firm's strategies regarding implementation of crowdsourcing must be selected carefully and adapted to the type of crowdsourcing, the goals of the projects, the firm's preferences, legal concerns or any other

specific circumstances, because every firm and every crowdsourcing project has its specific needs and particularities.

The study results and comparative analyses can also help managers identify, lessen, mitigate, or avoid the negative and non-constructive effects of inappropriate crowdsourcing practices and processes, and help them achieve their innovation and collaboration goals more efficiently and effectively.

4.5 Limitations of the Research

As mentioned in 3.2.2, one of the limitations of the case study approach is the case itself (Brown, 2008; Merriam, 1998). First, the scope of this study was limited to analyzing the crowdsourcing initiatives of only one company. A multiple case study approach that examines several companies that use crowdsourcing would allow collecting more information on crowdsourcing practices across firms, and would consequently lead to a better understanding of the impacts on organizations' strategies and culture, and to a more reliable validation of the research findings.

Another significant limitation of this study concerns the multiple time constraints imposed on the researcher. This research was initiated and conducted as a master's thesis project, which means that the researcher had to meet the time constraints of the master's degree program in order to complete the study. Other time constraints included the fact that data had to be collected in Berlin, Germany, implying additional time-consuming preparations, coordination of the researcher's plans with the hosting company, and travel and stay in Berlin for fieldwork. Moreover, due to the limited timeframe of the researcher's master's program, the data had to be collected in June, 2013 over a two-week period only.

An additional limitation of the study is the fact that the researcher was unable to meet with and interview as many BT professionals as initially intended (see 2.2.3.4). Consequently, some questions concerning BT's technology needs and solutions and the integration of the external Web platforms into BT's IT system remain unanswered. A larger number of interviewees would allow a more detailed understanding of BT's three crowdsourcing initiatives, along with further validation of the research results.

In addition, confidentiality issues limited the type and amount of information that could be presented under this study. Disclosing information such as the names of BT employees, project

details, and sensitive data, particularly concerning the internal crowdsourcing tool Innovation Express, would be considered a breach of confidentiality. Therefore, these data could not be discussed or published.

Finally, it is important to note that the comparative analysis between the case study findings on BT's internal and external crowdsourcing initiatives and the findings in the literature shows that the study results cannot be easily generalized, confirming Brown (2008) claim that case study research has limited scope.

4.6 Suggestions for Future Research

The conclusion that the findings of this study cannot be generalized or easily compared to other firms' crowdsourcing practices described in the literature opens the way to multiple avenues for further research on crowdsourcing as a business and innovation approach.

A promising research idea would be to conduct multiple case studies on the business use of crowdsourcing by varying the scope of the projects in order to assess the impact of different factors and variables on the use of crowdsourcing.

One potential research direction would be to conduct a multiple case study on crowdsourcing practices in firms of comparable size operating in the same industry sector. This would allow identifying differences and similarities in the impact of crowdsourcing on firm's strategies, and could lead to better identification and assessment of best practices as well as theory building.

A further direction for future research would be a multiple case study on similar crowdsourcing initiatives in firms operating in different industry sectors. Such study will contribute to the existing knowledge on crowdsourcing by identifying needs and business, innovation and technology strategies of firms from different business sectors that eventually lead to similar ways to acquire crowd-generated input.

Taking into consideration the fact that BT was the first railway manufacturer to launch external crowdsourcing initiatives such as YouRail and YouCity, and that for the time being, crowdsourcing is used mainly in consumer goods industries, it would be useful to conduct a comparative study of the crowdsourcing practices of firms operating in non-consumer goods industries. This would make a broader contribution to the theoretical knowledge on crowdsourcing, a topic that has been underinvestigated to date.

A recent APQC (2013) study identified firms' open innovation best practices, with a focus on internal and external collaboration for idea generation, and also provided examples of business uses of crowdsourcing as an open innovation approach. The present study can serve as a starting point for further studies aimed at describing and summarizing firms' crowdsourcing best practices in particular. Such future research would provide a solid foundation for theory building on the subject.

Another promising research idea is to study the relationships between incentives, prizes and other motivation factors, and internal and external crowdsourcing practices of firms. A future research on the motivation factors depending on the profile of the crowd contributors would also shed light on an underexplored aspect related to crowdsourcing.

It is also worth investigating the role of crowdsourcing as a collaboration enabler for both internal and external firm collaboration. The BT's external crowdsourcing initiatives YouRail and YouCity that were particularly targeted to attract students as participants can serve an inspiration for future research on the use of crowdsourcing for collaboration and sourcing knowledge from universities.

CONCLUSION

This study aimed to complement the existing knowledge on crowdsourcing with an extensive empirical research on the impact of crowdsourcing on firms' business and innovation strategies. More specifically, the study documented and analyzed the use of crowdsourcing as an innovation strategy by studying three real-life internal and external crowdsourcing initiatives (Innovation Express, YouRail and YouCity) of Bombardier Transportation, Germany in terms of strategic foundations, processes, and technologies that supported the implementation of crowdsourcing. The research also examined how crowdsourcing influenced firm's innovation culture.

The research findings revealed that the business and innovation strategies, advertisement strategies, IP management, evaluation and community management approaches, and the technology settings of the three BT's crowdsourcing initiatives differ significantly depending on the type of crowdsourcing (internal or external), the scope, the theme and the goals of the projects. The comparative analysis of the research results and the literature found some similarities between BT's crowdsourcing management approaches and the ones described in past research works. However, the analysis suggested that a direct comparison of firms' crowdsourcing management strategies is impossible, and also that BT's three crowdsourcing initiatives have their particularities.

The case study results showed that despite the fact that crowdsourcing gained its popularity mostly because of its ability to provide low-cost solutions, and to lead to significant cost savings for businesses using this model, low labor costs and cost savings were not amongst BT's motivations to use crowdsourcing. In a mature and traditional industry such as rolling stock manufacturing the crowd-generated input also cannot directly replace the professional expertise. Therefore, in BT's case, crowdsourcing cannot be regarded as a direct and foreseeable employment threat. And again, due to the specifics of the industry sector, crowdsourcing cannot decrease BT's dependence on its providers or subcontractors, and cannot result in firm's dependence on crowd-generated content or crowdsourcing platforms, as suggested in the literature.

An important contribution of this study to the scientific literature is the fact that the research studied the use of crowdsourcing as a business and innovation approach in a non-consumer goods industry, such as railway manufacturing, and provided important insights that haven't been

described and analyzed in past research works, as crowdsourcing is mainly used in consumer goods industries. Moreover, the research presented three complex examples of successful implementation of crowdsourcing by a leading firm in its industry sector, including creative, problem-solving and collaboration elements for both internal and external forms of crowdsourcing. The study also discussed the obstacles related to the implementation of crowdsourcing and its limitations. Thus, on a practical level, the research provides managers with valuable, novel empirical information which can help them identify successful practices for implementation of both internal and external crowdsourcing. The research can also serve as an inspiration for companies willing to give crowdsourcing a try for the first time, and can help managers identify, diminish, modify or avoid the negative or non-constructive effects of inappropriate practices related to the implementation of crowdsourcing, and can help them achieve their innovation goals in a more efficient way.

REFERENCES

APQC. (2013). Open Innovation: Enhancing Idea Generation Through Collaboration (Best Practices Report). Houston, Texas, USA: APQC.

Bartl, M. (n.d.). Launch of the BMW Group Co-Creation Lab. from http://www.michaelbartl.com/miscellaneous/launch-of-the-bmw-group-co-creation-lab/

Bartl, M., Jawecki, G., & Wiegandt, P. (2010). *Co-Creation in New Product Development: Conceptual Framework and Application in the Automotive Industry*.

Bilgram, V., Bartl, M., & Biel, S. (2011). Getting Closer to the Consumer–How Nivea Co-Creates New Products. *Marketing Review St. Gallen*, *28*(1), 34-40.

Bombardier. (2013a). About Us. Retrieved 28.08.2013, 2013, from http://www.bombardier.com/en/about-us.html

Bombardier. (2013b). Bombardier Transportation Internal Document.

Bombardier. (2013c). History. Retrieved 28.08.2013, 2013, from http://www.bombardier.com/en/about-us/history.html

Bombardier Inc. (Producer). (2009). YouRail Design Contest 3D Presentation. Retrieved from http://top10.yourail-design.bombardier.com/#/3/0/0/1

Bombardier Museum. (2008). J. Armand Bombardier. from http://www.museebombardier.com/en/content/jab/biographie1946_1948.htm

Brabham, D. C. (2008). Crowdsourcing as a Model for Problem Solving An Introduction and Cases. *Convergence: The International Journal of Research into New Media Technologies*, *14*(1), 75-90.

Brown, P. A. (2008). Review of the Literature on Case Study Research. *CJNSE/RCJCÉ, 1*(1).

