

“PadMan”: A Case of Diffusion of Innovations Theory

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Abstract

Twenty years ago, Arunachalam Muruganatham, a poor school dropout from Southern India, launched a revolution in menstrual hygiene among developing nations with his invention of a simple machine that produces cheap sanitary pads. Muruganatham created a four-step process for producing sanitary towels through the innovative use of existing simple tools and technologies. Eventually, Muruganatham's invention and method spread, one village at a time, to 1,300 villages in 23 Indian states, with plans to eventually reach more than 100 countries. This article illuminates how Muruganatham's achievement progressed from a simple and practical idea to one that is changing lives—perhaps even saving lives. The diffusion of innovation in Muruganatham's achievement exemplifies Rogers' (1962/2003) landmark theory, *Diffusion of Innovations*. In explaining his theory, Rogers described the types of persons involved in diffusion of innovations, including *opinion leaders*, *change agents*, *innovators*, and *versions of adopters*. This article focuses on cultural factors regarding two categories of influencers on diffusion that are evident in Muruganatham's case: *early adopters* and *laggards*.

Key Words

PadMan, Diffusion of Innovations, sanitary, menstruation

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Introduction

Twenty years ago, a poor school dropout from Southern India named Arunachalam Muruganatham launched a revolution in menstrual health care among developing nations with his invention of a simple machine that can produce inexpensive sanitary pads (Kummar, 2009). A naive newlywed who knew few details about menstruation, Arunachalam Muruganatham discovered that his new wife was using and reusing dirty rags because store-bought sanitary pads were cost-prohibitive, with a markup 40 times the price of the raw materials they comprised. In less than five years and through trial and error and experimentation on mostly volunteer “testers” among college students, Muruganatham created a four-step process for producing sanitary towels through the innovative use of existing simple tools and technologies. In a year and a half, he had distributed 250 machines to the poor and culturally conservative states of Northern India. Eventually, Muruganatham's machine and method spread, one village at a time, to 1,300 villages in 23 of India's 29 states. Muruganatham's mission, however, was not simply to make sanitary pads more available to women

in rural areas, but also to create jobs for those women, who could learn to manufacture, market, and distribute the pads in bulk. His invention won a national competition for innovations and an award from the president of India.

This article illuminates how Muruganatham's achievement progressed from a simple and practical idea to one that today is changing lives—perhaps even saving lives. The diffusion of innovation in Muruganatham's achievement exemplifies Rogers' (1962/2003) landmark theory, *Diffusion of Innovations*. In explaining his theory, Rogers described the types of persons involved in diffusion of innovations, including *opinion leaders*, *change agents*, *innovators*, and *versions of adopters*. This article focuses on cultural factors regarding two categories of influencers on diffusion that are evident in Muruganatham's case: *early adopters* and *laggards*.

Background

Menstruation

Cultural and religious issues. Among Hindus in Muruganatham's homeland, menstruation, especially first menstruation or menarche, is viewed positively as an aspect

of a girl's life. In Southern India, where Muruganantham comes from, girls who experience their menstrual period for the first time are given presents and celebrations to mark the occasion. The girl's family feasts with friends and relatives and sings joyfully. However, in many traditional Hindu homes in India, girls and women are denied entry to the temple or to the kitchen because of menstruation (Arumugam et al, 2014). In some areas, it is believed that "menstruation is a disease and not a normal biological process"; therefore, menstruating women are not allowed to sleep on beds, enter kitchens, touch male members of their family or eat spicy foods (Tomar, 2015).

Becoming "PadMan"

Born in Pudur in Coimbatore, Tamil Nadu, Muruganantham faced economic hardships for more than 30 years while trying to support his family ("Mini-sanitary," 2009). As a poor 14-year-old, he dropped out of school in Southern India but achieved success three decades later, after creating a miniature sanitary napkin machine that is changing—and perhaps saving—girls' and women's lives in underdeveloped areas of the world. He worked as a part-time machine technician and operator, an insurance agent, a farm laborer, and yarn sales agent. Muruganantham was a newlywed in 1998 when he discovered that his wife was hoarding dirty rags. She told him that

she needed them during menstruation. Buying sanitary napkins would cost too much. His response: designing a simple machine to produce sanitary pads. He even wore some himself, using a tiny pump to test absorption. And instead of selling his idea to the highest bidder, he supplies his low-cost machines to rural communities. Now millions of poor Indian women can avoid painful urinary-tract infections and create their own pad-manufacturing businesses. The invention has also sparked interest around the world. (Gupta, 2014)

"Empathy," Gupta (2014) wrote, "is the most revolutionary emotion."

