

# Unpacking the productivity narrative in manufacturing organisations

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## Abstract

This paper explores the narratives around productivity in UK manufacturing firms. Whilst we hear a lot about the UK's poor productivity from politicians and economists, this paper explores the conversations within manufacturing firms. Initial evidence from a project funded by the ESRC through the Productivity Insights Network is presented. It appears that there are many different narratives around productivity and often the conversations in the manufacturing firms bear little resemblance to the productivity statistics being presented by politicians and economists. The work is innovative in that it moves the conversation from the economists, politicians and statisticians to the manufacturing workplace.

**Keywords:** manufacturing, productivity

## Introduction

Productivity growth, or the lack of it, has become a global concern (OECD, 2015; WEF, 2017). As Krugman (1994) suggests: "productivity isn't everything, but, in the long run, it is almost everything". The most recent data from the Office of National Statistics (ONS)

suggests that many of the biggest EU nations are also facing negative labour productivity growth (Romei, 2019). Governments all over the world are concerned about productivity growth (OECD, 2015; WEF 2017). The most recent data from the Office of National Statistics (ONS) suggests that many of the biggest EU nations are facing negative labour productivity growth (Financial Times, 13 Jan 2019).

The UK based authors have been hearing regular reports in the media about the UK's poor performance in terms of productivity growth, which since the global financial crisis of 2008 has been falling behind its European neighbours and G8 member nations. But as operations researchers, who spend significant time out in industry, the authors started to question whether the media headlines aligned with what they were seeing and hearing in manufacturing firms. So the authors wanted to explore productivity from the perspective of manufacturing firms.

There has been very little academic work that looks at the narratives around productivity within firms. Recently there have been a few studies by professional bodies who have started to look at productivity from the perspective of the firm. The CBI (2017) report "Unlocking Regional Growth" is one of the few studies that has taken the conversation down to the level of the firm, although the analysis was still very much at a macro level. Similarly, the EEF 2016 and 2018 reports also pull out key factors that are influencing productivity in the manufacturing sector. But none of these studies actually take the conversation to the workers on the shop-floor.

Fast forward 10 months and the work reported in this paper is an early stage output of an exploratory study funded by the UK's Economic and Social Science Research Council (ESRC) through the Productivity Insights Network. The project discussed in this paper takes the productivity discussion down to the operational level of the workers in manufacturing organisations. It seeks to investigate the narratives around productivity in manufacturing firms. It seeks to understand how productivity is understood at different levels of the firm and asks the question whether productivity is being discussed and measured at different levels. The project engages in conversations with employees at different levels within manufacturing firms and is innovative in that it moves forward the conversation around productivity in a meaningful way, engaging the employees.

This conference paper is an early output from the project and is structured as follows. Firstly the authors investigate the dialogues taking place around productivity in the literature (and particularly considering this in the context of manufacturing). This involves interrogating the literature from a number of academic domains, as well as looking at industry reports. The research approach of the project is then discussed before the authors present findings from initial interviews with people working in manufacturing firms. The paper concludes with a discussion on these preliminary findings and explores future avenues for research.

### **What does the literature tell us about productivity?**

In the UK, our poor productivity performance, particularly compared to other economies, has become a popular subject for politicians, economists and commentators. The lack of improved productivity growth is perceived as problematic (CBI, 2017; EEF, 2016; IoD, 2018; McCann, 2018). So what is the big concern? And what are these productivity statistics actually telling us? To answer these questions we have to first look at how productivity is being defined and measured by these commentators. And herein lies one of the first problems – there are multiple definitions of productivity (eg. this is highlighted by CMA July 2015). According to the ONS, Office of National Statistics' Productivity Handbook (2017) "productivity represents the relationships between inputs and outputs in the production process". The European Association for National Productivity Centres

(EANPC 2005:12) defined productivity as “an expression of how efficiently and effectively goods and services are being produced”. These definitions highlight how productivity essentially measures the efficiency in production by relating the output obtained from some given inputs. Productivity measurements typically adopt physical or economic units and relate them as an output–input ratio. So it follows that to improve productivity the key levers are increasing output (addressing the numerator) or decreasing the input (addressing the denominator) or ideally working on both simultaneously.

