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Path Dependency

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Path dependency is a conceptual framework through which one analyzes how current actions or decisions are constrained by choices made in the past and by expected returns in the future. It is often applied when assessing choices made with regard to technology or policies.

General economic theory is based on the concept of decreasing returns, resulting in a single equilibrium between supply and demand. Path dependency is based on the economic theory of increasing returns in which many outcomes are possible. These outcomes are shaped by seemingly random choices early in the development process. The concept assumes that in every sequence of choices when a certain alternative is chosen from a set of two, the alternative that happens to be chosen more often early in the process tends to dominate, even though the overall payoff of the nondominant alternative may be superior to that of the dominant alternative in the long run.

The adoption of the dominant alternative is reinforced by a positive feedback process: experience with the most chosen alternative will grow faster while the costs of production, through economies of scale, will decrease quicker compared to the other less adopted alternative. The costs of switching to the other alternative will increase with every additional choice for the dominant alternative. More experience, lower production costs, and higher switching costs are increasing returns for adopters of the dominant alternative later in the process. The self-reinforcing increasing returns of the dominant alternative consolidate the path of development (e.g., a path of dependency). This may ultimately result in a lock-in. In a situation of a lock-in, the costs of reversal are estimated as too high to be considered viable.

Development of a Path of Dependency

A path of dependency may evolve because of lack of information and knowledge at the time of the original choice. Yet, in many occasions a path of dependency evolves due to lack of time and budget for further research, or for competitive reasons: a first mover may create demand, set the standard, and reap the benefits from the first adopted alternative.

The development of a path of dependency and the importance of the sequence of events is illustrated by a mathematical experiment: Pick a ball from a bowl that contains two balls, each of a different color. Replace that ball and add an extra ball of the same color. Repeat the process, each time adding a ball of the same color as the color of the last pick. Probability forces the dominant color of the balls in the bowl to become the color of the first randomly picked ball.

There are many examples of path dependency in commonly used technologies: the continuation of the use of the QWERTY keyboard, designed to avoid clashes of type bars in early typewriters, continued even after new typewriters designs were developed that could work with a more efficient keyboard; or the use of small light-water nuclear power reactor designs, based on early applications in the U.S. Navy, utilized even though the constraints imposed by naval use no longer applied. Examples studied by social scientists include the development of the social welfare state, a process difficult to reverse because of accrued citizen entitlements, or the notion of economic agglomerations like Silicon Valley, where the concentration of resources like experts, knowledge, and infrastructure continues to have a self-reinforcing effect through ever increasing returns for new start-ups locating themselves there.

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See Also

Further Readings

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