Lean as ideology and practice: A comparative study of the impact of lean production on working life in automotive manufacturing in the United Kingdom and Poland

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Abstract

This article reports on research conducted at General Motors UK and Poland; BMW-UK; VW-Motor Poland. The development of a range of managerial practices at the workplace, often described as lean production techniques, is discussed. The focus is on the impact of the latter on employees' quality of work-life. While advocates of lean, so-called *leanistas*, argue that the 'right' management cadre will allow the positive effects of lean to prevail, evidence confirming this assumption remains limited. In contrast to 'lean ideology', findings here highlight the deleterious effects of systems so defined on the quality of life at work and to workers' health beyond employment.

Keywords: lean production, lean ideology, automotive industry, Poland, UK,

Introduction

This article reports on the results of research into the impact of management practices at the workplace level, referred to by managers and workers as lean production techniques, at General Motors UK and Poland (General Motors Manufacturing Poland, hereinafter GM-Poland), BMW-UK and Volkswagen Motor Poland (hereafter, VWMP). Due to the powerful advocacy of 'lean' by companies, consultants and some advocates from the academic community, the article also comments on the ideological nature of the 'lean production' (which includes JIT, Kaizen, Kanban, team working) and in so doing offer an alternative agenda for understanding the impact on workers of a (not so new) approach to the control of labour at work. Specifically the article is concerned with the impact on management practices on employees' perceptions of the quality of their working life understood through an exploration of the following dimensions: workers' involvement in the lean agenda, work intensification; and worker health. Further, the role of union opposition to or acquiescence in changes in the labour process are discussed. The empirical analysis is based on a questionnaire survey and in-depth semi-structured interviews at the four plants between January 2012 and June 2013.

While advocates of lean, termed as *leanistas,* have argued consistently that, with the 'right management cadre' 'in the right place', lean will successfully prevail (see Vanguard Consulting, 2014) evidence demonstrating higher levels of employee satisfaction in lean regimes is highly conditional (Harley, 1999) and limited in scope. In contrast to the ideology of lean research has shown that the impact of such systems, so defined, is deleterious to the quality of life at work and to worker health more widely defined - including life beyond employment. For example, there is some evidence that the impact of those systems described as lean may be impacting negatively on worker decisions to take early retirement or to exit the sector (Stewart and Murphy, 2012). While there are variations within and between the plants in the study, nevertheless, the data highlights the growing disjuncture between claims and rhetoric of lean production and the evidence from the perspective of workers. This evidence is growing and supported by the research from other sectors which confirms that what managers term lean production compromises workers' quality of life at work. The evidential gap is now so extensive that it is posited here that the devotion to lean can be understood to derive from ideological commitment.

It should also be noted that even where critical views of lean are addressed they are frequently incorporated into management improvement agendas. This is evidenced, for

example, by internal critics of lean, notably Seddon and Caulkin (2007). Their approach has been to accept some of the views of labour movement critics by incorporating them into an agenda that extends lean into a vision of broader organisational change. More generally, Seddon and Caulkin (ibid) argue that the key exponents of lean (most notably, Womack et al, 1990) limit an understanding of lean to a technical fix that ignores a wider systems approach premised, not simply on technical change, but rather technical change wedded to the cultural transformation of the organisation and its employment relationship, that lean transformation requires. Seddon (2008) argues that a 'systems approach' to understanding lean is more sustainable for organisational development across all sectors and not only automotives. Critically, it is argued here, that his view also highlights the extent to which lean can be understood as an ideological construction advanced by those that we term *leanistas*. The latter embrace the original progenitors, Womack *et al* (1990) and new, internal critics (that the *leanista* exponents who reject the original Womack *et al* thesis as intellectually and strategically limited), including Seddon (2008) and the Vanguard consultancy team (2014). In arguing that the *idea* of lean production is an ideological construct, the article is concerned to challenge the mistaken assumption that lean is reducible to technical production variables. The idea that lean is simply about manufacturing (and, or, labour organisation) techniques is a conceit that presumes 'techniques', are somehow gifted as socially value free, and merely concerned with conveying and implementing objectively valid technological and organisational practices by a socially aware management (Lewchuk et al, 2001; Stewart, 2014). By contrast, the argument here is that management cannot simply rectify supposedly poor 'lean' implementation because social control and subordination are axiomatic to it.

