

Experience Curve Effects

Introduction

The learning curve effect and the closely related experience curve effect express the relationship between experience and efficiency or between efficiency gains and investment in the effort. As an individual or organization gets more experience at a task, he/she/it will usually become more efficient. Both concepts are a modern formulation of the old adage, Practice makes perfect. The learning/experience curve concept was introduced by Wright in 1936. The general rule of expertise was developed in the 1960's by Dr. Herbert Simon of Carnegie Melon University.

We know that most companies have been “making changes” for decades. But most of those companies have not conducted a study of how the change process works in an organization. Odds are that the company is now consciously building its change expertise and are doing it the only way one can ... one change at a time. Experience and competence has to be built the same way ... When the business change you want to make is critical to your company's success, you always have choices ...

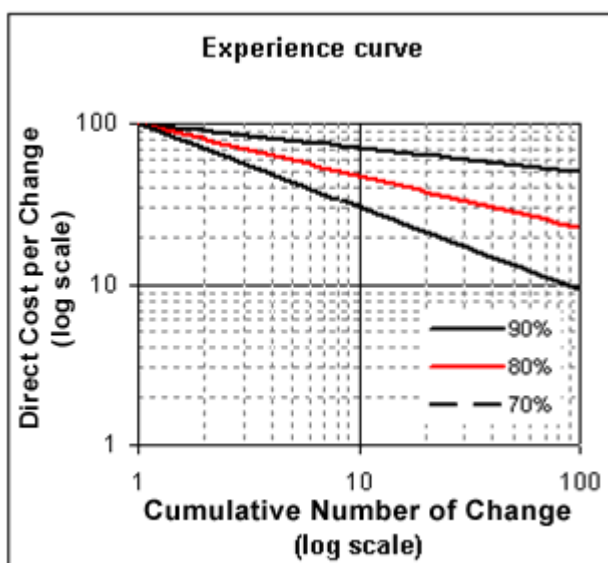
1. go with your company's experience curve
2. go it alone and learn as you go
3. practice on your next big organizational change ... or put the experienced resources in place to ensure success while your build your expertise

Reasons for the Learning Curve Effect:

Besides the sheer volume of change initiatives, there are other factors that have allowed maximise the experience curve.

1. **Optimized Change Designs/Models** –There are only a few “fundamental types of change” that can be made with business organizations. Examples include:
 - Changing a company's strategy
 - Integrating an organisation after merger/ acquisition
 - Reengineering core work processes
 - Inserting and integrating new technology

- Changing the corporate culture
2. **Standardization, Specialization, and methods improvements** - As we complete more and more change, knowledge and methods undergo constant enhancement.
 3. **Open Minds and Open methodologies** – Proven methods are based on core principles to fit client’s specific and unique situation. Organisation consultants know change and they can handle a company’s change situation (or internal change methodology), much like a surgeon can go into an OR anywhere in the world and make safe and effective surgery happen.
 4. **Better use of technology, tools, and automation** – With experience in hundreds of changes, automated change tools has to be developed that make change easier to see, easier to learn, and easier to follow-up on .
 5. **Accumulated Tools** – When it comes to unique tools it has to be developed to help clients make successful changes.
 6. **Changes in the resource mix** – a fair mix of H&D consultants will be most complementary and productive in certain kinds of changes.
 7. **Shared experience effects** - Experience curve effects have been reinforced when different H&D consultants were mixed together. Each consultant’s unique business journey over more than 20 years provides ingredients for a rich brew of business, organizational and change savvy.



The Learning Curve Effect

The learning curve effect states that the more often a task is performed, the less time will be required on each iteration. This relationship was first quantified in 1925 at Wright-Patterson Air Force Base in America, where it was determined that every time aircraft production doubled, the required labour time decreased by 10 to 15 percent. Subsequent empirical studies from other industries have obtained different values ranging from only a couple of percent up to 30 percent, but in most cases it is a constant percentage. It did not vary at different scales of operation.

The Experience Curve Effect

The experience curve effect is broader in scope than the learning curve effect encompassing far more than just labour time. It states that the more often a task is performed, the lower will be the cost of doing it. Each time cumulative volume doubles, value added costs (including administration, marketing, distribution, and manufacturing) fall by a constant and predictable percentage. This broader effect was first noticed in the late 1960's by Bruce Henderson at the Boston Consulting Group (BCG). Research by BCG in the 1970's observed experience curve effects for various industries that ranged from 10 to 25 percent.

These effects are often expressed graphically. The curve is plotted with cumulative units produced on the horizontal axis and unit cost on the vertical axis. A curve that depicts a 15% cost reduction for every doubling of output is called an 85% experience curve, indicating that unit costs drop to 85% of their original level .

