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THE KAIZEN PARADOX: HOW INCREMENTAL IMPROVEMENTS CAN IMPEDE INNOVATION

DESIGN ¦ DEVELOP ¦ DELIVER

TABLE OF CONTENTS

KAIZEN AND KAIKAKU

Kaizen. It is a word synonymous with improvement in organizations around the world. While the Japanese word literally means 'improvement', in industry and business the focus is on small, continuous steps to better processes. It is embedded in the management thinking of many organizations.

Japanese businesses developed Kaizen practices around the 1950s, most notably Toyota as part of their Toyota Production System. After studying why the company was so successful at high-volume production of high-quality vehicles in the 1960s, Masaaki Imai wrote several books on Kaizen and formed the Kaizen Institute, spreading the knowledge and practice around the globe.

However, there are times when Kaizen is not enough. Worse still, a small improvement can often hold an organization back, perhaps even stifling significant development.

This is the Kaizen Paradox.

In the 1980's, author and business professor Oren Harari famously pointed out that not everything that exists could have been developed by continuous improvement alone.

This idea is captured in another Japanese word that is less well known but equally important: Kaikaku

Kiakaku means 'radical change'. It describes the other side of improvement: a radical transformation or a major leap forward. An analogy is a home illuminated by candles; while Kaizen improves upon the candle, Kaikaku is the installation of electric light.

Kaikaku is a less famous but equally important part of the Toyota Production System, and is often overlooked by organizations in their rush to embrace Kaizen.

Evolutionary
Company Wide
Involves Everyone
Continuous - Never Ends
Limited Productivity Impact
Modest Efficiency Gains:
- Labor Requirements
- Space Needed

Revolutionary
Production / Distribution
Involves Managers / Engineers
Discrete Project Timeframe
High Productivity Impact
Significant reduction in:
- Labor Requirments
- Space Needed

"The electric light did not come from the continuous improvement of candles"
Oren Harari