Following a brief overview of key debates on the nature of lean and the research methodology the article addresses: the contradictions inherent in the lean implementation as seen from workers' perspectives; specifically, work intensification and workers' health. Worker ill-health is impacted by what we term 'continuous rationalisation'. The latter is derived from what is a conventional Taylorised notion of the capacity of management to coordinate human movement. Principally, lean job reform – another way to describe continuous improvement - imposes reductions both to indirect (reduced buffers) and direct (reduced line) staff. In addition, we explore the role of unions and their response to changes in the labour process, through resistance, negotiation or compliance.

Debates and ideologies

From the standpoint of manufacturing capital, waste reduction is the *leitmotif* of lean whereas the principle of worker involvement in continuous improvement activity constitutes the underpinning ideology, which it is argued cements labour's participation-collaboration in the production process. For early advocates of lean such as Kochan *et al* (1997), MacDuffie (1988), and Womack *et al* (1990) the participation of worker teams in *kaizen* activities was supposed to entail their liberation from the rationalisation of the assembly line, blurring scientific management's divide between the conception and execution of tasks. Adler (1993) referred to this as the new 'democratic Taylorism' (:98). (see discussion between Adler and others in Landsbergis et al, 1998). In fact, as a number of critics in the Japanisation debate found, where workers were granted the opportunity to participate in *kaizen* they either opted out *en masse* (Elger and Smith, 2005) or became subject to managerial attempts to control and fragment their work in the pursuit of the employer's agendas (Garrahan and Stewart, 1992; Head, 2003; Rinehart et al., 1997; Stewart et al., 2009). As reported by Head (2003), *kaizen* became a veil for the ratcheting-up of work intensity through the extant input of teams of work-study engineers constantly aiming to reduce optimum staffing levels on the production line. The findings below, from a transnational four plant survey in Britain (BMW and GM) and Poland (VWMP and GM) add to these critiques of lean production. (Landsbergis et al, 1998 & 1999); Brenner *et al*, 2004). Further, this article reinforces the findings of Carter *et al* (2011; 2013), which posit that the presence of lean working practices are positively correlated to a deterioration of work experience, including worker health across both blue and white collar sectors (see also Taylor et al 2010 and Mooney and Law, 2007).

While, until recently there was limited research on lean beyond the automotive sector, reported results of investigations in non-manufacturing sectors are now becoming available. One reason for historically limited work on non-automotive sector activities can be attributed to the fact that it has taken some time for lean to be adopted more widely in other sectors. It has taken some time, in other words, for the repackaging of lean for other sectors. Findings by Taylor et al (2010) indicate either complimentary or often commensurate findings with research on automotive final assembly plants (see, inter alia, Stewart et al, 2009). Landsbergis et al (1999), reported the findings of European and other researchers (Canada, England, Finland and USA in other sectors such as telecoms and healthcare) demonstrating the relationship between lean and decline in workers' health. In this article explicit attention is given to the relationship between the implementation of defined lean variables and worker reported experiences of physical and mental stress. The interview and survey results add to the existing evidence of the link between ongoing rationalisation and labour intensification

central to lean - together with the question of workers' perceptions of the likelihood of their ability to remain in their job due to the impact of lean.

Methodology and context

Methodology

The data derives from a questionnaire survey and in-depth semi-structured interviews at the four plants between January 2012 and June 2013. The questionnaire was developed from previous research instruments by the authors (Stewart et al. 2009) and comprised 41 questions, including sections on current workload, control and performance monitoring, workplace stress and wellbeing, lean, sickness, ill-health and absence, consultation and management and job/personal information. In the case of the British plants, questions addressed pre- and post-introduction of lean practices, while for the greenfield Polish plants, in which lean was present from inception, the comparison was between the experience of work before employment at the plant and the new lean environment and their experience over the period of time in which they had worked in the plant (see Table 1). A limitation of the research is that it was not possible to adopt a longitudinal approach to these questions and the analysis is based, therefore, on workers' recollection of pre-lean in contrast to current, lean, experience. However, while time-series data would be preferable the use of retrospective recall does not invalidate the study (see, for example, Miller et al., 1997).

