Science Model of Consumer Behavior on Direct-to-consumer Genetic Testing

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ABSTRACT

Despite the rapidly decreasing cost and increase in the range of direct-to-consumer (DTC) genetic testing services, uptake and utilization of these services has been slow compared with similar technologies. We examine the potential consumer trends of DTC genetic testing using the Theory of Diffusion of Innovation and the Bass Model to simulate consumer purchasing trends with respect to internal and external influences such as word-of-mouth dissemination and regulatory trends. By simulating these influences on the adoption of DTC genetic testing in the consumer market, stakeholders will be better able to evaluate the need for changes in policy and influences in consumer demand for DTC genetic testing products. This study will provide model on how DTC genetic testing can project consumer behavior, expectations and motivations towards purchasing the service and consequently their reaction to their results.

OBJECTIVE

To examines the potential consumer trends of direct-to-consumer genetic testing using the theory of diffusion of innovation and the Bass model to simulate consumer purchasing trends with respect to internal and external influences leading to adoption or resistance to direct-to-consumer (DTC) genetic testing.

HYPOTHESES

1) Personalized genomic testing will continue and increase as Sigmoidal curve as direct-to-consumer platform.
2) Personalized genomic testing will continue but plateau at “time” point.
3) Personalized genomic testing will continue a linear curve.

METHODS

Diffusion of Innovation theory also takes into account the characteristics and needs of the potential adopter.

The Bass model is an empirical representation that describes the adoption process and diffusion of new technology products with respect to external and internal forces. Equation used :

$$\frac{f(t)}{1-F(t)} = p + \frac{q}{m}[Y(t)]$$

t = proportion of the potential market that adopts at time t given.
f (t) / 1 – F(t) = likelihood that a customer will adopt the innovation at exactly time t.
p= new adoptions due to influences outside the social network.
q= the number of new adopters in proportion to the number of prior adopters.
m = number of members which word-of-mouth from past adopters drives new adoptions.

RESULTS

Figure 1

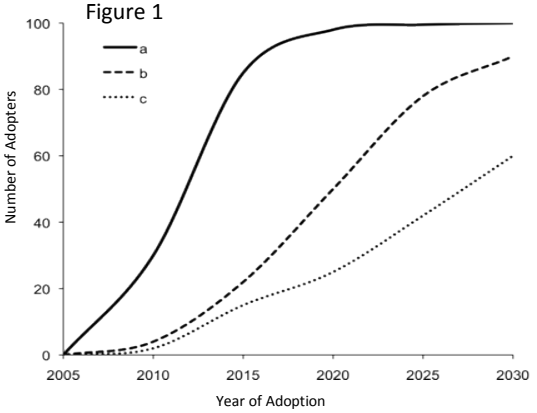

Figure 1. To simulate a scenario in which the majority of potential users in the market purchase DTC genetic testing kits, the simulation sets the parameters p=0.045 and q=0.6 in the Bass model equation to produce curve A. This S-curve shows that the early and late majority contribute quickly to the dissemination and adoption rate of the innovation. Curve B represents a scenario in which there is a time delay for the majority of consumers, and parameters are set at p=0.015 and q=0.2. Curve C represents a longer delay until majority adoption and the parameters are set at p=0.0105 and q=0.12. In this scenario, the innovation has a less than normal market value for desirability at -1 and degree of imitation is lower at -3.

FRAMEWORK

Table 1. Does DTC genetic testing meeting decision-making criteria?

Criteria	Yes	No
1. Relative advantage: The degree to which the is perceived as better than the idea it supercedes or more productive, efficient, cost-effective, or improves in some other manner upon existing practices	- With the exception of some companies, DTC genetic testing offers testing directly to consumers, thereby circumventing and avoiding the need for approval by physician. - Results are received in a few days.	- Expensive; not covered by insurance - Physicians can offer diagnosis of a condition such as diabetes and heart disease based on labs and test that cost less than DTC genetic testing
2. Compatibility: The degree to which the innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters	- Needs: consumers want genetic testing results immediately without involvement of their physician. - Disease-gene susceptibility builds on work done with the completion of Human Genome Project	- Past experiences: does not always offer genetic counseling or guidance with interpreting results. - Existing values: genetic testing results may lead to a view of genes as being deterministic
3. Complexity: The degree to which the innovation is perceived as difficult to understand and use	- Easy to use saliva kit to send for sampling	- Results may be misinterpreted without professional guidance or genetic counseling
4. Trialability: The degree to which the innovation may be experimented with on a limited basis	- Saliva kits are sent to consumers with instructions.	- Samples may be mixed up.

CONCLUSIONS

- Genetic testing may help improve health and lifestyle choices and increase preventive screening.
- With the ease and accessibility of the internet, consumer may have 'new' opportunities to be engaged in personalized medicine.