Focusing at first on menstrual hygiene for women in rural India, Muruganantham began work toward inventing a low-cost sanitary pad-making machine that since 2006 has spread awareness in his homeland and elsewhere of traditional unhygienic practices and how to manufacture an inexpensive product to protect menstruating girls and women while also creating an industry and jobs for them. Muruganantham demonstrated his idea to a company called IIT Madras in 2006. Without his knowing it, IIT registered his invention for a national competition in India known as the National Innovation Foundation's Grassroots Technological Innovations Award. Muruganantham

won the competition ("Mini-sanitary," 2009). After that, Muruganantham was able to obtain funding to launch Jayaashree Industries, which handles the marketing of the machines to rural women across India.

The Innovation

The simple devices that Muruganantham invented—and the process by which those devices can be replicated by women everywhere—can manufacture sanitary pads for less than a third of the cost of commercial pads. In 18 months, Muruganantham built 250 machines and took them to the poorest and most underdeveloped states in Northern India, including Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh, where women walk for miles to fetch water—impossible to do when they are menstruating, leaving their families to suffer. Muruganantham said: "My inner conscience said if I can crack it in Bihar, a very tough nut to crack, I can make it anywhere." (Venema, 2014). The subject proved hard to broach in conservative society, but "village by village, there was cautious acceptance."

Theory

Diffusion of Innovations

Everett Rogers (1962/2003) popularized the theory of *Diffusion of Innovations*, which sought to explain how and why new ideas, tools, and technologies are communicated and spread over time among participants in a social system. Rogers asserted that four main elements influence the spread of a new idea: the *innovation itself*, *communication channels*, *time*, and a *social system*.

Diffusion of innovations relies heavily on *human capital* and wide adoption through a *social system of communication*. Diffusion is highly subject to the type of *adopters* and the innovation-decision process, depending on *opinion leaders*, who serve to examine, analyze, and evaluate an innovation and who are influential in spreading either positive or negative information about it, according to a *two-step flow theory* of communication (Katz & Lazarsfeld, 1970). The criteria for the adopter categories—*innovators*, *early adopters*, *early majority*, *late majority*, and *laggards* (Rogers, 1962/2003, p. 150)—is defined as the degree to which, or stage at which, an individual adopts a new idea. Eventually, through this diffusion process, an innovation reaches critical mass—or doesn't. This article next identifies the innovators, early adopters, and laggards in Muruganantham's case.

Applying the Theory

The Innovator. Four-and-a-half years after his initial idea, Muruganantham succeeded in creating a low-cost method for the production of sanitary towels. The process involves four simple steps. First, a machine similar

to a kitchen grinder breaks down the hard cellulose into fluffy material, which is packed into rectangular cakes with another machine. The cakes are then wrapped in non-woven cloth and disinfected in an ultraviolet treatment unit. The whole process can be learned in an hour. Muruganatham himself, as an entrepreneur, is an example of an innovator whose brain power has been diffused. He lectures frequently and has presented his story from Mumbai IIT Bombay to Harvard. One further profound example of the diffusion of Muruganatham's innovation is his achievement in giving a TED talk, considered a true measure of success in the West. In addition, Muruganatham has not only won praise for his commitment to human rights in improving women's health, but he has also declined offers from commercial vendors to monetize his idea.

Early Adopters. Muruganatham has instead chosen to diffuse his idea through self-help groups (SHGs) run by women (Buncombe, 2012). Women have not only benefitted through the introduction of this better hygiene and the opportunity to run SHGs and work at producing the sanitary pads, but they also now are able to continue to work during menstruation (Baker, 2012). Muruganatham's success also inspired other entrepreneurs to enter this area (Nathwani, 2013), including some who propose to recycle banana fiber or bamboo for the manufacture of sanitary napkins (Osmanabad, 2013). Muruganatham is also the subject of a prize-winning documentary, *Menstrual Man* (2013), produced by Amit Virmani, and the film *Phullu* (2017), directed by Abhishek Saxena.

Laggards. Ignorance and education appear to be factors for laggards in adopting the innovation of Muruganatham's pad-making device. As many as 42 percent of Indian women who participated in a 2014 study still did not know about sanitary pads or from where in their anatomy menstruation originated. "Most were afraid or worried on first menstruation" (Arumugam et al, 2014). Literacy may also matter. Bihar, for example, is the third most populous state in India, per the 2011 census, but almost 89 percent of Bihar's population live in rural areas, leaving it, at 11.3 percent, with the second-lowest urbanization rate in India. In Bihar, female literacy is at 51.50 percent, up from 33.12 percent in 2001 ("6—States," 2011).

Conclusion

Over time, Muruganatham's machines spread to 1,300 villages in 23 of India's 29 states, and expansion is planned to 106 nations (Venema, 2014). In 2014, Muruganatham was named one of the "100 Most Influential People in the World" (Gupta, 2014). In 2016, he was awarded the Padma Shri, India's fourth-highest

civilian honor. Today, Muruganatham enjoys status as a wildly successful inventor and social entrepreneur: a true innovator. "Where Nehru failed," he says, "one machine succeeded" (Venema, 2014).

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