When we hear productivity figures discussed in the media, we need to look closer at what is actually being discussed. Economists look at both the levels and at the growth rates of productivity. When we hear about comparisons between countries it is important to understand what is being compared. It could be a snapshot of productivity at a point in time or productivity growth over time.

Then we have the main measures of productivity – labour productivity and total factor productivity. This is another thing to check when examining reports about productivity. Labour productivity as the name suggests focuses on output per unit of labour input. And within this approach some studies look at output per worker or output per hour worked. This could be important in looking at national figures as it is known that in some countries people work longer hours than others. Italy and France are said to work significantly less hours a year than say the USA largely due to different holidays, while workers countries such as the Netherlands typically work a 4 day week, with many companies experimenting with it in different locations. The Mexican’s Koreans and Costa Ricans are currently averaging the longest working hours annually. However these are average contracted hours – and some might argue bear little resemblance to the actual hours worked by people (the Independent, 19 July 2018). The other approach, total factor productivity (TFP) takes into consideration other input resources (not just the labour), including expenditure on capital and resources. It could be argued that it is more difficult to get a real handle on TFP, especially at a macro, aggregated level. TFP growth looks at the difference between output growth and the growth of inputs (labour and capital).

CMA (2015:p42) observe that the measurement of productivity presents a series of challenges, “for example for measurement purposes the value of output rather than the volume is sometimes used. With this measure, high levels of prices, for example due to market power, can erroneously give the impression of high productivity”. One of the problems is often when productivity is discussed in the media reporters are not clear on what type of productivity is being discussed or the units being measured. Next time you hear a report on productivity the authors challenge you to stop and see if it is clear what is being discussed. Productivity measurements can also focus on different levels of analysis for example the overall economy, a sector of the economy, the enterprise, the plants, the machineries or the individuals. In terms of academic discourse on productivity, until recently much of the work has been within the economics and policy domains. But more recently we are seeing a wider discourse on productivity. Researchers from a range of social science disciplines are now talking about productivity, linking productivity levels to technological, organizational, demand, and market related factors. Examples include organisational structures (e.g. Syverson, 2011; Garicano and Heaton, 2007), human capital (Fox and Smeets, 2011), incentives and rewards (Lazear, 2000), human resources practices (Ichniowski and Shaw, 2003) and managerial talent and practices (Bloom and Van Reenen, 2007).

Given the current interest in productivity in the UK, the Productivity Insights Network (<https://productivityinsightsnetwork.co.uk/>) was established in January 2018. Funded by the Economic and Social Research Council (ESRC) they are a network of multi-disciplinary social science researchers, whose aim is to change the tone of the productivity

debate. To date the network has undertaken a number of reviews. Possibly the most comprehensive cross-disciplinary look at productivity to date is Philip McCann's (2018) "Productivity Perspectives Synthesis". In this McCann explains how the way we think about productivity has changed over the years.

### **What do we know about the productivity narrative in manufacturing organisations?**

The authors are specifically interested in the narratives around productivity in manufacturing firms. There have been very few academic papers looking at productivity in manufacturing in the academic literature. Whilst they didn't set out to look at productivity in manufacturing, Smart et al (2017) identified "productivity and innovation" as a theme in the industrial sustainability literature. Smart et al (2017) conducted a systematic review, reviewing 574 articles on industrial sustainability and suggest that industrial sustainability is yet to achieve a paradigmatic consensus. Instead three distinct and unifying dialogues emerge from their review: "productivity and innovation", "corporate citizenship" and "economic resilience" were identified. The authors note a "preoccupation with efficiency strategies" (p1427). They note that much of the productivity and innovation literature (relating to industrial sustainability) comes from the operations/production management literature with significant focus on material and resource use and efficiency. Within the operations management literature, we do see much more focus both in the literature and in firms around efficiency rather than productivity. Mankins (2017) suggests that narratives within firms often focus on efficiency and are often conflated with productivity. CMA (2015) also observe the confusion over efficiency and productivity in everyday language.