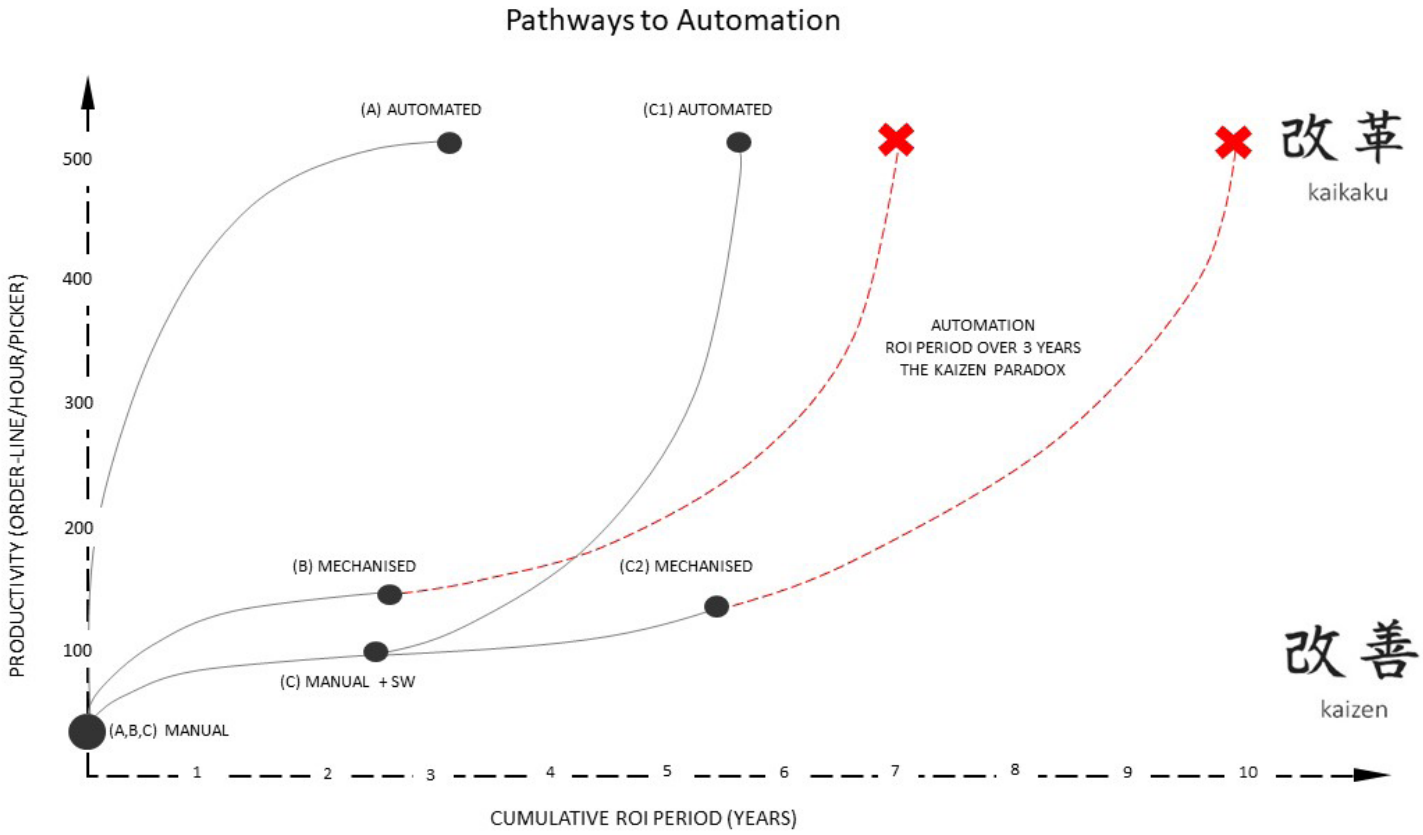
THE KAIZEN PARADOX AND THE ISSUES IT CREATES

By focusing exclusively on small improvements, an organization may miss an opportunity to gain a competitive advantage in costs and customer service. If competitors take a big leap, an organization will be left behind, still making candles in a light bulb market.

Small improvements also commit resources that could be better spent toward a larger step forward in performance, or with more strategic planning, could have contributed to a major change.

Finally, when a Kaikaku opportunity exists, the Kaizen path weakens the Kaikaku ROI and productivity can plateau at a lower level. This is the Kaizen Paradox at work.

Many businesses rightly identify the need for warehouse automation but make the assumption that they need to 'start small'. Yet unless the interim investment is part of a planned larger final system it could be a false start.



This is a graph of productivity vs. cumulative ROI per investment. Each point on the graph refers to a successful implementation of an investment with an ROI period of under 3 years. Each letter represents different investment and improvement pathways taken by three companies. They all start off in a manual and unimproved state at 50 order lines per picker per hour. Company A makes the leap to full automation and thereby achieves the highest productivity level of all three (500 order lines per picker per hour). Company B and C both understand the benefit of automation but decide to start smaller. Company B invests in a mechanized solution and achieves 150 order lines per picker per hour – Company C upgrades their Warehouse Management Software and achieves a modest 100 order lines per picker per hour.

In a second round of investment, Company C which is still a manual warehouse but with smart warehouse management software, has a choice to make – C1 would be to invest in a fully automated solution to sit under their new WMS. The second pathway (i.e. C2) would be to make the smaller investment in mechanisation of their manual warehouse. Both investment paths would achieve an ROI under 3 years, and so either pathway would get approval.

Company B's warehouse managers eventually decide that the time has come to automate. They investigate the cost and find the ROI doesn't stack up any more (it is over 3 years) – so they fail to automate. They understand why – their base level of performance has increased through mechanisation, but the cost of the automation is much the same as it was.

In a third round of investment sometime later, company C2 discovers the same problem. Even though their baseline performance has improved, the return on investment period for full automation extends over 3 years. In summary, 50% of the four investment pathways to automation were unsuccessful due to the smaller improvements that have already been made. This is the Kaizen paradox at work.

It is important to note that ROI limits for investment are contributing to the Kaizen Paradox that companies are experiencing. To solve this pitfall, companies should review their ROI restrictions for warehouses with existing mechanized systems already in place.

PARADOX IN PRACTICE

In a recent real-world example, a company was seeking to identify a solution for an automated 'goods-to-person' warehouse in a bid to achieve a significantly higher level of business performance.

However, a year earlier the company had invested in a mechanized 'zone–to-zone order picking' solution, consisting of conveyers and carton storage shelving.

Although the project was still in the commissioning phase, senior management could see that the solution wasn't going to meet their long-term requirements. Fortunately, the mechanized solution didn't occupy the entire warehouse, making it possible to build an automated goods-to-person solution on the same site.

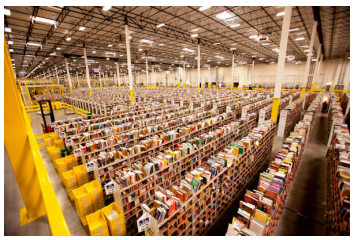
Developing a business case for a goods-to-person automated solution, the company gathered quotes to either move the zone–to-zone solution, redesign it or scrap it altogether.

It soon became clear that the mechanized system made it much harder for them to proceed with the automation they required, as the business had invested a large sum on a now largely redundant piece of equipment that occupied a prime position in the warehouse. Unless the mechanized system could become part of the fully automated solution, the company also faced the cost and embarrassment of scrapping the new installation.

