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Tennis, Anyone? Lessons on Innovation in a Mature Industry

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Tennis qualifies as the oldest racquet sport in the world. Since 1874, when the first patent for the modern tennis racquet was registered in London, little had changed until the 1970s when the wooden racquet was phased out followed by a succession of cutting edge designs. How did the classic tennis racquet lend itself to being so thoroughly reinvented?

Wharton management professor J.M. Pennings, together with Hann E Kim, professor at the KDI School of Public Policy and Management in Korea, set out to find some answers. Speaking at a recent Singapore Management University colloquium on factors underlying the successful introduction of new generation tennis racquets, Pennings said, "Innovations normally go hand-in-hand with emerging industries. Tennis, despite being a mature industry, has seen a flurry of innovations with new generation tennis racquets successfully marketed by manufacturers in recent decades."

As part of their research, Pennings and Kim reviewed archival materials about tennis racquets from *Tennis* and *Tennis World*, two popular magazines in the US market. Specifically, they focused on eight different designs of tennis racquets, introduced between 1976 and 1992. (By end 1991, the magazines had stopped reporting on the performance measures of new racquets, one of the key variables in the study.)

According to Penning, in the evolution of the tennis racquet over the past few decades, three major design architectures shaped and influenced the industry. The first major product was the oversize design introduced in 1976 with a surface area of 784 square centimeters, in contrast to the normal 460 square centimeters. This was followed by the widebody design in 1987, where the thickness of the new racquet varied across the frame. The thickest portion was in the middle up to 39 millimetres, compared with the traditional racquet that was 19 millimetres thick across the frame. The extra-long racquet introduced in the 1990s ranged from 68 centimetres to 71 centimetres in length, compared with the traditional racquet at 65 centimetres.

Supply and Demand Factors

The researchers examined the role of manufacturers and product innovations and the added dimension of how consumers were incorporated into the innovation process. "It should be remembered that only up to 3% of innovations eventually become commercially viable," said Penning. "Therefore, it is important to fully understand that many factors shed light on why some innovative designs are successful while many others fail. The supplier's side of the story and technological aspects tend to be the main focus attracting lots of research, but it is just one dimension," he explained.

Product innovation is a complex process, Penning stressed, and a successful outcome hinges on the innovator taking a multi-dimensional approach, drawing upon technical, organisational marketing, social and political-regulatory factors. Product innovators cannot just consider supply side dynamics, i.e. the development, production and launch of the new product, but should also take into account demand side factors such as education and marketing communication initiatives to induce shifts in consumer attitudes and behaviour. "Ultimately, what is also integral to the success of the new design involves overcoming any consumer uncertainty or resistance to the new product, hence the need to understand demand-side dynamics that include engaging consumers during the innovation process and making provisions to influence customers' preferences," Pennings said.

Changing Consumer Behaviours

Penning stressed that an innovative product will not sell by itself because consumers often resist change, thereby requiring entrepreneurial action to mould consumer preferences. Adoption of innovation by consumers, he added, is a complex issue which has attracted many studies from different viewpoints, encompassing technology through to organisational processes and strategic perspectives.

The current study shows that innovative racquet designs evolved through an extensive process of education and interaction between producers, consumers and media. No doubt technology investments were made by manufacturers, but the success of the new generation tennis racquets was the result of commitment by the industry to initiate behavioural and mindset changes among consumers.

Giving examples, Pennings said: "Some racquet design innovations required tennis players to adapt their playing style to benefit from the improvements. These new products sometimes met with resistance from individuals, professional players and industry publishers. For example, the over-sized racquet had to contend with negative feedback for up to two years after its launch. Players needed to understand that retraining to use the new racquet was necessary

to maximise performance because its sweet spot was located closer to the handle than with traditional racquets. Today, it is hailed as one of the most innovative racquet designs around." In fact, Pennings recounted, Michael Chang's improved ranking later in his career was believed to have stemmed from the prototype long-body racquet he used which sparked even more interest in innovation.

First-mover advantage notwithstanding, other research reveals that consumer preferences are not fixed. They are fluid, malleable and shaped by experience, either through direct exposure or vicariously. In terms of demand-side dynamics, product endorsements by professional tennis players for new racquets have become the cornerstone of marketing communications and promotional programmes. "The use of celebrities as spokespersons for new products increases the credibility of the innovation. This requires follow through in advertisements to enhance acceptance of the innovation by individual tennis players," said Penning.

According to research published by R. Ohanian in 1991 and L. Kahle and P. Homer in 1985, celebrity endorsements of an innovation impart three attributes – expertise, trustworthiness and attractiveness. Expertise confers respect as the celebrity is credited with superior knowledge of the product being endorsed. Trustworthiness denotes the degree to which a person furnishes objective and honest information. Attractiveness implies that a message is more successfully communicated by a physically attractive person.

Success Breeds Replications

At the same time, supply-side dynamics attract more competitors to replicate the successful innovation in view of growing evidence about the technically superior solution and willingness of the market to pay for the new design. According to research published by F. Malerba in 2006, and P. Windrum and C. Birchenhall in 1998, the feedback from early adopters and lead users become catalysts that drive further demand, giving the product even more dominant status.

This research led Pennings to form the hypothesis that a firm's efforts to communicate its innovative product to consumers – such as professional endorsements and advertising campaigns -- will spur on competitors to launch similar products. They will be prepared to pay a license fee to ride on the innovation, in this case a new tennis racquet design. "Innovators should actively manage various participants in the industry as an integral part of their efforts and, even more so, when considering their rivalry towards 'me-too' peers," he said.


However, 'me-too' competitors should not concern the innovator, added Pennings. He highlighted research published in 1989 by G. Carpenter and K. Nakamoto which showed that the firm pioneering a new product category enjoys an enduring advantage because consumers begin to form preferences around its product attributes.


According to Pennings, racquet manufacturers must contend with industry specific quirks when launching a new product. Since players put a premium on physical proficiency and skill, any reliance on a performance enhancing innovation and cutting-edge equipment is viewed as a weakness or even dishonest. This type of issue must also be addressed by the advertising campaigns and product endorsements as they seek to engage players at the individual level. Another consideration are design rules set by the International Tennis Federation (ITF). By setting the boundary for design parameters, the playing field is levelled for both incumbents and potential entrants.

Innovator-Consumer Relationships

In launching an innovative racquet design, manufacturers therefore have to consider the views of a range of players, not just the scientists and engineers involved. They also need to develop full-fledged marketing communication campaigns and promotional programmes involving tennis celebrity endorsements, the tennis playing public, journalists and regulators. Eventually success is grounded on a technically solid, innovative design complemented by a host of programmes to reduce uncertainty about the product in the marketplace and shape consumer preferences to align with that of the manufacturer.

Whilst acknowledging that this study is one of only a few to incorporate both supply and demand-side dynamics, Pennings concluded that there was scope for more research to better understand how innovator-consumer relationships are successfully forged. "In essence, we show that product innovators influence consumer preference formation, trigger imitative reactions among peer firms, and sway the market towards a new design that eventually becomes a standard. This study opens new vistas which include research that promotes understanding into the intricate relationships between producers and consumers in realising the full potential of an innovative product," he said.

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