Two Experience Curves- *Examples*

1. NASA has calculated the following experience curves:
 - Aerospace 85%
 - Shipbuilding 80-85%
 - Complex machine tools for new models 75-85%
 - Repetitive electronics manufacturing 90-95%
 - Repetitive machining or punch-press operations 90-95%
 - Repetitive electrical operations 75-85%
 - Repetitive welding operations 90%

- Raw materials 93-96%
- Purchased Parts 85-88%

Reasons for the Effect

There are a number of reasons why the experience curve and learning curve apply in most situations. They include:

- **Labour Efficiency** - Workers become physically more dexterous. They become mentally more confident and spend less time hesitating, learning, experimenting, or making mistakes. Over time we learn short-cuts and improvements. This applies to all employees and managers, not just those directly involved in production.
- **Standardization, Specialization, and Methods Improvements** - As processes, parts, and products become more standardized, efficiency tends to increase. When employees specialize in a limited set of tasks, they gain more experience with these tasks and at a faster rate.
- **Technology Driven Learning** - Automated production technology and information technology can introduce efficiencies as they are implemented and people learn how to use them efficiently and effectively.
- **Changes in the Resource Mix** - As a company acquires experience, they can alter their mix of inputs and thereby become more efficient.
- **Product Redesign** - As consumers have more experience with the product, they can suggest improvements. As one produces more products, you learn how best to configure process engineering procedures.
- **Value Chain Effects** - Experience curve effects are not limited to your company. Suppliers and distributors will also ride down the learning curve, making the whole value chain more efficient.
- **Shared Experience Effects** - Experience curve effects are reinforced when two or more products share a common activity or resource. Any efficiencies learned from one product can be applied to the other products.

Experience Curve Discontinuities:

The experience curve effect can on occasion come to an abrupt stop. Graphically, the curve is truncated. Existing processes become obsolete and the firm must upgrade to remain competitive. The upgrade will mean the old experience curve will be replaced by a new one. This occurs when:

- Competitors introduce new products or processes that you must respond to
- Technological change requires that you or your suppliers change processes
- The experience curve strategies must be re-evaluated because :
 - they are leading to price wars
 - they are not producing a marketing mix that the market values

Strategic Consequences of the Effect

The BCG strategists examined the consequences of the experience effect for businesses. They concluded that because relatively low cost of operations is a very powerful strategic advantage, firms should capitalize on these learning and experience effects. The reasoning is, increased activity leads to increased learning, which leads to lower costs, which can lead to lower prices, which can lead to increased market share, which can lead to increased profitability and market dominance. According to BCG, the most effective business strategy was one of striving for market dominance in this way. This was particularly true when a firm had an early leadership in market share. It was claimed that if you cannot get enough market share to be competitive, you should get out of that business and concentrate your resources where you can take advantage of experience effects and gain dominant market share. The BCG strategists developed product portfolio techniques like the BCG Matrix (in part) to manage this strategy.

Today we recognize that there are other strategies that are just as effective as cost leadership so we need not limit ourselves to this one path. See for example Porter generic strategies which talks about product differentiation and focused market segmentation as two alternatives to cost leadership.

One consequence of the experience curve effect is cost savings should be passed on as price decreases rather than kept as profit margin increases. The BCG strategists felt that maintaining a relatively high price, although very profitable in the short run, spelled disaster for the strategy in the long run. They felt that it encouraged competitors to enter the market, triggering a steep price decline and a competitive shakeout. If prices were reduced as unit costs fell (due to experience curve effects), then competitive entry would be discouraged and one's market share maintained. Using this strategy, you could always stay one step ahead of new or existing rivals.

Criticisms of the Effects

In theory we can say that economies of scale are those efficiencies that arise from an increased scale of production, and that experience effects are those efficiencies that arise from the learning and experience gained from repeated activities, but in practice the two mirror each other: growth of experience coincides with increased production. Economies of scale should be considered one of the reasons why experience effects exist. Likewise, experience effects are one of the reasons why economies of scale exist. This makes assigning a numerical value to either of them difficult. Some authors claim that in most organizations it is impossible to quantify the effects. They claim that experience effects are so closely intertwined with economies of scale that it is impossible to separate the two.

Others claim that it is a mistake to see either learning curve effects or experience curve effects as given. They stress that they are not a universal law or even a strong tendency in nature. In fact, they claim that costs, if not managed will tend to rise. Any experience effects that have been achieved results from a concerted effort by all those involved. They see the effect as an opportunity that management can create, rather than a general characteristic of organizations.

References

- Wikipedia
- NASA website
- In Search of Cost Competency - Dr Sreehari Chava