Businessweek. (2006). Crowdsourcing. from http://www.businessweek.com/stories/2006-09-24/crowdsourcing

California State University Long Beach. (n.p). PPA 696 Research Methods; Data Collection Strategies II: Qualitative Research. 2013, from http://www.csulb.edu/~msaintg/ppa696/696quali.htm

Champion, I. K. S. (Producer). (2009). Better Apps with Crowdsourcing & the Cloud. Retrieved from http://www.utest.com/webinars/better-apps-crowdsourcing-cloud

Chen, B. (2010). How Microsoft Crowdsourced the Making of Office 2010. from http://www.wired.com/gadgetlab/2010/06/microsoft-office-2010/

Chesbrough, H., & Crowther, A. K. (2006). Beyond high tech: early adopters of open innovation in other industries. *R&D Management*, *36*(3), 229-236.

Chesbrough, H. W. (2007). Why companies should have open business models. *MIT Sloan management review*, *48*(2), 22-28.

CIO. (2013). Interview CIO of Bombardier Transportation. In S. Dimitrova (Ed.).

CloudSigma. (n.d.). What is the cloud? Retrieved from www.cloudsigma.com website: http://www.cloudsigma.com/bg/cloud-computing/kakvo-e-cloud

Crowdsouricng.org. (n.d.). Crowdsourcing's Seven Deadly Sins. from http://www.crowdsourcing.org/editorial/crowdsourcings-seven-deadly-sins/1900

De Massis, A., Lazzarotti, V., Pizzurno, E., & Salzillo, E. (2012). Open innovation in the automotive industry: a multiple case study. *Management of Technological Innovation in Developing and Developed Countries, Dr. Hong Yi Sun (Ed.).*

DiNucci, D. (1999). Fragmented future. *Print, 53*(4), 32.

Doan, A., Ramakrishnan, R., & Halevy, A. Y. (2011). Crowdsourcing systems on the world-wide web. *Communications of the ACM, 54*(4), 86-96.

Felstiner, A. L. (2010). Working the crowd: employment and labor law in the crowdsourcing industry.

Frei, B. (2009). Paid crowdsourcing: Current state & progress toward mainstream business use. *Produced by Smartsheet. com*.

Gladstone, B. (2012). Crowdfunding scams top investor threat: regulators. *www.reuters.com*. http://www.reuters.com/article/2012/08/21/us-investing-scams-threats-idUSBRE87K17W20120821

GlobalGiving Foundation. (n.d.). About GlobalGiving. from http://www.globalgiving.org/aboutus/

Graham, F. (2010). Crowdsourcing work: Labour on demand or digital sweatshop? *http://www.bbc.co.uk/*. Retrieved from http://www.bbc.co.uk/ website: http://www.bbc.co.uk/news/business-11600902

Graham, P. (2005). Web 2.0. Retrieved from http://www.paulgraham.com/web20.html website: http://www.paulgraham.com/web20.html

Harris, C. G. (2011). *Dirty Deeds Done Dirt Cheap: A Darker Side to Crowdsourcing.* Paper presented at the 2011 IEEE Third International Conference on Social Computing Boston, MA, USA.

Head of Industrial Design. (2013). Interview Head of Industrial Design for the Division Rolling Stock Central & Northern Europe and Asia of Bombardier Transportation,. In S. Dimitrova (Ed.).

Henkel. (n.d.). Henkel Innovation Partnership Program. 2013, from http://www.henkel.com/innovation/henkel-Innovation-Partnership-Program-11817.htm

Howe, J. (2006a). Crowdsourcing: A Definition. from http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html

Howe, J. (2006b). The rise of crowdsourcing *Wired magazine* (Vol. 14, pp. 1-4). http://www.wired.com/wired/archive/14.06/crowds.html.

Howe, J. (2008). *Crowdsourcing: Why the power of the crowd is driving the future of business*. USA: Random House.

Ideaconnection. (n.d.). Open Innovation: Goldcorp Challenge. from http://www.ideaconnection.com/open-innovation-success/Open-Innovation-Goldcorp-Challenge-00031.html

InnoCentive. (n.d.). Crowdsourcing meets Crowdfunding to improve lives. from http://www.innocentive.com/blog/2012/02/07/crowdsourcing-meets-crowdfunding-to-improve-lives/

Innovation Manager. (2013). Interview Innovation Manager of Bombardier Transportation,. In S. Dimitrova (Ed.).

Investopedia. (n.d.). Brazil, Russia, India And China - BRIC. from http://www.investopedia.com/terms/b/bric.asp

Ipeirotis, P. (2010). Demographics of mechanical turk. *Center for Digital Economy Research, NYU Stern School of Business, Working paper*.

Jason. (2012). Crowdsourcing: The Cloud Computing of Business Practices. Retrieved from www.onthenetOffice.com website: http://www.onthenetoffice.com/blog/2012/10/crowdsourcing/

King, N., Cassell, C., & Symon, G. (2004). Using templates in the thematic analysis of texts. *Essential guide to qualitative methods in organizational research*, 256-270.

Koetzier, W. A., A. (2009). You Need A Chief Innovation Officer. from http://www.forbes.com/2009/12/16/chief-innovation-officer-leadership-managing-accenture.html?feed=rss_home

Krishnamurthy, S. (2005). The Launching of Mozilla Firefox-A Case Study in Community-Led Marketing. *Online verfügbar unter: http://citeseerx. ist. psu. edu/viewdoc/download*.

Krugman, P. (2006). Feeling No Pain. *New York Times*. Retrieved from http://www.nytimes.com/ website: http://query.nytimes.com/gst/fullpage.html?res=9807EFDE1531F935A35750C0A9609C8B63

Lanxon, N. (2011). How the Oxford English Dictionary started out like Wikipedia. *www.wired.co.uk*. Retrieved from www.wired.co.uk website: http://www.wired.co.uk/news/archive/2011-01/13/the-oxford-english-wiktionary

Lessl, M., Bryans, J. S., Richards, D., & Asadullah, K. (2011). Crowdsourcing in drug discovery. *Nature Reviews Drug Discovery, 10*(4), 241-242.

MacDonald, L. (2002). *The Bombardier story: planes, trains, and snowmobiles*: Wiley.

McKendrick, J. (2012). Crowdsourcing starts to clear away corporate cobwebs. from http://www.smartplanet.com/blog/business-brains/crowdsourcing-starts-to-clear-away-corporate-cobwebs/24153

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education. Revised and Expanded from" Case Study Research in Education."*: ERIC.

Mohr, J. J., Sengupta, S., & Slater, S. F. (2009). *Marketing of high-technology products and innovations*: Jakki Mohr.

Moses, J. W., & Knutsen, T. L. (2012). *Ways of knowing: competing methodologies in social and political research*: Palgrave Macmillan.

Municipality of Tzarevo. (2009). Definition of Outsourcing. http://netoff.net/ewiki/index.php?title=%D0%9E%D0%BF%D1%80%D0%B5%D0%B4%D0%B5%D0%BB%D0%B5%D0%BD%D0%B8%D0%B5_%D0%B7%D0%B0_%D0%B0%D1%83%D1%82%D1%81%D0%BE%D1%80%D1%81%D0%B8%D0%BD%D0%B3

O'Reilly, T. (2005). What Is Web 2.0-Design Patterns and Business Models for the Next Generation of Software. *What Is Web 2.0*. Retrieved from http://oreilly.com/ website: http://oreilly.com/pub/a/web2/archive/what-is-web-20.html?page=1

Open Source Initiative. (n.d.). The Open Source Definition. Retrieved from www.opensource.org website: http://opensource.org/docs/osd

Org-2. (2009a). Contest. from http://yourail-design.bombardier.com/jury-prizes-contest/contest/

Org-2. (2009b). Start. from http://yourail-design.bombardier.com/

Org-2. (2009c). Terms & Conditions. from http://yourail-design.bombardier.com/terms-and-conditions

Org-2. (2012a). About Bombardier YouCity. from http://youcity.bombardier.com/info.php?ID=24

Org-2. (2012b). All Proposals. from http://youcity.bombardier.com/pool.php?rst=1

Org-2. (2012c). Bombardier YouCity Innovation Project Executive Summary. Bombardier Transportation Internal document: Org-2.

Org-2. (2012d). Terms & Conditions. from http://youcity.bombardier.com/info.php?ID=26

Prive, T. (2012). What Is Crowdfunding And How Does It Benefit The Economy. http://www.forbes.com/sites/tanyaprive/2012/11/27/what-is-crowdfunding-and-how-does-it-benefit-the-economy/

Ross, J., Zaldivar, A., Irani, L., & Tomlinson, B. (2009). Who are the turkers? worker demographics in amazon mechanical turk. *Department of Informatics, University of California, Irvine, USA, Tech. Rep*.

Saunders, M. N., Saunders, M., Lewis, P., & Thornhill, A. (2011). *Research Methods For Business Students, 5/e*: Pearson Education India.

Schenk, E., & Guittard, C. (2009). *Crowdsourcing: What can be Outsourced to the Crowd, and Why?* Paper presented at the Workshop on Open Source Innovation, Strasbourg, France.