While the mechanized system improved productivity from 50 to 150 order lines per hour per person, the automated goods-to-person system would deliver 500 order lines per hour per person. As a result, almost a third of the productivity gain that would have been realized in going from a manual to an automated operation was already delivered by the mechanized system. In a simple accounting approach this worsened the business case, extending the ROI of the desired automated system by an extra year. Because the mechanized system could not be incorporated in the automated solution, there was no reduction in the cost of the required automation.

This Kaizen Paradox hasn't only occurred to this one organization and doesn't only occur in case of zone routing solutions in warehouses. It is just one example of a common predicament for many businesses, where investments are made to achieve productivity gains, but in doing so they dilute the business case for a better investment, causing them to plateau at a lower level of productivity.

The evolution of warehouses



改善
kaizen

改革
kaikaku

Manual Warehouse

Person to Goods (Trolley)

One Picker processes between 50 and 100 OL/hr

To process 20,000 OL:
40 to 50 pickers for 8 hours

To store 20,000 SKUs:
5,000m²

Mechanized Warehouse

Person to Goods (Conveyor)

One Picker processes between 100 and 150 OL/hr

To process 20,000 OL:
20 to 25 pickers for 8 hours

To store 20,000 SKUs:
5,000m² (+ mezzanine)

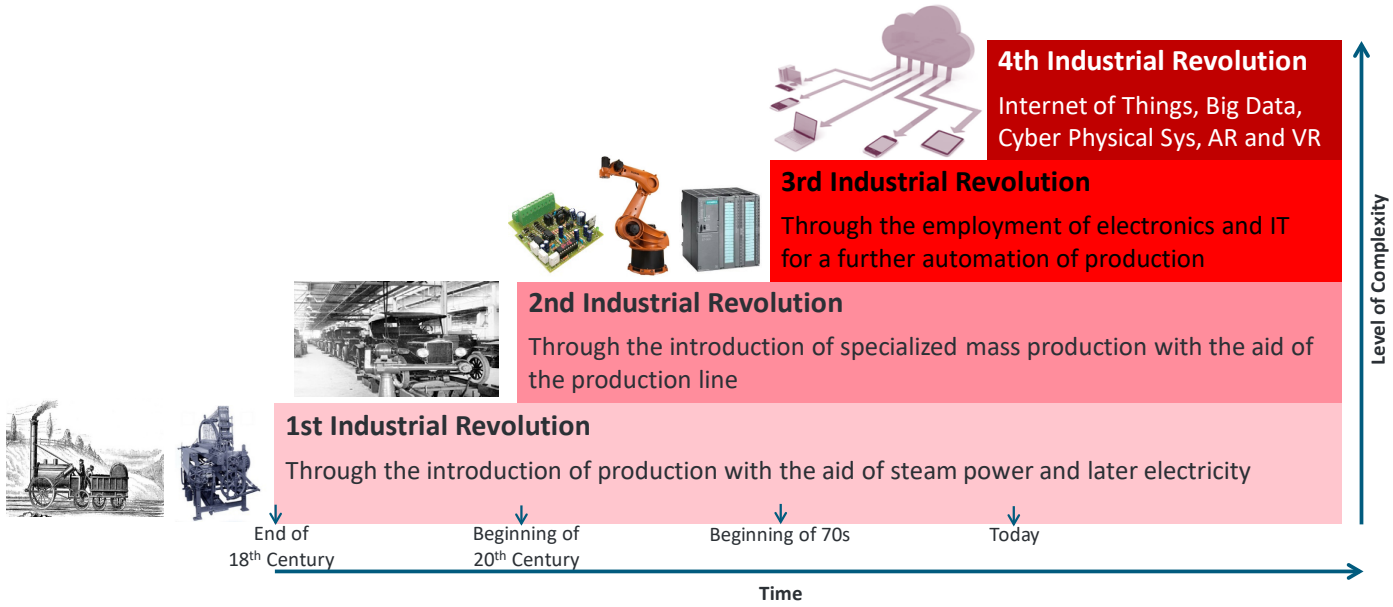
Automated Warehouse

Goods to Person (Robot/Shuttle)

One Picker/Robot processes between 500 and 1000 OL/hr

To process 20,000 OL:
0 to 5 pickers for 8 hours

To store 20,000 SKUs:
1,000m²



Making the leap with Industry 4.0

TOOLS AND APPROACHES TO SUPPORT BEST PRACTICE

Both manual and mechanized warehouses involve 'person to goods' in some form. The difference being the way the order tote moves around the facility, trolley or picking truck to conveyor, and the addition of WMS software to control order picking more efficiently. These improvements have helped reduce the time between pick operations and gradually lift productivity from around 50 to 150 order lines per hour per picker.