For the first element, questionnaires were distributed by union representatives to random samples of three hundred workers in assembly hall areas in each plant. Response rates were BMW-UK (27 per cent); GM-UK (25 per cent); GM-Poland (47 per cent); and VWMP (37 per cent). The second element of the data derives from in-depth interviews conducted with the factory convenor of the union UNITE, four shop stewards and four assembly operators at BMW-UK; the factory convenor of UNITE, two shop stewards and seven assembly operators at GM-UK; four NSZZ Solidarność senior union representatives and two assembly operators at GM-Poland; and three NSZZ Solidarność senior union representatives, two assembly operators and one maintenance worker at VWMP.

Context

The essential differences between the two UK plants with respect to the history of the implementation of lean production are important (See inter alia, Stewart et al. 2009). The

BMW plant was formerly owned by the British company Rover when the first variant of lean was introduced in 1992 after a considerable period of plant based opposition and debate across the company in number of locations throughout England. Opposition ended in the mid-1990s after the unions (TGWU and Amicus, since 2007, UNITE) suffered a strategic defeat over working conditions. The variant of lean now used in the BMW plant is a hybrid of the extant agenda and its own version brought from Germany after it purchased the plant in 1994. One of the intriguing aspects of lean production operating in GM-UK is that is was introduced following a dispute over the form and character of lean introduced into the plant in 1990 (Stewart et al. 2009). Over the subsequent period lean has been subject to continual challenge and negotiation by UNITE and despite periodic and sometimes successful union and worker unofficial opposition, the plant remains pivotal to GM-Europe's Astra car portfolio.

Table 2 here

GM-Poland and the VWMP represent some typical features of foreign multinational investments in complex manufacturing in Poland, including relatively higher wages and stronger unionisation than an average private company (Czarzasty, 2015). They reflect a wider strategy of automotive producers to move to the New Member States of the European Union to reduce their costs in order benefit East-West European pay differentials and the preferential treatment afforded to foreign investors by national and local governments in Eastern Europe (for instance, due to tax relief in Special Economic Zones).

The important feature of both plants is the fact that lean production was introduced from the beginning. GM-Poland (General Motors Manufacturing Poland) is an automotive assembly plant founded as a greenfield investment in 1996 in Gliwice (the Upper Silesia region). Production commenced in 1998. Currently, NSZZ Solidarność is the largest of three trade unions in the plant where total union density is around 40 per cent. There are also two smaller unions and management-labour relations are conflictual. By contrast, VWMP is a greenfield engine assembly plant in Polkowice (the Lower Silesia region) and was founded in 1999. There is only one trade union in the plant, NSZZ Solidarność, with an extraordinarily high union density of 97 per cent. VWMP is distinctive due to what are regarded as more cooperative employment relations based on the co-determination principle, recently (2011-2014) included in the *VW Charter on Labour Relations* (Pernicka et al. 2014). Comparing Eastern and Western European locations, as well as the US-based multinational (GM) with

Volkswagen enables us to explore the extent to which some of the outcomes of similar production systems are generic regardless of the cooperative or adversarial corporate cultures and the specific national trajectories of lean.

Continuous Improvement

Continuous improvement activities at the two UK plants did not involve any meaningful input into discussions by workers generally, or trade union specifically, aimed at improving task completion and work routines and in this respect, the interviewees reported a number of examples of management disdain for worker suggestions. This did not mean, however, that lean organisation meant that there was an optimum staffing level and work rhythm. At GM-UK, as a matter of routine, time and motion studies continue to be conducted in the pursuance of 'waste' and spare labour capacity. As one assembly worker at GM-UK observed:

> They do a time and motion study, get all of our numbers and then work out how long it takes to do a car, how much waste is in that car, put all the numbers together and then they evaluate it, then come up with a figure about how efficient we are.