Whilst there is little work on manufacturing productivity in the academic literature, in the past few years there have been a number of reports from professional bodies such as the CBI, IoD and EEF (now renamed Make UK). The CBI (2017) explored influences on the UK's productivity success in their report "Unlocking Regional Growth" and the EEF (2016, 2018a, 2018b) has produced a number of reports highlighting key issues for UK manufacturing including the factors influencing productivity success. EEF contributed one of the most relevant studies for this project, "Productivity: the state of the manufacturing nation" (EEF, Spring 2016). They noted that the productivity growth of manufacturing outperformed that of services and the whole economy in the two decades to 2014, suggesting that manufacturing may not be the source of the UK's weak performance" (p3). Whilst being positive about the actions of manufacturers the EEF suggest that manufacturers need to focus more on improving productivity of the company as a whole rather than just the factory, and on adopting major advances in technology (p3). Relevant to this paper, EEF (2016:p3) put forward the view that "manufacturing has the potential to be a major driving force behind improving the productivity performance of the UK economy" and go further to suggest "the sector will get further if government and businesses are talking the same language about productivity". The EEF report concludes that by focusing too much on a macro-economic view of productivity we "could be missing a trick", suggesting it is important to "dig deeper" and look at different sectors and indeed the businesses themselves. Echoing this view, one of the most recent calls comes from CIPD in their Labour Market Outlook (winter 2018-19:p15). CIPD point out that often these headline media productivity figures are derived from "official statistics" that aggregate data "from the whole economy, representing outputs as disparate as cars, haircuts, and public services. And observe that "it is no wonder that this abstract macroeconomic concept may feel distant from the everyday practice of employers".

CIPD asked their members if productivity is a term often used when discussing performance. And half agreed they do – but there were big differences by sector. The

CIPD survey suggests that 71% of manufacturing firms are using the term – but the term is used by only 18% of education employers and just 16% in the voluntary sector. CIPD (2019:p16) suggest that this discrepancy might come from the fact that “measurement is much easier in some industries than others. It is much easier to measure the value of a car that is openly traded in the market than a teacher’s lesson.”

In a similar investigation the Institute of Directors, IoD (2018: p9) report that “60% of IoD SME members do not formally monitor productivity in their organisation”. IoD suggest that many small business leaders prefer to frame productivity as “working smarter” but opt to focus their measurement on other measures such as profit and revenue. IoD call for “supporting businesses to understand and monitor their productivity”. The IoD calls for a better understanding of what productivity is, what it means for performance, and how it can be monitored, in order to promote a “productivity mindset” in SMEs.” (p9). A similar call for better understanding and common language comes from Be the Business (May 2018). So there is a clear gap in understanding around the narratives of productivity at the level of the firm. And there is a call to arms that says only by speaking common language can we really drive real improvements in productivity that the UK wants to see.

### **Research design of the “Manufacturing Productivity Narratives” project**

The authors of this paper wanted to address this gap, at least in the context of manufacturing firms, and to engage with people in manufacturing firms to really understand the narrative around productivity. The researchers also seek to engage in conversation about the drivers and constraints – from the perspectives of people working in manufacturing firms. Indeed the project will also go on to analyse whether there are different views at different levels of the firms and in different sectors. But this will be reported in later papers.

The project is a short, 9 month, pioneer project funded by the UK’s Economic and Social Science Research Council (ESRC) through the Productivity Insights Programme (Reference ES/R007810/1). Further information on this and related projects can be found at <https://productivityinsightsnetwork.co.uk/>. It is an empirical study incorporating an exploratory, inductive systems thinking approach with a multiple case study design. The project focuses on firms within four key sectors in the UK: food & drink, automotive, aerospace, pharmaceuticals, as well as looking at high value manufacturing (HVM) organisations across the sectors. The aim is to move the productivity conversation forward, away from the economists, politicians and statisticians to the workplace by engaging with employees in manufacturing firms. Qualitative data are collected from 20 purposefully selected firms via 60 semi-structured interviews with three levels of personnel (Director, Manager and Supervisor), observations during site visits, firm-related archival data, and a review of secondary information about the firm and sectors. Engaging directly with employees working in manufacturing companies, provides a much-needed perspective from inside the firm and across the firm hierarchy, a perspective highlighted as crucial by Boys (2019) who advocates the need to “continue research into firms’ attitudes and awareness of the issue.” Interim findings will be shared via two workshops in regional locations with key manufacturing stakeholders from industry and Government, before final reporting in July 2019.

