How Collective Learning Improves Innovation

App developers listen to their customers and competitors to learn how to succeed.

Where "entrepreneurial ecosystems" exist, there are hotbeds of rapid entry and experimentation. These ecosystems consist of mostly small organisations that share a technological architecture and a set of norms. Take the Apple App Store, where app developers often rely on users who make concise suggestions on improvements, point out bugs and cite competing products in their feedback. This not only gives the app developer the consumer's perspective, but also an industry landscape view of the competition and competing apps.

Typically, legacy businesses focus on individual-level learning with sporadic surveys and polls, which give mixed data on their products and services from respondents who might not be the most engaged or knowledgeable. App developers, on the other hand, get feedback from active users and strive to achieve the coveted 5-star ratings, which push their apps to the top of the store. But does this rapid feedback and learning lead to more innovation?

To quantify how beneficial this "population level-learning" is, we looked at a population of more than 390,000 apps listed on the U.S. iTunes App Store market over 15 months, combined with the detailed data on rankings and consumer comments, for our paper, **Collective Intelligence of Market-**

Categories in Entrepreneurial Ecosystems: Evidence of Population-Level Learning in Mobile Applications. We find a considerable difference in learning across and within each category.

Learning from the community

The Games category suggests more innovative learning, and gleaned more modifications from user feedback than other categories. The following chart shows each category with the number of apps, firms and top downloaded apps:
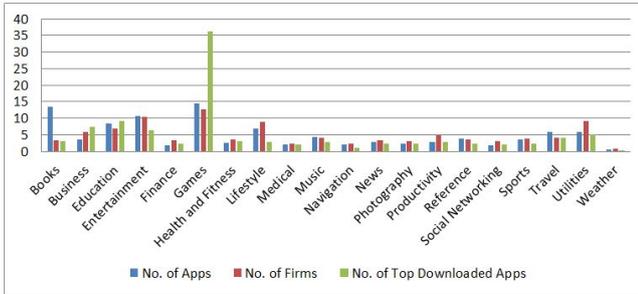
number of apps) to highlight the changing patterns of learning within apps' Games and Weather categories.
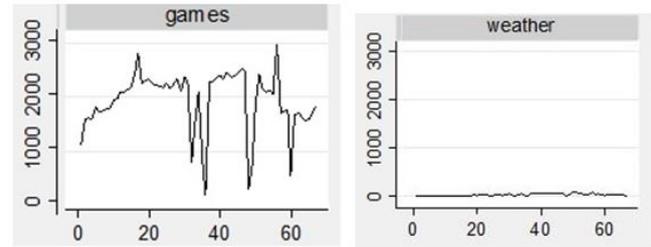
The Games category surpasses the others in terms of downloads. Although there are many apps in the Books category there isn't much innovation and learning in this space. Consumers already understand how to use electronic books and most book apps are electronic modifications of the offline publications.

Those who download games, however, are more willing to spend money on apps. This makes app developers hyper-competitive and keen to learn from their competitors to outcompete them. For example, when the first games for the App Store were developed in 1997, there was a lot of debate about the best way to earn money out of then-new platform. Games were the frontrunner of in-app purchases, offering a free download followed by enhancements for sale.

Reviews in the Games category are highly detailed. The learning loop is very well developed between active consumers and active feedback. Because only users who have downloaded an app can make comments, the feedback is valid. As reviewers' comments often compare features with similar apps, developers can investigate their competitors – who they are and what they are good at, and then download competitors' apps for reverse engineering.

Charting group learning

In addition we find that as consumer feedback increases, their intelligence is able to merge. This becomes clearer from the following chart, in which we 'combined' important performance measures (the number of apps for a week relative to the mean

Looking at the different categories offered in the App Store and how users interact with them, we find considerable differences between categories in terms of how much they improve over time. In the above charts, which show learning factor adjusted for the number of apps in a category, we can see that while weather apps experienced very little learning over the set period, apps in the Games category improved significantly. This is thanks, in part, to active consumer feedback prompting Games developers to make changes and users to learn new ways to use their apps, increasing collective intelligence.

Spreading too thin

This active feedback also helps developers spread across categories. They apply what they learned from one category to other categories. App developers generally spread their creations across two or three different categories. But there is a limit to this; we found that the potential for developers to learn from feedback is diluted as the collective learning is spread out.

In summary, our study suggests the importance of facilitating active feedback between consumers and producers as well as using that feedback for diversification. It is clear from our findings that an entrepreneurial ecosystem facilitates learning as well as innovation, including customers in the journey.

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