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Agent Based Modeling of "Innovator's Dilemma"

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1 Background

Management and administration science is pseudo science or science? According to philosophy of science, a theory we call as science should be falsifiable. But it is impossible to test almost management theories many times. There are several reasons. Firstly society changes little by little and we have never seen the same social phenomena twice. Secondly the society is composed of too many elements thus the control of the society is too expensive. Of course it is possible to test mathematical business theories many times. Most of these theories are based on new classical economics. But new classical economics have very strict premises, in detailed maximization principle and equilibrium theory. Thus we cannot apply this approach to many management theories. However business science has new method called constructive approach. This approach can treat with dynamical phenomena and apply in various business investigations. Thus, it becomes easier to examine the past theory again.

2 Purposes

The purpose is to apply constructive approach to qualitative management theory and validate it. The target theory is "Innovator's Dilemma". This theory explains why

outstanding companies fall from greatness. The cause is sound business practices such as listening to its best customers and investing in its most lucrative areas. In detail, excellent company's investment plan is relied on the assumption that consumer's demand is stable. However these companies have several technologies to meet consumers' several demand, the benefit does not satisfy stockholders. Thus big companies dose not listen to the small needs but small companies accept this demand. But it is entrance of "Innovators' Dilemma". When this small demand involves other consumers' needs, market even kills leading company because at some case consumers' needs change rapidly beyond high brilliant managers' expectation. Many actual samples support this theory and many researchers suppose it highly universal. Thus, through the translation of this qualitative theory into agent based model (ABM), I want to verify this probability.

3 Method

In this Multi Agent Simulation, we assume there are company agent and consumer agent.

Company agent's features are the following.

1. A company agent sells goods to increase sales.
2. A company agent invests its own goods to meet his demand.
3. A company agent has unlimited life.

Consumer agent' features are the following.

1. A consumer agent purchases goods on the basis of its experiment.
2. A consumer agent learns to satisfy its utility, which is the sum of its evaluations to each benefits belonging to goods.
3. Through the interaction among consumer agents, the evaluation's criterion changes.
4. Consumer agents have limited life. When a consumer agent dies, new consumer agent is born.

But initial consumer agents misesteem one attribution and new consumer agents do not. This means the change of values among consumer agents.

The Simulation repeats the following steps.

1. Each consumer agent selects suitable goods and dose trade with company agents.
2. Each company agent invests its goods.
3. Each consumer agent gets the utility and updates the experiment.

4. Each consumer agent meets other consumer agent and its criterion is varied at low rate.
5. All old consumer agent die at very low rate and new consumer agents are born.

We analyze company agents' behaviors when consumer agents' demand market changed.

4 Result & Conclusion

In all cases leading company agent failed, this company agent reacted to his customers' demand too much. This study sustains "Innovator's Dilemma".