### **Initial findings**

Whilst presenting early stage findings (a fuller analysis will be presented at the conference in June) this section of the paper delivers initial insights into how productivity is understood and measured at different levels in manufacturing firms. The data presented

in this paper is based on 20 interviews transcribed to date. By June our analysis will include a significantly higher number of interviews and will be stratified by sector and by level in the firm.

*Usage of the term “productivity” is common but not universal*

So far in our investigations more interviewees have confirmed that productivity is discussed in their organisation than those saying it is not a term used. The following quotes demonstrate this,

*“You’ve got a target and productivity is something that at the very start of the shift I tell my team the target at the end of the shift is that we should reach a certain point.” (C2)*

*“Yes, we look at this on a rolling basis” (E1)*

*“We use the word productivity” (F2)*

But it is certainly not used by all firms interviewed to date,

*“Not as such. We use various terms for how effective we are at... how efficient we are. I guess... not really productivity.” (B1)*

*“We don’t refer to productivity by its name” (D2)*

*The terminology is variable*

A significant number of interviewees recognise that the language is confusing and the terminology used differently by different people. This is evidenced in the following quotes from interviews:

*“Yes but variations across sites. Not a standard.” (F2)*

*“It is nothing to do with the way government looks at productivity in GDP terms” (E1)*

*“Externally one of the real bugbears that I have is that everybody means something different by it [productivity], so it is a completely meaningless word to use externally. Internally we’re absolutely specific. Externally, the first question we ask is what are you actually measuring. What is the basis of comparison between what you’re telling me and what you’re asking me and my company”? (E1)*

*“Productivity is quite an old-fashioned terminology [...] productivity can often be constrained into only the manufacturing side. (D1)*

*Productivity is linked to other narratives*

Throughout our interviews to date we are finding that productivity definitions can sometimes get entwined with narratives about efficiency, effectiveness, measurement and company and site specific terminology. Conversation often turns to measures to try to show what they mean by productivity. When talking about measuring productivity interviewees have talked about many things including: machine utilisation, OEE, on-time delivery, standard work, and output per unit of time. The following quotes show a range of things people conflate with productivity.

*“Efficiency well that sort of overlaps with productivity” (E1)*

*“We don’t refer to productivity by its name. [...] We’re trying to drive efficiency through effectively greater output with a similar size headcount over the period. That’s how we would I suppose at the broadest sense measure productivity. Are we winning the*

*orders that we generate in the sales, are we increasing the margins? As a business are we getting more efficient in terms of the outcome financially of the business?” (D2)*

*“How efficient you are, not effective but efficient... this is my interpretation. How efficient you are at turning the raw material into the finished good... well, as a business how efficient you are at satisfying the customer. Fulfilling that customer desire, the whole way through, so selling... you know, the cost of sale, that’s important, I didn’t even mention that. I don’t think we ever measure any cost of sale type efficiency of productivity. Cost of sale, cost of design, the whole value chain piece, the cost of making it, delivering it, supporting it. That whole efficiency piece.” (B1)*

*“The measure of productivity is quite simply we break down all of our task into an hour’s content through industrialisation studies and work studies. We do that as part of the NPI, the product introduction process, and then we use that to set a standard for all the jobs in the facility. We then do a working out of how many people we need to run the facility. In doing that and taking into account all our costs as well, we work out effectively what’s called our cost rate. That is a cost per hour that we run the business by. So, that’s important. (A2)*

*“We use the word productivity. We record... we look at efficiency in utilisation but more utilisation.” (F2)*

*“Productivity can often be constrained into only the manufacturing side. So, we tend to follow more business-oriented KPIs that give you a measure of growth. [...] I think we talk more about growth, improving our competitiveness than we do, than being fixated on something like productivity. [...] So, when I hear productivity, my first go-to metric would be our five-year plan.” (D1)*

This is consistent with what some of the reports from the professional bodies were saying, as well as evidence from the academic literature (eg. Smart et al 2017 and Mankins 2017)

#### *Internal communication*

In our interviews we are picking up on different language at different levels of the firm (this will be further analysed and presented in June). But the quotes below give some suggestions of the issues:

*“It’s sort of translated ... as it goes through the organisation it’s translated into an appropriate language for the audience, if that makes sense, rather than having a standard headline” (F2)*

*“they might not know the productivity off the cuff, the charge hand would, by the way, but [...] they’d be able to show you where it’s measured there, and also how it’s tracked day by day at that level. (E1)*

*“Inside the company whilst as employees we’re using productivity all the time to talk about in our measure and standard hours” (E1)*

If politicians and policy makers want to be utilising the correct levers to improve productivity then they need to be able to speak the same language as those within firms, including manufacturing. So it is important that we understand the language used.