SimplyFlying. (2011). Top 10 Crowdsourcing Initiatives by Airlines. from http://www.slideshare.net/shanxz/top-10-crowdsourcing-initiatives-by-airlines

Stake, R. E. (1978). The case study method in social inquiry. *Educational researcher, 7*(2), 5-8.

Thomas, S. (2011a). 9 examples of crowdsourcing, before ‘crowdsourcing’ existed. *Memeburn*. Retrieved from www.memeburn.com website: http://memeburn.com/2011/09/9-examples-of-crowdsourcing-before-%E2%80%98crowdsourcing%E2%80%99-existed/

Thomas, S. (2011b). Microsoft launches crowdsourcing blog for Windows 8. from http://memeburn.com/2011/08/microsoft-launches-crowdsourcing-blog-for-windows-8/

Villarroel, J. A., & Reis, F. (2010). Intra-Corporate Crowdsourcing (ICC): Leveraging upon rank and site marginality for innovation: CrowdConference.

Von Ahn, L. (2006). Games with a purpose. *Computer, 39*(6), 92-94.

Von Ahn, L., Maurer, B., McMillen, C., Abraham, D., & Blum, M. (2008). recaptcha: Human-based character recognition via web security measures. *Science, 321*(5895), 1465-1468.

Von Hippel, E., Thomke, S., & Sonnack, M. (1999). Creating breakthroughs at 3M. *Harvard Business Review, 77*, 47-57.

Vukovic, M. (2009, 2009). *Crowdsourcing for Enterprises.* Paper presented at the 2009 World Congress on Services-I, 2009, Los Angeles, CA, USA.

Yin, R. K. (1984). *Case study research: Design and methods* (Vol. 5): sage.

Yin, R. K. (1994). *Case study research: Design and methods (2nd ed.)*: Thousand Oaks.

Zittrain, J. (2009). Work the new digital sweatshops. *Newsweek, December, 8*.

APPENDIX 1 – Interview Questionnaire

INTERVIEW QUESTIONNAIRE

1. When did you first hear about crowdsourcing?

2. When did you decide to start using crowdsourcing?

3. Is there anything that influenced your decision to give crowdsourcing a try?

4. What are the reasons to use crowdsourcing?

5. What were your initial expectations regarding the use of crowdsourcing?

6. How did you organize the crowdsourcing campaign?

a. Do you use your own web platform or a third party platform for posting the tasks?

b. Do you use internal or external experts/employees to moderate/evaluate the submissions?

7. How did you formulate the tasks and why?

8. Do you have any preselection criteria for participants?

a. If yes, what are they, and how the selection process works?

9. What do you think attracts the crowd to your initiative?

10. The question of keeping the crowds motivated is considered crucial for the success of any crowdsourcing campaign. How do you maintain the interest and the motivation of the crowd?

11. Do you offer monetary/non-monetary incentives to contributors?

a. If yes, what are the incentives and how did you decide what type of incentives to offer?

b. Do you think the crowd finds the incentives motivating enough?

12. Have you used other open innovation approaches?

13. Do your crowdsourcing practices have a positive marketing effect for the firm?

14. Does the implementation of crowdsourcing require:

- process modifications
- new processes
- hiring new experts/employees
- buying technologies
- renting technologies
- outsourcing
- other

15. What publicity techniques do you use in order to attract the crowd to your crowdsourcing initiative?

16. How do you deal with the IP related to crowdsourcing?

17. How do you find the quality of the crowd-generated content?

18. Do you have quality assurance mechanisms (to guarantee the quality of the crowd submissions)?

19. What are the benefits for your firm resulting from the use of crowdsourcing?

20. Is crowdsourcing profitable for you?

21. What are the negative effects of crowdsourcing for your firm?

22. What is the profile of the typical crowd worker for your tasks?

23. Did the results you got from crowdsourcing meet your initial expectations?

24. What are the key factors for success of a crowdsourcing campaign?

25. What were your errors and your lessons learned?

APPENDIX 2 – Classifications of Identified Crowdsourcing Initiatives of Firms

Classification by Industry Sector

NAICS CODE	INDUSTRY SECTOR	FIRMS USING CROWDSOURCING
11	**Agriculture, forestry, fishing, and hunting**	
21	**Mining, quarrying, and oil and gas extraction**	Goldcorp
22	**Utilities**	E.On, Orange UK, British Telecommunications
23	**Construction**	
31–33	**Manufacturing**	Nivea (Beiersdorf), L'Oreal, Henkel, Colgate, Johnson & Johnson, Unilever, John Fluevog Boots & Shoes, Converse, Adidas, Swarovski Ducati Motor Holding, BMW, Audi, Fiat, Chrysler, Chevrolet, Citroen IBM, LG, Philips, Dell, BASF, Life Technologies, Microsoft, Sony, Siemens, Cisco Kraft, Unilever, General Mills, Sara Lee, Starbucks, Pepsi Canada, Big Al's kitchen, McDonald's Procter & Gamble, Unilever, Johnson & Johnson, Clorox, Henkel, Newell Rubbermaid, Stanley, Colgate, BASF, 3M, Sony, Syngenta Thoughtseeders**,** Newell Rubbermaid, GlaxoSmithKline, 3M, Pfizer, Life Technologies, Roche, Johnson & Johnson, DuPont, Amway, Bombardier Transportation, Boeing
41	**Wholesale trade**	
44–45	**Retail trade**	Swarovski, McDonald's
48–49	**Transportation and warehousing**	American Airlines, Air France, British Airways, Estonian Air, Finnair+ Helsinki Airport, KLM, Lufthansa Cargo, Ryanair, SAS Scandinavian, Westjet, NASA
51	**Information and cultural industries**	Chicago Sun-Times, Popular Science Magazine, The Economist, Orange UK

Classification by Industry Sector (con't and end)

52	Finance and insurance	Kickstarter, Indiegogo, RocketHub, Rock The Post
53	**Real estate and rental and leasing**	
54	**Professional, scientific and technical services**	PwC Canada, KPMG
55	**Management of companies and enterprises**	PwC Canada, KPMG
56	**Administrative and support, waste management and remediation services**	
61	**Educational services**	Oxford University
62	**Health care and social assistance**	WWF-Switzerland, Rockefeller Foundation
71	**Arts, entertainment and recreation**	
72	**Accommodation and food services**	Starbucks, McDonald's
81	**Other services (except public administration)**	
91	**Public administration**	Government of Iceland, US Government, Canadian Government

Classification by Industry Subsector

NAICS CODE	INDUSTRY SECTORS AND SUBSECTORS (NAICS 2012)	FIRMS USING CROWDSOURICNG
21	**Mining, quarrying, and oil and gas extraction**	
211	Oil and gas extraction	
212	Mining and quarrying (except oil and gas)	Goldcorp
213	Support activities for mining, and oil and gas extraction	

Classification by Industry Subsector (con't)

22	**Utilities**	E.On, Orange UK, British Telecommunications
31–33	**Manufacturing**	
311	Food manufacturing	Kraft, Unilever, General Mills, Sara Lee, Starbucks, Big Al's kitchen, McDonald's
312	Beverage and tobacco product manufacturing	Pepsi Canada
313	Textile mills	
314	Textile product mills	
315	Clothing manufacturing	John Fluevog Boots & Shoes, Converse, Adidas
316	Leather and allied product manufacturing	
321	Wood product manufacturing	
322	Paper manufacturing	
323	Printing and related support activities	
324	Petroleum and coal product manufacturing	
325	Chemical manufacturing	Procter & Gamble, Unilever, Clorox, Henkel, Colgate, BASF, Syngenta Thoughtseeders, Newell Rubbermaid, GlaxoSmithKline, 3M, Pfizer, Life Technologies, Roche, Johnson & Johnson, DuPont, Nivea (Beiersdorf), L'Oreal, Henkel, Colgate, Johnson & Johnson, Unilever, DuPont, BASF, Amway
326	Plastics and rubber products manufacturing	Newell Rubbermaid, Henkel, DuPont, BASF
327	Non-metallic mineral product manufacturing	
331	Primary metal manufacturing	
332	Fabricated metal product manufacturing	

Classification by Industry Subsector (con't)

333	Machinery manufacturing	BASF, Stanley
334	Computer and electronic product manufacturing	Philips, Dell, BASF, Life Technologies, Microsoft, Sony, Siemens, Cisco
335	Electrical equipment, appliance and component manufacturing	Philips, BASF, Sony, Stanley
336	Transportation equipment manufacturing	Ducati Motor Holding, BMW, Audi, Fiat, Chrysler, Chevrolet, Citroen, Bombardier Transportation, Boeing, BASF
337	Furniture and related product manufacturing	
339	Miscellaneous manufacturing	
44–45	**Retail trade**	
441	Motor vehicle and parts dealers	
442	Furniture and home furnishings stores	
443	Electronics and appliance stores	
444	Building material and garden equipment and supplies dealers	
445	Food and beverage stores	McDonald's, Starbucks
446	Health and personal care stores	
447	Gasoline stations	
448	Clothing and clothing accessories stores	
451	Sporting goods, hobby, book and music stores	
452	General merchandise stores	
453	Miscellaneous store retailers	Swarovski