At BMW-UK, continuous improvement was imposed more systematically through the use of MPI (Magnetic Particle Inspection), a new lean maintenance labour process. A variant of Total Productive Maintenance (Prabhuswamy *et al*, 2013), which has long been associated with lean, MPI requires assembly workers to attempt to repair production equipment if the line develops a fault and equally, maintenance workers are expected to carry out production functions during less busy maintenance periods. Outcomes were dysfunctional in that the maintenance engineers interviewed argued that insufficient operator training for these tasks meant that eventually more time had to be spent on correcting line sequencing and poorly repaired components. However, this did increase the labour power of maintenance groups; these skilled workers were expected to load parts to buffers and line conveyors for, in some cases a significant proportion of their working day. For example, a maintenance worker described one area of the plant where the section manager demanded to see maintenance workers on the line when it was moving and completing maintenance work when it stopped:

> The managers down there - they take great delight, even if they don't need a maintenance guy on the job, they take great delight that they can do it and they make sure that they do it. [The manager said] 'that when the gate is down, the guy is maintenance, and when the gate is up he's production and that's his fifty percent'. So that's how ridiculous it does get [...].

BMW-UK's production operators were equally critical of these changes. For example:

> There's lean and there's anorexic. That's how I tend to see it. But it's just the same old story isn't it? Drive the worker into the ground.

The situation at GM-Poland can be compared with the situation at BMW-UK. At GM-Poland, Solidarność leaders observed a tendency to broaden the scope of the tasks expected from workers in their plant:

> If there are pilots, new improvements implemented, it should be done by a new group and this work is now performed by workers taken out of a process. Their workload in the process is taken over by other employees, they go to work on overlapping shifts, and this is evidently the lack of staff.

In interviews at GM-Poland, a typical statement concerned the discrepancy between 'official' procedures highlighted in the lean GM-GMS (Global Manufacturing System) system and the requirements of production targets to which workers referred using the word 'plan'. One of the most criticised aspects of the GM-Poland plant was the pragmatic approach by managers rather that the nature of the system itself, which points to the impact of the ideological nature of lean. In GM-GMS there is a range of informal rules and procedures which sustain production in the event of unexpected problems:

> I'd tell you, if they respect it all the time, it would be a good system. But truth is they don't fully respect it. I mean, if it suits the supervisor, he obviously comes out with this GM-GMS and he has an argument. But if it doesn't suit him, it happens very often that you have to do something incompatible with GM-GMS [because] the plan is sacred.

An assembly worker suggested that the GM-GMS is only adhered to fully during company audits:

> [The GM-GMS] is only on paper and functions only when the GM audit comes, these foreign auditors, then everybody bucks up, because there's audit and everything has to be according to GMS. And auditors are there for 3-4 days, everything is hunky-dory. And immediately when they leave [...] everything goes back to its old form...

The same worker estimated that there were only 5 per cent of workers at the GM-Poland who worked according to the GM-GMS 'book'. In addition, he suggested a fundamental contradiction between the 'book's' expectation and practices necessary to meet targets. The contradictions are between the standardisation of production procedures (adjusted to a 'standard' car), individualisation of customer choice (which requires more time to produce) and unexpected production problems.

Opinions voiced concerning the production system at the VWMP plant were generally more positive than those at GM-Poland. VWMP adopts the so-called VW Motors 18, which aims to constantly increase worker productivity and efficiency. 'Strategic workshops' are aimed at developing improvements in which all management cadres and union representatives participate. A union representative is involved in *kaizen* programme development and related training. The company introduced the system of production maintenance autonomy *(autonomous maintenance)* aimed at enhancing workers' skills such that 80 per cent of tasks (including maintenance) can be performed by every worker in the factory. Thus, production workers are regularly involved in various training activities, including internal corporate and external training.

Despite more emphasis on worker participation in the implementation of lean production, a number of respondents at VWMP suggested that the production system is mainly good for the employer, although workers often became inured to its subordinating character:

> You [...] can divide people into groups, make them compete and make the most out of them. But is this really good for the people? I think it is as it is. I think that there is no other ways to improve quality. Because we have really good results here (...). Time is money here, for sure.

