

Why Measuring Productivity in Higher Education is Critical to Success

A guide to designing the Caja Higher Education Productivity Quadrant

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Where it all began

Here at Caja we've been pondering the concept of productivity in Higher Education for some time, alongside how this could be measured. We're a curious bunch and relish a challenge. Measuring productivity in Higher Education was one such challenge.

In spite of its possible negative associations, we don't think productivity is a dirty word. This is because we work in sectors where productivity is just shorthand for continuous improvement, rather than a judgement about whether people should be working harder.

Looking at Higher Education operations through a productivity lens is an opportunity to identify process wastes and improvement opportunities.



Does Higher Education Productivity even matter?

For some, the idea of measuring productivity in education may appear morally objectionable. Many have been scarred by the process, seeing it as being measured and a form of judgement or control.

They believe their contribution to the organisation can't be measured like a widget on a production line.



But education institutions, like any enterprise, exist to produce desirable results: outputs, outcomes, impacts. They also consume inputs in order to achieve those results - see Causal Model of HE Challenges on Page 6.

Conceptually at least, those outputs divided by the inputs consumed would qualify as a measure of productivity.

Do we want more output for our input in Higher Education? If the answer's 'yes' we could also ask:

"Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input use.

While there is no disagreement on this general notion, a look at the literature and its various applications reveals very quickly that there is neither a unique purpose for, nor a single measure of, productivity."

OECD Manual – Measuring Productivity

- Is productivity getting better or worse over time? Better in one system or process than another?
- Does productivity get better when we intervene to change a process? Improve when we use technology in that process?

Measurement Dangers - Concerns about focusing too much on productivity are real

There's always a danger that 'you get what you measure', unintentionally distorting the system's goals or harming it in other ways.

Any productivity measurement must be properly aligned with a system's purpose and kept in tension, balanced with other measurements. People for example:



"Most HE structures are excessively hierarchical and take a top down management approach and foster a culture where people/employees are unable to pivot and be flexible in the design, delivery and development of their role in the organisation."

Dr Hilary Murphy Associate Dean & Professor of Digital Marketing University of Applied Sciences, Switzerland

So what exactly is Productivity?

A key challenge of using 'productivity' terminology is that it carries baggage. What comes to mind for you? The nation's economy, your personal time management, worker exploitation?

One of the first things we explored was the language of productivity and the various ways in which it might be measured in our more technical article - 'Measuring Productivity'.

Extract from Measuring Productivity article

"Each measurement has its own purpose, with an initial focus on those parts of the system you want to explicitly improve, or where erosion of productivity would cause system decline."

Productivity Perspectives

In exploring the language of productivity, a couple of perspectives emerged.



System vs Process Level Perspective

Inputs and outputs exist at different levels in an organisation.

- We might compare an aggregated system output with some original inputs, for example: Revenue divided by categories of expenditure.
- Or we might compare a process output with its direct resources, for example:
 # of students recruited dived by # people

Productivity may also have a throughput meaning at a process level, for example: The rate of staff recruited per unit time.

Process-level productivity may be linked in a cause-effect relationship with the system-level productivity. Seeking the downstream results of this 'productivity chain' may produce more potent measurement.

External vs Interval Audience Perspective

A second perspective is that there may be different decision audiences for productivity information.

- The external audience might want to compare the productivity of Higher Education Institutions in a range of dimensions for 'benchmarking'.
- The internal viewpoint might look at a single Higher Education Institution to make decisions about where to focus productivity improvements.

The information used and the decisions made may be different for these external and internal audiences.

An external audience may ask why one institution appears more 'productive' than another. This then leads to a useful scrutiny by an internal audience of the cause-effect explanations for prioritising improvement.

Causal Model of HE Challenges - We're making your complex simple

Caja used a set of statements which describe HE sector challenges to construct a causal model.

These models were based on Causal Loop Diagrams, from the Systems Thinking field. We then performed a graph analysis to reveal the most influential cause-effect paths through these systems. Initially the model appeared complex, but, as these progress, they reveal a narrative for how HE institutions could address their strategic challenges.





This simpler story emerged from the main causal loops in the system and illustrates a cycle of investments in reputational growth, along with operational improvement.



The primary limit to growth is the market 'Competition' for the student and research income



streams. There will be many other finite constraints in the system too such as an expenditure envelope, physical estate, and so on.

This causal model helps the thinking around where two main forms of productivity might be in the system.

- 1. **Performance, productivity of operations.** The claim is that investing in process improvement, perhaps underpinned by technology (inputs) would improve operational performance (outputs). In turn, this would reduce waste expenditure, releasing funds for other investments. This describes a process-level productivity with an internal audience.
- 2. **Student and research achievement and reputation.** The claim is that investing in facilities and teaching/research talent (inputs) will lead to better student and research outcomes and reputation (outputs). Another dimension is how student and research funding (inputs) translate into achievements (outputs). These describe system-level productivity with both external and internal audiences.

In these cases, 'investment' could mean a blend of one-off and recurring expenditures and elevating these would also act to reduce surplus/profits.