Classification by Industry Subsector (con't)

454	Non-store retailers	
48–49	**Transportation and warehousing**	
481	Air transportation	American Airlines, Air France, British Airways, Estonian Air, Finnair+ Helsinki airport, KLM , Lufthansa Cargo, Ryanair, SAS Scandinavian, Westjet, NASA
482	Rail transportation	Bombardier Transportation
483	Water transportation	
484	Truck transportation	
485	Transit and ground passenger transportation	
486	Pipeline transportation	
487	Scenic and sightseeing transportation	
488	Support activities for transportation	
491	Postal service	
492	Couriers and messengers	
493	Warehousing and storage	
51	**Information and cultural industries**	
511	Publishing industries (except internet)	Chicago Sun-Times, Popular Science Magazine, The Economist
512	Motion picture and sound recording industries	
515	Broadcasting (except internet)	
517	Telecommunications	Orange UK, Cisco
518	Data processing, hosting, and related services	
519	Other information services	

Classification by Industry Subsector (con't)

52	**Finance and insurance**	
521	Monetary authorities - central bank	
522	Credit intermediation and related activities	Kickstarter, Indiegogo, RocketHub, Rock The Post
523	Securities, commodity contracts, and other financial investment and related activities	
524	Insurance carriers and related activities	
526	Funds and other financial vehicles	
541	**Professional, scientific and technical services**	PwC Canada, KPMG
551	**Management of companies and enterprises**	PwC Canada, KPMG
611	**Educational services**	Oxford University
62	**Health care and social assistance**	
621	Ambulatory health care services	
622	Hospitals	
623	Nursing and residential care facilities	
624	Social assistance	WWF-Switzerland, Rockefeller Foundation
72	**Accommodation and food services**	
721	Accommodation services	
722	Food services and drinking places	Starbucks, McDonald's
91	**Public administration**	
911	Federal government public administration	Government of Iceland, US Government, Canadian Government

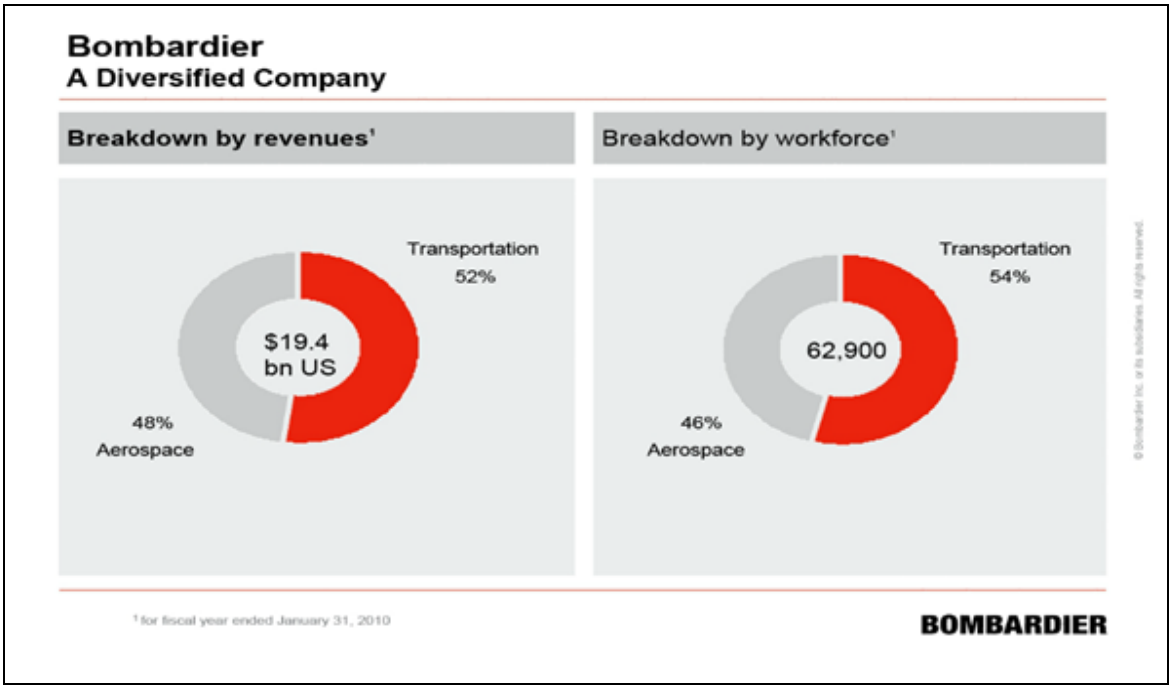
Classification by Industry Subsector (con't and end)

912	**Provincial and territorial public administration**	
913	Local, municipal and regional public administration	
914	Aboriginal public administration	
919	International and other extra-territorial public administration	

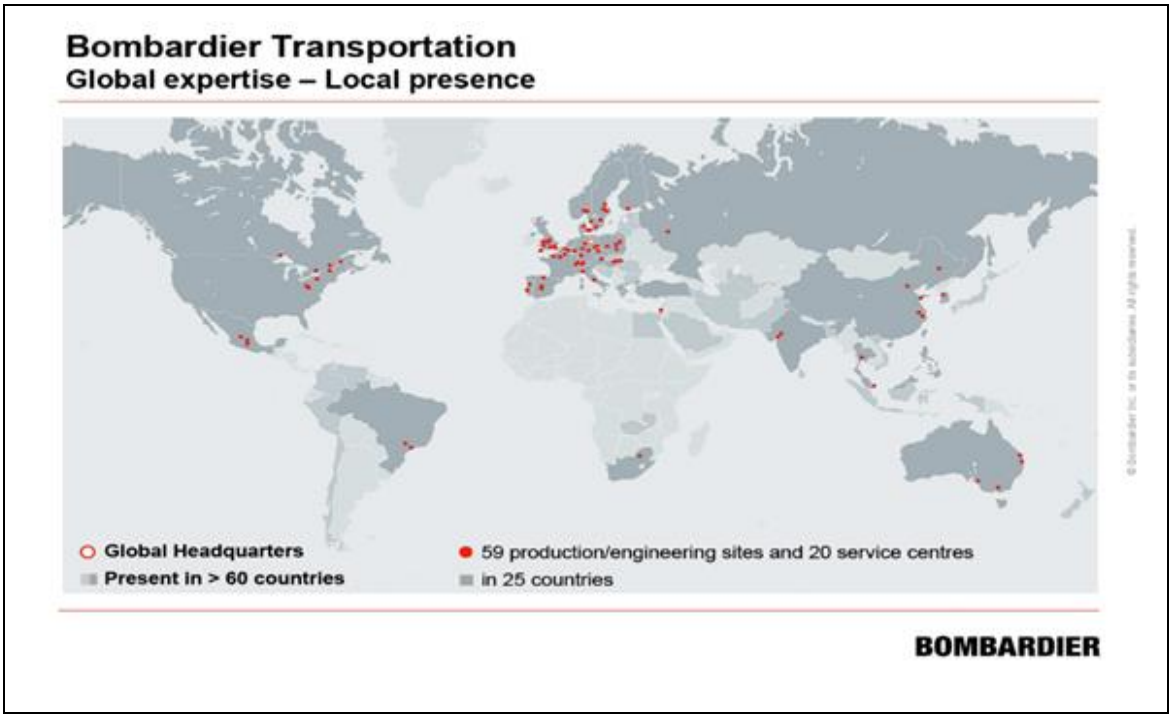
APPENDIX 3 – Facts about Bombardier Transportation

Bombardier Transportation: Overview (for fiscal year ended January, 2010) Copyright 2009 by Bombardier Inc.