The Kaikaku leap occured when organisations implemented goods to person technology that radically transformed the way orders were picked, allowing a stationary worker or a robot to pick from products delivered to them in sequence. This can typically boost individual picker performance to between 500 and 1,000 order lines per hour and minimize the labor required, while at the same time significantly reducing the warehouse footprint due to higher density storage.

An automated goods-to-person warehouse can typically achieve the same throughput as a manual or mechanizied operation, with around half the staff and in half the building size. As a result, a strategic approach to automation can save significantly on the cost of warehouse expansion or remove the need for relocation, prolonging the life of the existing facility.

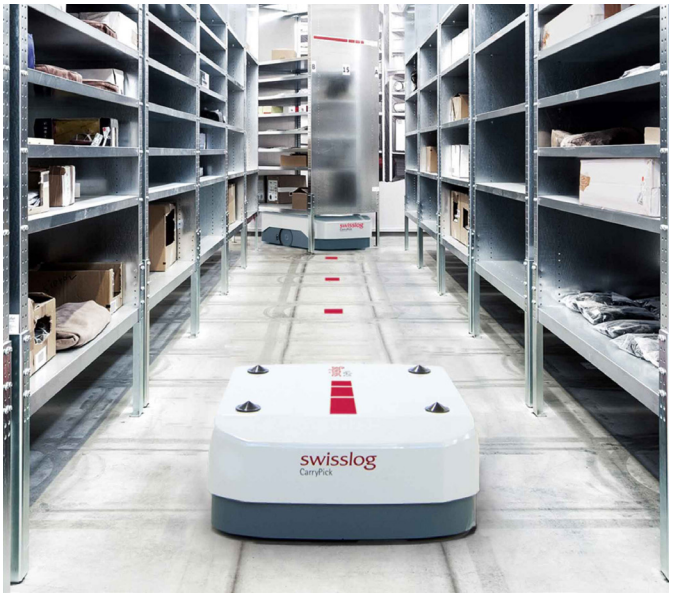
In the age of Industry 4.0 we have many tools that enable us to accurately model and predict the performance of solutions. Real product master and order line information can be used to simulate and emulate each type of technology and test its productivity impact.

Using new virtual reality tools, it is possible to build an automated solution in cyber space and take a virtual tour, watching as orders are assembled and dispatched, confirming the effectiveness of the solution before being purchased. This 'cyber-physical' approach allows an organization to perfect their new operation and make the greatest Kaikaku advance, before any physical system is built.

Also, as many advanced technologies are modular and can scale with growing demands of the business, the combination of predictable and adaptable performance effectively eliminates business risk, freeing executives to make investment decisions with greater confidence.

This more strategic approach to Kaikaku can protect an organization from being trapped in a focus on low performance operations. Being cursed with the Kaizen Paradox.

CarryPick workstation



CarryPick

NEXT STEPS FOR BOARDS AND MANAGERS

For many of the most successful organizations, major leaps forward in performance are approached strategically. Kaikaku investment are made before Kaizen improvement.

Before embarking on a technology path or even selecting a building, businesses should consider their long-term requirements and how technology could be implemented. It may be achievable in phases if this is planned from the start. Use of an Industry 4.0 approach and modular systems can significantly mitigate long-term business risks.

Strategic improvement plans are more robust when they consider costs that could have been avoided. These could include land and buildings, equipment, labor, and the cost or service issues associated with pick errors and returns.

There should be agreement at senior levels that any innovative leaps identified are critical to success, and must be planned and scheduled properly to optimize ROI and avoid plateauing or future waste.

In developing their optimal plan, organizations can develop a well-defined gap analysis, outlining the incremental improvements and innovative leaps they need to either catch up with global leaders or take the global lead in their industry. The organization should have confidence that it has the capability to close these gaps as quickly as possible, or can engage partners with the required experience.

As part of that approach, meetings and site tours with industry leaders and technology providers can gain awareness of current KPIs that are achievable for key processes within an operation.

Transition planning between technology providers and warehouse managers provides another critical step in ensuring that no opportunities are missed, and the installation of new solutions can be phased in appropriately.

Every business is striving to improve, but not all improvements are complementary or equal. Opportunities to stay ahead of the competition can be stalled by an organization's own efforts. Critical to enduring competitiveness are a regularly reviewed strategic approach to improvement, and a long-term strategy to deliver.

The Kaizen Paradox is a common predicament for many businesses, where investments are made to achieve productivity gains, but in doing so they dilute the business case for a better investment, causing them to plateau at a lower level of productivity. Once organizations are aware of the potential for investments that create a Kaizen Paradox, they are better able to consider potential improvements as part of a bigger, longer-term picture.

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