Intensity of work

The questionnaire survey results provided further evidence of the dynamic of continuous rationalisation and labour intensification central to lean management. Whereas the *leanistas*, would argue that once a lean manufacturing system is established with its synchronised task operations and optimum staffing levels and work pace then any changes generated from continuous improvement initiatives, would henceforth make task operations, not only more efficient, but also easier for production operators. By contrast, Table 2 suggests that a more rudimentary process of ratcheting up work intensity had taken hold since lean was introduced at the four plants. The considerable majority of respondents indicated that the volume and speed of work had increased substantially and good majorities indicated likewise for the intensity and pressure of work. Only a small minority of workers at all plants indicated that these had decreased or stayed the same since lean's introduction (UK) or the beginning of their work experience in the sector (Poland).

[Table 2 about here]

In relation to these trends, typical commentary from longer service workers at GM-UK was that:

> It's definitely changed, everything is quicker [...] than when I first started here, back in '78. I feel, hand on heart that it has changed too much. There's no fun, you know? You can't talk to anybody, you used to be able to say, "hello, [...] it boils down to the less men you have and they are asking you to do more and more.

In GM-Poland, job intensification was evidenced, sometimes seen as related the change of management from British to Polish management cadres. According to an assembly worker:

> When Englishmen were here, there wasn't so much pressure on production plan, on stoppages. In the past, the line could stop for 10-15 minutes and nobody cried about it. Now, it stops for 10 seconds and the group leader runs there making big fuss, what's going on? [...] At the present moment, the most important is the movement of the line [...] At the beginning we made 60 cars during one shift, now we make 220, [...].

The image of 'good foreign managers' can be interpreted both as the outcome of the ideology of lean which encourages workers to believe that work intensification is just a matter of imperfect implementation of the system by the Polish managers and the reflection of an actual deterioration of working conditions following the exhaustion of initial incentives to attract workers (for a similar observation in the electronics industry see, Mrozowicki and Maciejewska 2013).

Similarly, a number of interviewees at VWMP remarked that work had become increasingly more intensive over the period since they started at the plant:

> Since I started here the norm increased by 20 per cent (?) [...]. So, it's clear that with each new engine introduced, until one gets used to it [it is tough]. Being as old as I am now [mid-20s], this pace is acceptable. But it's interesting what will happen when I'm twenty years older.

Indeed, a large number doubted their capacity to work at their current pace until the age of 60. Moreover, there was resentment that managers would no longer discriminate in favour of older workers when allocating arduous tasks. This was reflected in a refusal to continue the tradition of offering easier tasks (such as repair work, stores or cleaning) to older, injured or disabled workers. The principle that no worker, irrespective of health issues, could hide from the physical pain of lean (see Table 4) became paramount. In this respect, Table 3 shows that over three quarters of workers at the UK plants and at GM-Poland indicated that they work as fast as they can so as not to fall behind at least 50 per cent of the time; (two-thirds of VWMP workers also indicated this). Large proportions of workers at all plants indicated that they work as fast as they can 75 per cent of the time with large majorities of respondents from all four plants indicating that they could not, or were unlikely to be able, to work at the current pace until the age of their retirement.

[Table 3 about here]

Workers' health

The issue that concerned the interviewees more than any other was the impact of the lean working environment on their health. This was particularly the case at the British plants where the workforce profile was marked by greater proportions of workers aged forty and above. A number of studies have established an association between work overload and stress indicators such as job-related anxiety, exhaustion and depression (Warr, 1987). Carter *et al* (2013) notes that health problems such as back and neck pain can be associated with a combination of problems in the proximate environment of the workplace (for example, technology utilised) and the social environment (for example, job design and management control regime). Production workers at GM's (UK) plant observed typically:

> I've got it myself, my hands are going, not bad enough to go to the doctors yet, but the strength is going, constantly pushing, pulling and straining your body, some of the angles that you get yourself in to, to get the car done, there are definitely aches and pains.

> It's my back as well, my backs gone [...]. Every job is different yes, it's my knees as well, but I don't like to go down there and complain about it, they could say, "do you think it's your job?" which it is.

Despite on average shorter period of employment in the plant, workers at GM-Poland and VWMP also complained about health-related problems connected with assembly work.