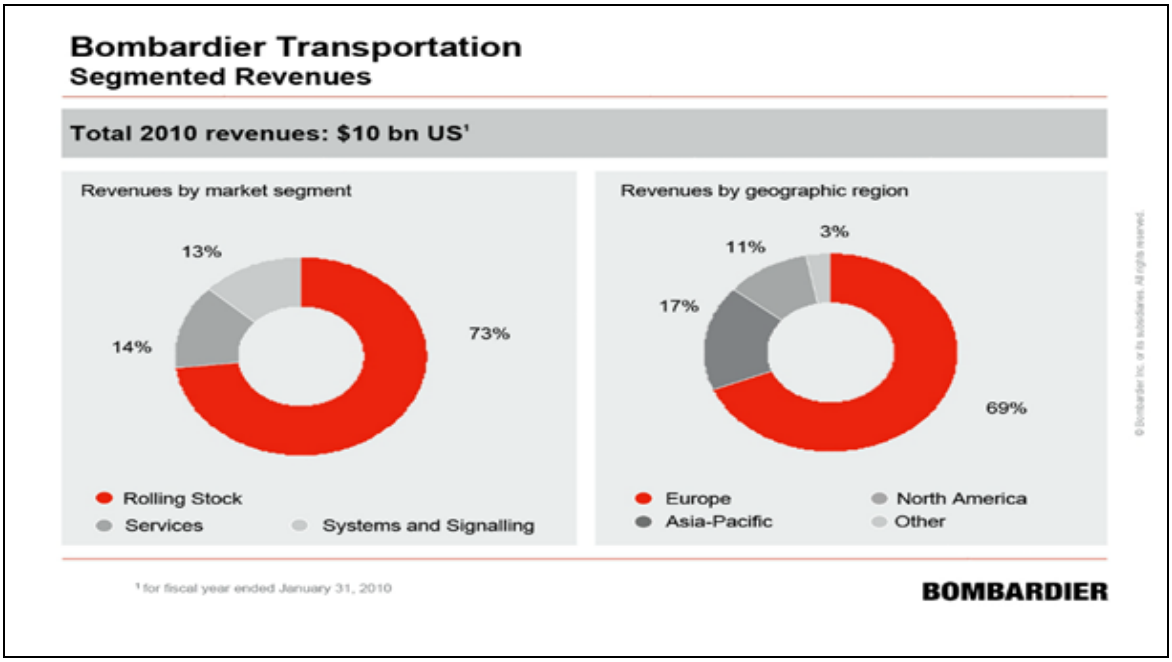
Bombardier Transportation: Facts and figures (for fiscal year ended January, 2010) Copyright 2009 by Bombardier Inc.



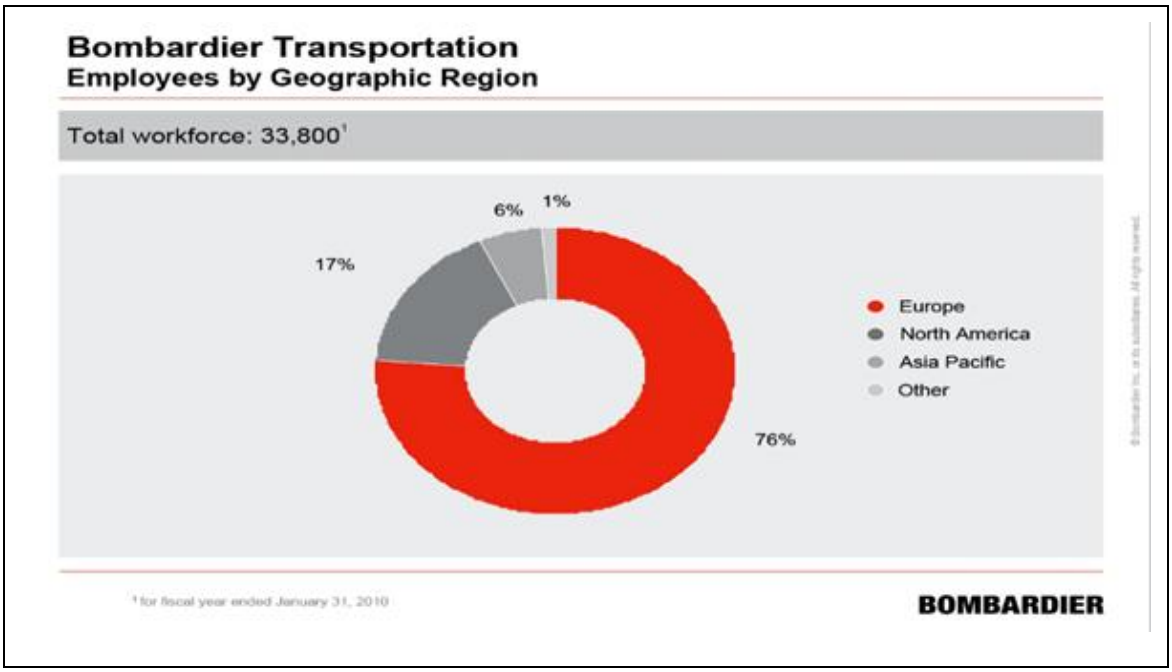
Bombardier Inc.: Breakdown by revenue and workforce (for fiscal year ended January, 2010) Copyright 2009 by Bombardier Inc.



Bombardier Transportation: Global footprint (for fiscal year ended January, 2010) Copyright 2009 by Bombardier Inc.

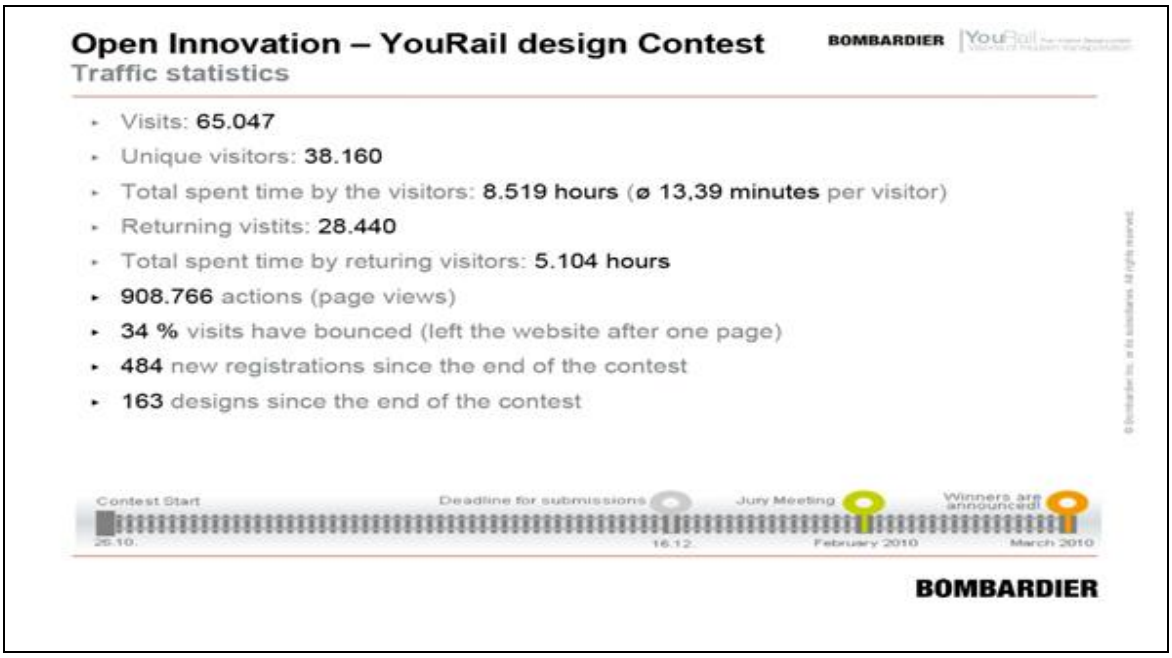


Bombardier Transportation: Segment revenues (for fiscal year ended January, 2010) Copyright 2009 by Bombardier Inc.

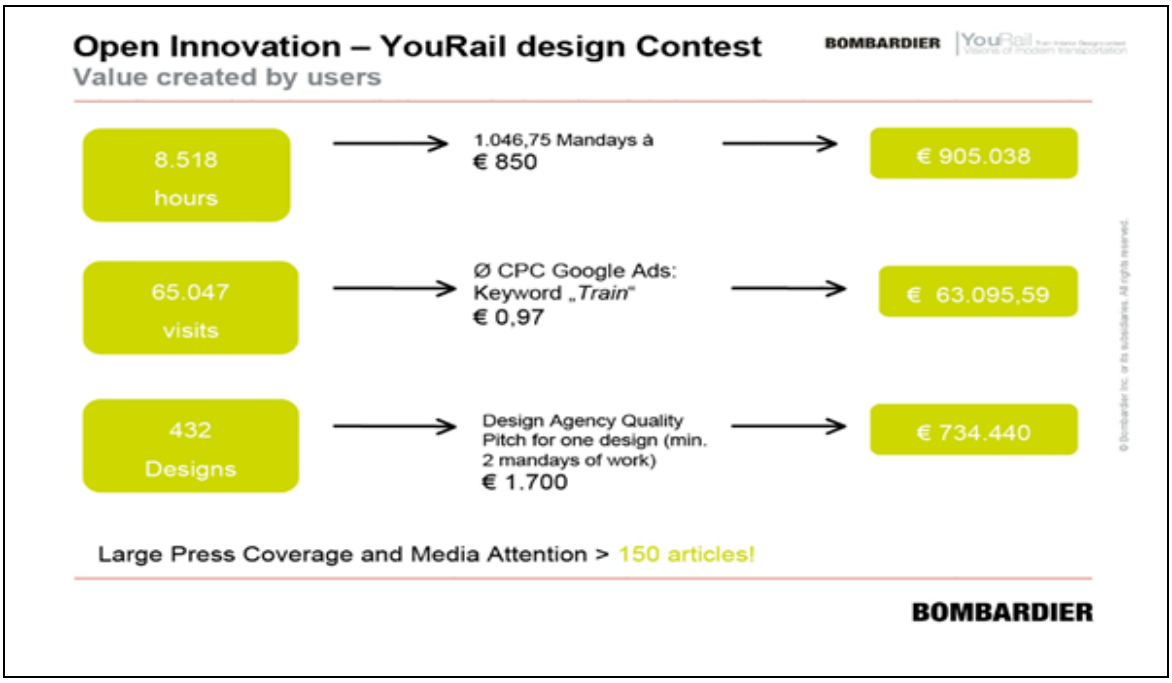


Bombardier Transportation: Employees by geographic region (for fiscal year ended January, 2010) Copyright 2009 by Bombardier Inc.