Causal Model of Value Stream Results

We further examined the two main student and research value streams. This was expected to yield system-level productivity results for both external and internal audiences.

Desirable result statements for each value stream were connected in another cause-effect model. These are illustrated in shaded rectangles and joined in outer loops describing the investment, reputation and revenue forces.



It was decided to decouple the productivity of undergraduate students from the research value



streams as different institutions will have a different mix and emphasis of these. We then focused on the undergraduate value stream.

The two results which were closest in proximity to driving the 'Graduate Reputation' loop were selected, namely:

- 1. Students are satisfied with the academic results of their investment.
- 2. Graduates receive an economic return on their investment.

The numerators of these two results then became the outputs of our system-level productivity measures:

- 1. Student satisfaction with some aspect of the course or their results.
- 2. Graduate employment and salaries sometime after graduating.

The denominator for a productivity rate/ratio could either arise from the undergraduate student's input in time and fees, or from the institution's input in resources.

Combinations of productivity numerators and denominators have been developed, triangulated across public data sources. This series of productivity metrics provide new and revealing ways for Higher Education leaders to explore their institution's performance.

The Value of Measurement

Measuring anything has a cost. The economic justification for measurement is that the information created has some decision value. In other words, a decision made using the information should be better than a decision made without it.

So to understand the potential value of a productivity measure, we explored the expected decision contexts. These are some examples written as 'user stories':

- 1. "As a Higher Education leader, I want to decide whether to start a conversation about productivity in my institution, so we can understand whether it could be useful."
- 2. "As a Higher Education leader, I want to decide whether dig deeper into why our productivity looks different to similar institutions, so we can improve things and compare more favourably."
- 3. "As a potential student, I want to see which Higher Education institutions have given graduates the best return on their investment, so I can decide which to add to my shortlist."

League Tables

We explored the idea of a productivity league table for the comparison of Higher Education Institutions. League tables are already a familiar yet potentially divisive aspect of the UK's education landscape.



Ranking

Ranking in a league table relies on a single dimension for a measure. This suggested some form of aggregated productivity index. When constructing an index, it isn't easy to claim that something is objectively 'better' even if a number is 'bigger'. We can say a graduate salary is 'bigger' but that isn't always 'better' when the utility of a salary is balanced against other factors.

Another problem with ranking is that it doesn't often adequately reflect random variation in a measure.

Overall, we didn't feel a league table with a productivity index would communicate a rich enough picture of a complex topic.

Productivity Quadrant

Instead, we decided to plot our initial productivity measure in a quadrant. This would enable us to represent our headline factors in two dimensions and communicate a more nuanced, balanced picture.

Visually this takes the form of a scatter plot, with our productivity-related measures on the X (independent variable) and Y (dependent variable) axes. Each dot on the scatter plot is an institution.

This quadrant plot is more visually appealing than a table and could be made interactive to save space. Several of these charts could also be stacked in 'small multiples' to reveal more productivity dimensions in a single view.

The following is an example of how that Productivity Quadrant looks using two simple measures of Overall Course Satisfaction (X) against Year 3 Median Earnings (Y).





Caja Higher Education Productivity Quadrant Student Satisfaction & Earnings

Overall Satisfaction with Quality of Course ->

The use of this chart doesn't force a simplistic judgement about which institutions might be better or worse. This will depend on the productivity dimensions on each axis. It also reflects the balance between measures on two continua, guided by the decision-makers own utility. An institution which specialises in the arts can have high satisfaction with the moderate salaries expected for that niche.

In placing educational institutions on a chart, we are also embracing the idea that we can trust our visual senses to ask better questions than a crude ranking or a statistical table might pose. We're able to get a sense of the diameter and distribution of values and see clusters and outliers. We can also explore this visualisation interactively and ask, 'where are we?'.

Other groupings can be represented on this chart with filtering or with colour. Regions, Specialisms, Russell Group, Post-1992, etc. Each chart would take on a different shape, a glyph for easy side by side comparison.



Quadrant Zones

The lines which bisect the chart area are the medians for each axis. So, half the institutions are above that median and the other half are below it. This creates the 4 zones of the quadrant, each representing groups of systems which are different from one another but not necessarily 'better'.

Of course, this visualisation could be more statistically sophisticated. It could have overlapping confidence intervals, quantile regions and perhaps regression lines. We don't think that would add much value in this decision context.

And we're not alone

Caja is guided by a forum of senior leaders in Higher Education institutions. Our forum contributes a rich mental model of the challenges faced by the sector to Caja's research.

You can meet our forum members in our first issue of Spotlight, which features some of their recent articles. Just click on the image to view the magazine.



Further Developments

This paper only offers a brief overview of how the Productivity Quadrant was conceived. Several strands of work are underway to develop this further:

- 1. An interactive version of the Productivity Quadrant which can be shared with Higher Education Institution leaders to start a conversation.
- 2. A series of productivity metrics with a range of denominators from both the student and institution standpoints
- 3. Productivity metrics for the research value stream.
- 4. The ability for institutions to provide their own data to introduce an internal process.



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