#### **Conclusions and further work**

Consistent with our expectations from the limited literature, our initial primary research is suggesting that productivity means different things to different people within

manufacturing and is measured in many different ways. Some manufactures will track aggregated measures at a high level, such as turnover per employee but often the conversation is more about the manufacturing shop floor and will be measured using multiple metrics eg. OEE, output per line, downtime etc. There is no single measure being used in the firms we have spoken to but rather multiple measures are used. This is in line with what we found by interrogating the existing but limited existing literature (eg EEF 2016, CIPD 2019). Often productivity is measured against some kind of target, standard or benchmark. For some this might be standard units of work and for others it might be against a target.

Speaking to people within manufacturing organisations is exposing a greater richness of the challenges and complexities. Some economic and policy studies have talked about certain sectors as being more productive than others in the UK. ONS for example suggests that chemicals and pharmaceuticals alongside automotive being the most productive sectors in terms of output per hour (£). EEF also talks about manufacturing productivity being higher than services and higher than the overall national picture. But statistics only tell you so much. Engaging in conversation with people within the manufacturing firms themselves reveals a much more complex picture. If we take a sector such as pharmaceuticals then we see some firms with big manufacturing sites with almost continuous manufacturing. Unsurprisingly such operations will look highly productive – with high volumes, low variety, high levels of automation, low staffing levels etc. But the other side of the pharmaceutical sector we can also see companies who are engaged in a lot more of the development work – needing significant investment, with high levels of regulation that see little or no return in the short term. So it's not as simple as talking about sectors being productive.

Obviously manufacturers who have low variety, high volume and who are highly automated products will have economies of scale and might look productive (eg. pharma and automotive come out well in ONS figures) – particularly if you are talking about labour productivity and if you are measuring units of output. But at the same time companies operating in high value areas where there is significant design and customisation – may also be productive as long as they are charging premium prices for their products and the market can bear it. And if you are measuring output in value, rather than units. Which brings us to whether firms who are operating as high value manufacturers - in terms of competing on things other than price (design, innovation, quality etc.) will be more productive. Well that depends on how you are measuring it. As we saw from our review of the literature there are many different ways of measuring productivity. You could argue that a firm who is HVM has more opportunity to manipulate the numerator (the output in terms of value £). Whereas a firm who is operating more at the commodity side of things has less scope to manipulate the output in £ through innovation – and will naturally focus more on the efficiency angle and reducing the inputs. If we are using value (revenue) as our output measure then we can see how much such a company's productivity is at the mercy of market forces – no matter how hard they work at reducing inputs. If the demand and hence the price of the good was to shoot up then obviously the company's productivity would shoot up, without the company actually doing anything different. But the flip side if the price goes down then productivity, if measured using value will go down.

Conversations in our study so far are dominated by talk about reducing inputs and efficiency, with very little about increasing business outputs. Whilst EEF in 2016 did hear some talk of step change investment and investment in R&D, as yet we are not hearing this. More commonly the focus is on waste reduction, utilisation, lean, supply



chain etc. If this continues to be the case then this perhaps opens up interesting avenues for further research and potential targets for improving productivity.

### **Relevance/Contribution**

By engaging with workers at all levels and exploring the current pressures and metrics at different levels of the firm this paper starts to identify some of the opportunities for improving productivity, moving the conversation forward and addressing some of the challenges of measurement. This really moves the focus from a macro level to a micro level. Whilst presenting only early stage findings (a fuller analysis will be presented at the conference in June) this paper delivers insights into how productivity is understood and measured at different levels in manufacturing firms. The research uncovers different clusters of definitions used within manufacturing organisations and contrasts these with the economic definitions used by economists and politicians. The research also uncovers the use of productivity definitions that show a real disconnect between the levers of government and the levers of the firm as well as show where they can align. The paper contributes to the operations management literature relating to productivity measurement, and providing empirical evidence from the manufacturers themselves rather than just data from their manufacturing sectors. The paper may also be of interest to managers in industry and to policymakers by improving the evidence base.

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