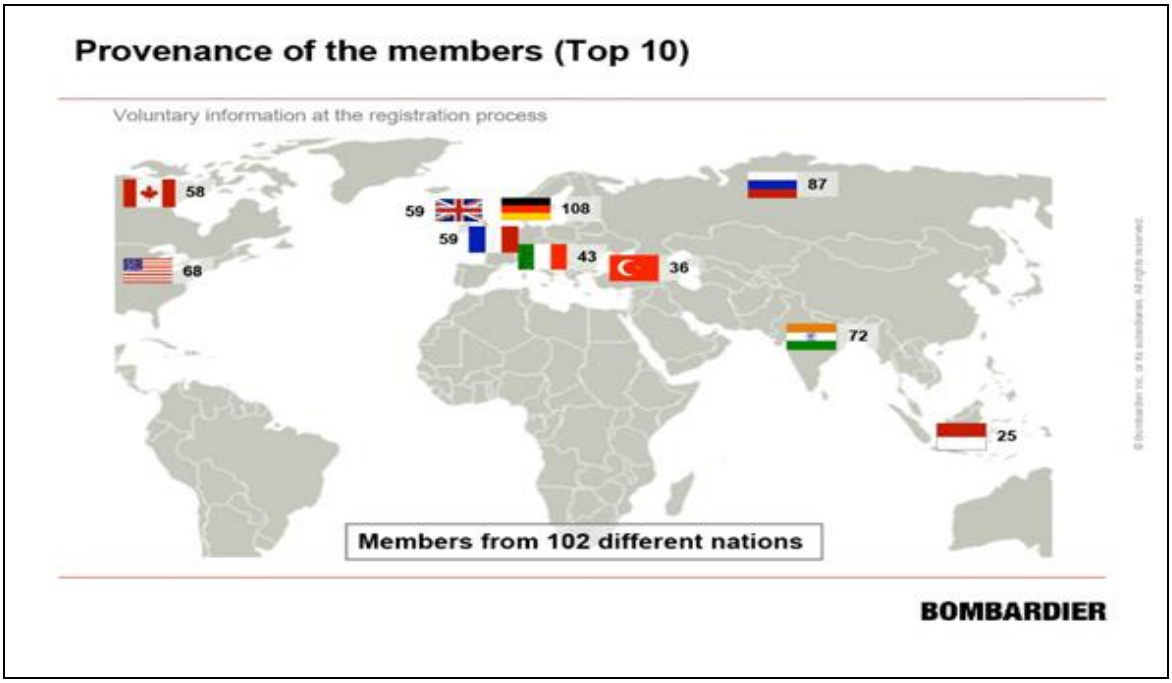
APPENDIX 4 – The YouRail Train Interior Design Contest



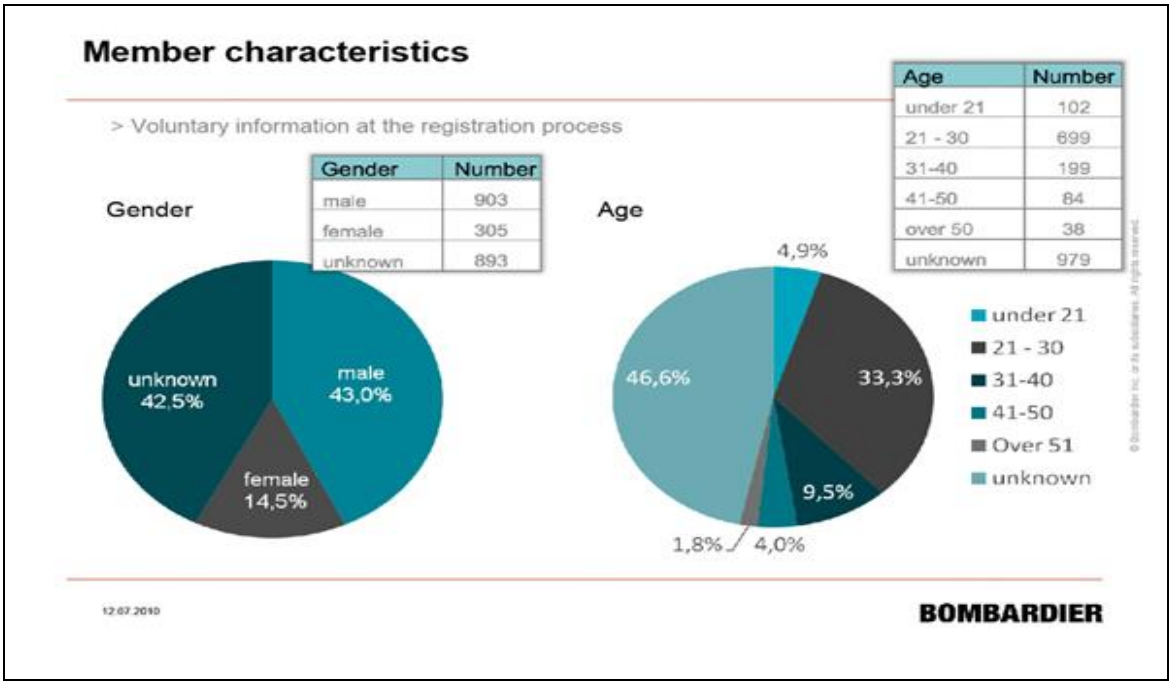
The YouRail Design Contest: Traffic statistics Copyright 2009 by Bombardier Inc.



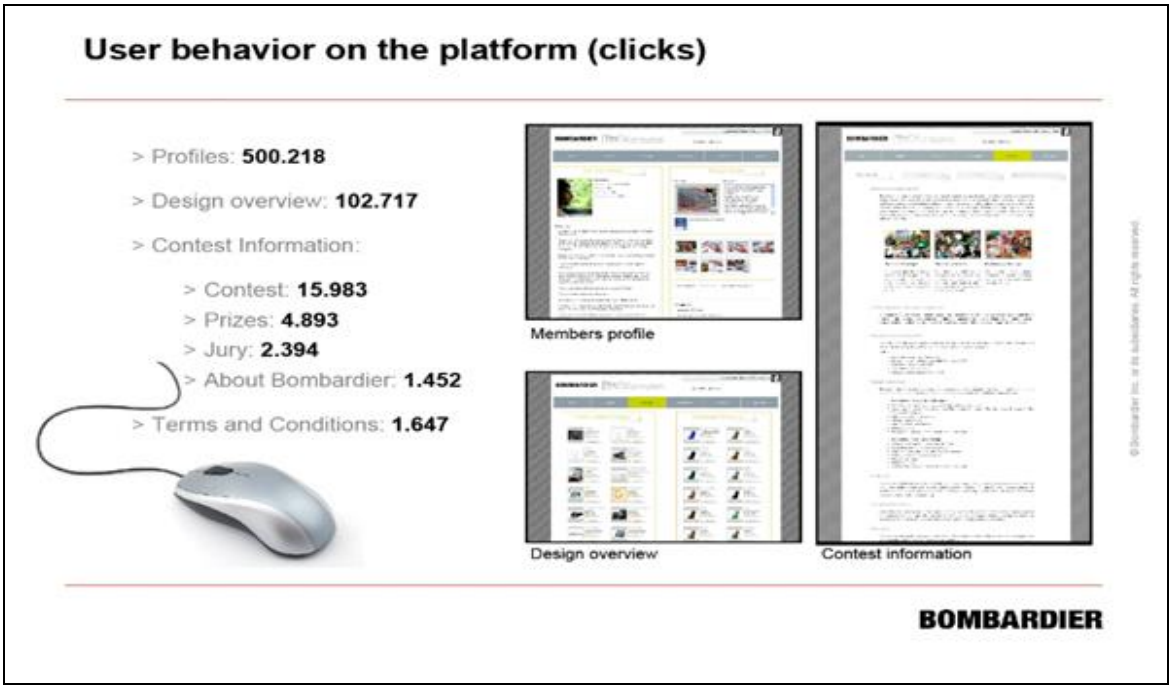
The YouRail Design Contest: Value created by users Copyright 2009 by Bombardier Inc.



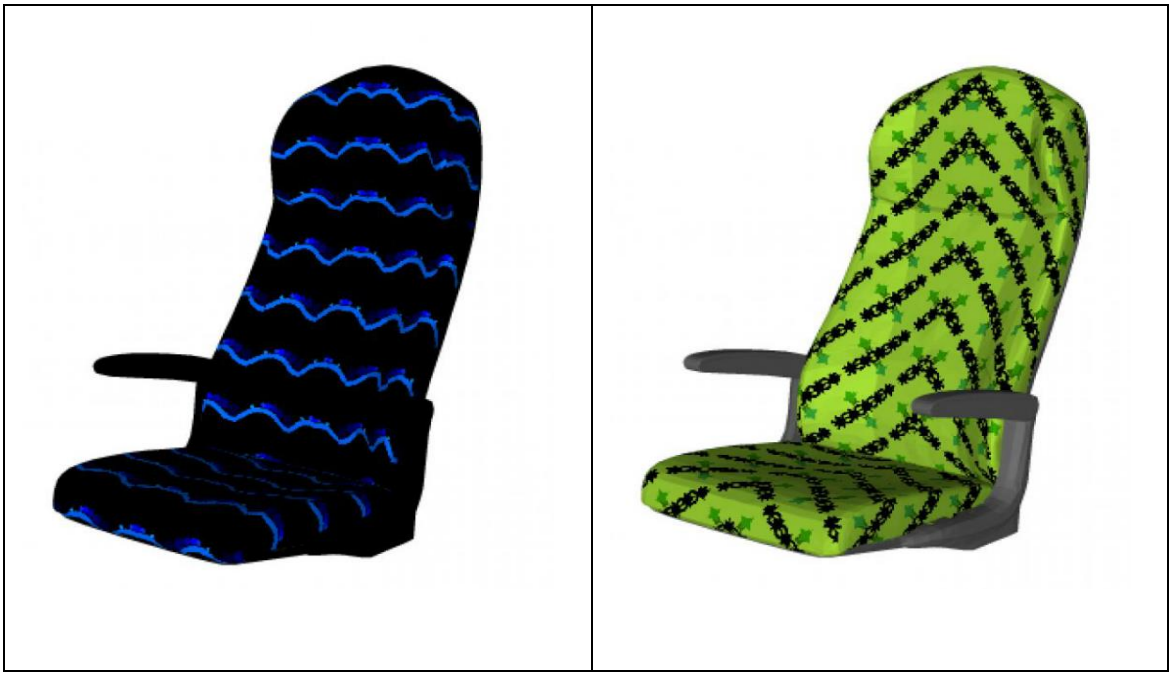
The YouRail Design Contest: Provenance members Copyright 2009 by Bombardier Inc.



The YouRail Design Contest: Member characteristics Copyright 2009 by Bombardier Inc.



The YouRail Design Contest: User behavior on the platform Copyright 2009 by Bombardier Inc.



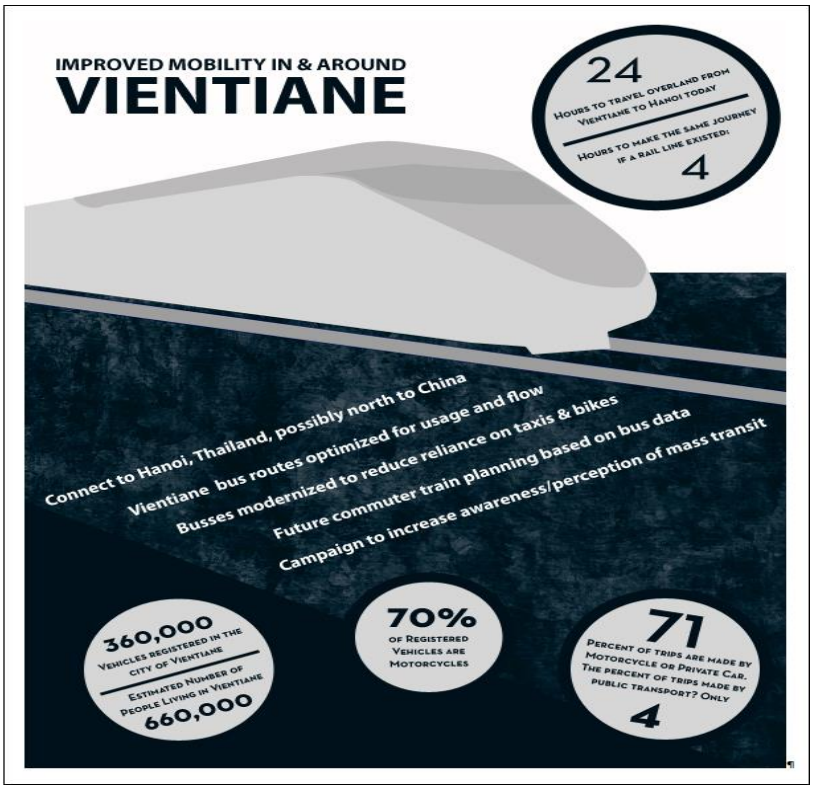
The YouRail Design Contest: Examples of submitted seat upholstery designs Copyright 2009 by Bombardier Inc.

Example of submitted train interior design Copyright 2009 by Bombardier Inc.

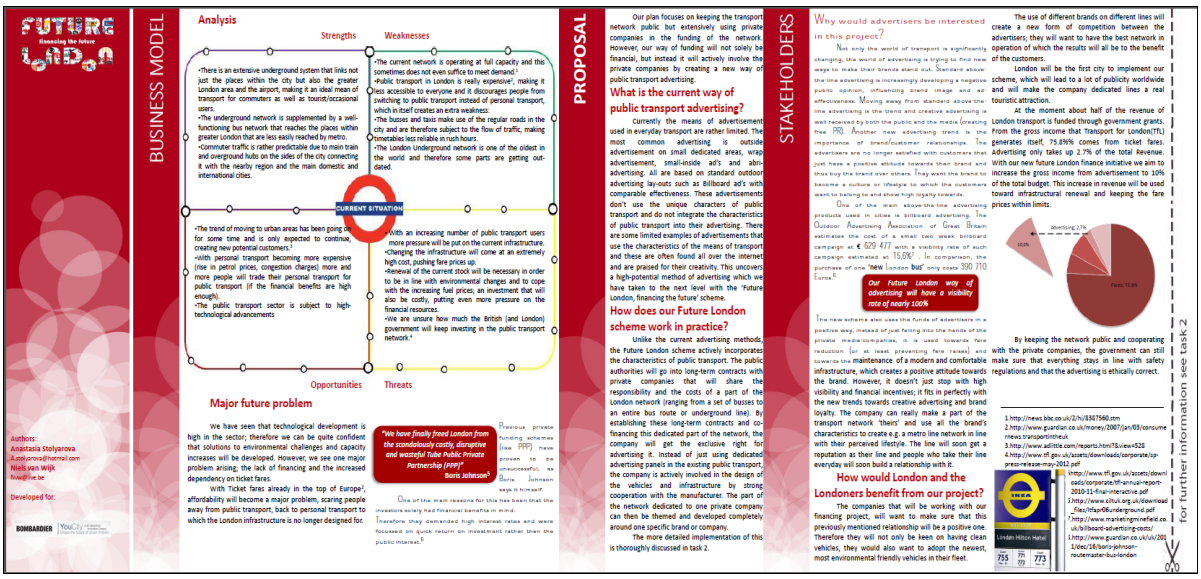
Example of submitted train interior design Copyright 2009 by Bombardier Inc.

Example of submitted train interior design Copyright 2009 by Bombardier Inc.

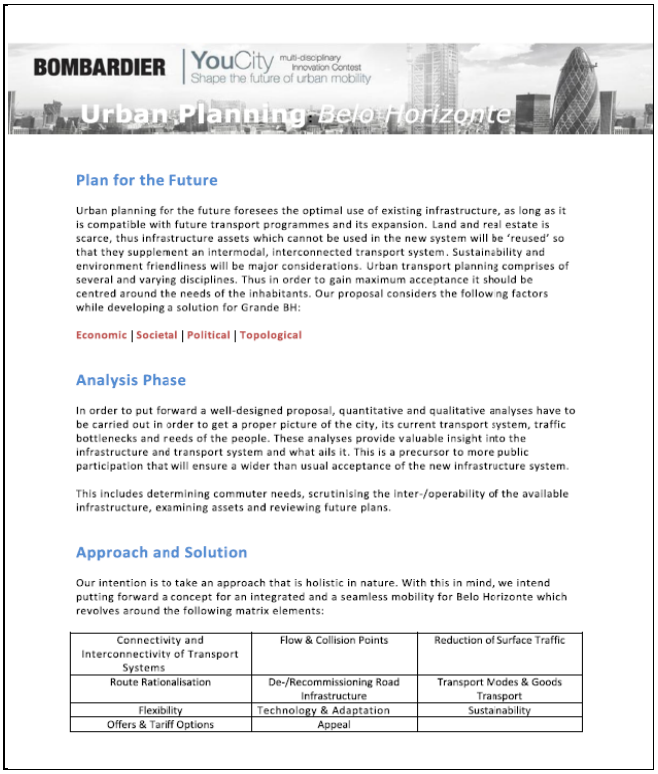
APPENDIX 5 – The YouCity Multi-Disciplinary Innovation Contest



The YouCity Contest: Example of submitted proposal-Task 1 (Org-2, 2012b)



The YouCity Contest: Example of submitted proposal-Task 1 (Org-2, 2012b)



BOMBARDIER | YouCity multi-disciplinary Innovation Contest
Shape the future of urban mobility

Urban Planning Belo Horizonte

Plan for the Future

Urban planning for the future foresees the optimal use of existing infrastructure, as long as it is compatible with future transport programmes and its expansion. Land and real estate is scarce, thus infrastructure assets which cannot be used in the new system will be 'reused' so that they supplement an intermodal, interconnected transport system. Sustainability and environment friendliness will be major considerations. Urban transport planning comprises of several and varying disciplines. Thus in order to gain maximum acceptance it should be centred around the needs of the inhabitants. Our proposal considers the following factors while developing a solution for Grande BH:

Economic | Societal | Political | Topological

Analysis Phase

In order to put forward a well-designed proposal, quantitative and qualitative analyses have to be carried out in order to get a proper picture of the city, its current transport system, traffic bottlenecks and reeds of the people. These analyses provide valuable insight into the infrastructure and transport system and what ails it. This is a precursor to more public participation that will ensure a wider than usual acceptance of the new infrastructure system.

This includes determining commuter needs, scrutinising the inter-/operability of the available infrastructure, examining assets and reviewing future plans.

Approach and Solution

Our intention is to take an approach that is holistic in nature. With this in mind, we intend putting forward a concept for an integrated and a seamless mobility for Belo Horizonte which revolves around the following matrix elements:

Connectivity and Interconnectivity of Transport Systems	Flow & Collision Points	Reduction of Surface Traffic
Route Rationalisation	De-/Recommissioning Road Infrastructure	Transport Modes & Goods Transport
Flexibility	Technology & Adaptation	Sustanability
Offers & Tariff Options	Appeal	

The YouCity Contest: Example of submitted proposal-Task 1 (Org-2, 2012b)

BOMBARDIER YouCity
BOOSTING URBAN MOBILITY IN VIENTIANE

Problems&Causes
Nowadays, one of the biggest problems is management of traffic transport, especially in developing country. Lao People's Democratic Republic is the best example to be given a very urgent transport consideration. Vientiane represents poor management of traffic mobility as a big picture of others developing country. the problem on the management of transport traffic in Vientiane [1] can be attributed to the following factors:
PHYSICAL | ATTITUDINAL | INSTITUTIONAL

Sustainable urbanism is meat to make it easier for people to get around by making it possible to travel to various bussinesses.

1] Car Parks
We concentrate on reducing number of private car in downtown and preparing for city extension in the future. The public car parks need to be the initial consideration. The three car parks are required to be done first in the outer ring of the city.
1746 vehicles at Thadua car park
1824 vehicles at Samsenthai car park
3585 vehicles at Nongchan car park

2] BUS
According to the contemporary urban planning concept, a public transport is one of the most important systems to bring people in and out of the city. Bus routes are built in the concepts of ring network and CBD (Star network) to ensure the highest efficiency of the system.
Interlinked with rail ways
connected to the airport in the east of vientiane

3] Tram
While the car park and the public transport systems are being implemented, the use of the tram is the next consideration. he purpose of the tramwaysis to fast bringing people into and out of the city in a big lot, which will also be served by supported car parks and bus routes.
265 persons/trip.
60 km/h
Innorail technologies.

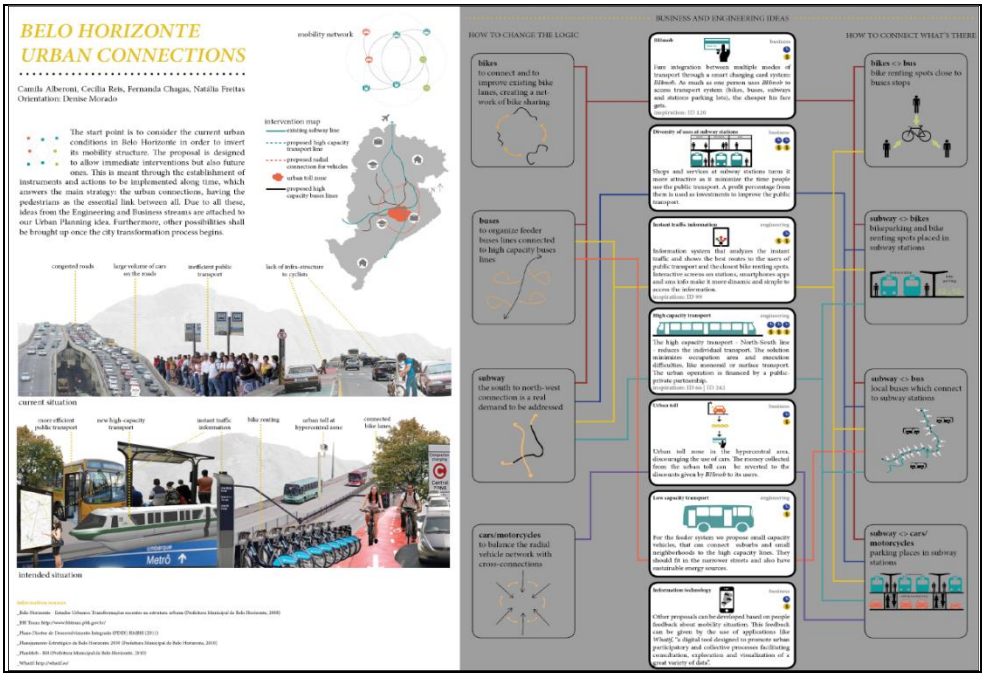
Samsenthai Rd Car Park
Ban Anou
Fa ngum park Station
Lane Xang
Sakerin
Nongchan Car Park
Thadeua Rd Car Park
Lao Thai Station
2015-2020 : 5 km from Lane Xang
2020-2030 : complete plan
Tram Line 5 Yr: 2015-2020
Bus Loop 1
Bus Loop 2
Phase 1 2012-2015
Bus Loop 3
Bus Loop 4
Phase 2 2015-2020
Bus Loop 5
Bus Loop 6
Phase 3 2020-2030
Interchange Station

New e-payment system for holistic public transport is proposed in our system.

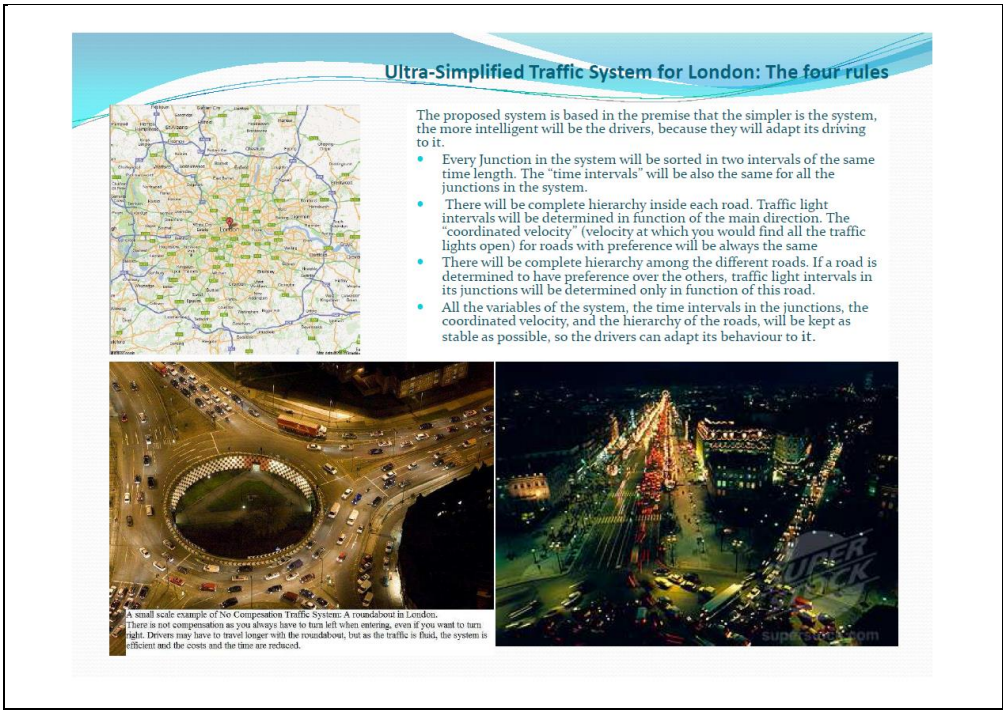
Selected References

THAILAND BOY

The YouCity Contest: Example of submitted proposal-Task 2 (Org-2, 2012b)



The YouCity Contest: Example of submitted proposal-Task 2 (Org-2, 2012b)



The YouCity Contest: Example of submitted proposal-Task 2 (Org-2, 2012b)