> Honestly, I can say that I'm not afraid of work, but a man is exploited here so much that I can't imagine [working here till retirement]. I'm working here ten years and I doubt if I manage to work for five next years. (***Question: Is it because of health problems?)*** Yes, yes, like varicose veins, wrist pain.

> I'm complaining about knee pain for four years (...) I was [also] once on leave because of elbows, it seems I've got something like tennis elbow.

The main difference between the responses from GM-Poland and VWMP is that the latter tended to emphasise company support in instances where health problems were reported. This reflects a generally better perception of medical provision at VWMP as

compared to GM-Poland. At VWMP, 83 percent of the workers agreed that the firm provided very good medical treatment; almost twice as many as at GM-Poland where a positive evaluation of medical provision was given by only 37 per cent.

Table 4 reports the experience of physical problems among many workers in the survey. For example, bodily discomfort such as physical pain or working in physically awkward positions was, in most cases, experienced every day, most days or at least half a working month by in excess of 50 per cent of the workplace samples. Much larger proportions of workers indicated that they felt exhausted after their shift, many indicating every day or most days. For the British plants it was also notable that this experience had become worse when compared to the same questions asked in plant surveys in 2001 (Stewart et al 2009).

[Table 4 about here]

Interviewees at all plants complained of the growing incidence of workplace stress, directly attributable to the incessant pressure of the lean control regime. The following comment from an assembly worker at BMW-UK exemplified this:

> I'm working with one now a guy he's ready to pop because he's asked to do too much and he knows he can't do it, so he stresses about it and he's ready to pop. He's already had time off sick and then they want to take him to a disciplinary for being off sick [...].

At GM-Poland, workers related workplace stress to the discretionary nature of management adoption of lean. According to one worker:

> My job in terms of physical strain and stress, it would be half and half. There is immense pressure from supervisors who put pressure on you in this way that... supposedly, you do everything according to documentation, you shouldn't supposedly do it otherwise. But there is such psychological pressure. That you know that he won't tell you that you are worth nothing, but they keep on showing you that if you don't do it as fast as your colleagues on other shifts, you are a second category of employee.

Another source of stress at GM-Poland was the feeling of insecurity and an absence of clear hiring and firing rules. As one worker put it:

> In 2008, 1,000 people went and nobody cared. In 2005 and 2004, 450 people left and it was not like “You work well, you'll stay, you are clumsy, you go”. The clumsy ones with connections stayed.

By contrast, workers at VWMP emphasised that they felt secure as far as employment stability was concerned. This could be accounted for by the absence of major redundancies since the plant opened. In the survey, 77.8 per cent of interviewees at the GM-Poland and 53.2 percent of interviewees at VWMP agreed that stress levels had increased since they started at the plants.

Along with the general intensity of car assembly work the compulsion to maintain production volume through overtime and sudden changes to shift rosters generated work-life balance issues. These can in turn exacerbate stress-related illnesses. At BMW-UK for instance, working hours were regularly extended without warning to meet unscheduled surges in demand. Typically, in these situations management gave the union two days notice of compulsory Saturday working without any recognition of the disruption this might cause to family life. For one interviewee:

> Family life has suffered a lot. We have to work obviously longer days and nights. Friday nights and Saturdays [...]. It’s compulsory [...]. There's a Saturday coming up now and people can't do it because of child care issues.

A similar observation about the negative impact of production on employees’ private lives was made by the union president at GM-Poland in the context of introducing non-production days during the crisis in 2012.

More generally, bodily abuse, increasingly a consequence of working on the lean production line, had a detrimental effect on workers’ social lives, a characteristic that many felt was not noticeable under previous production regimes. As one GM-UK production operator complained:

> There are a lot of times when I go and play tennis and after ten minutes I’m done in because my legs are sore from leaning over the car and my back’s sore from leaning over the car and my hands are just worn [...] so it affects you big time. So if you get

lent-on today in two days time when your aches and pains come, you can't do anything, it's a hot bath and straight to bed sort of job.

The impact of lean production on workers' health was assessed more systematically in the questionnaire survey. Respondents were given a list of items related to general fatigue, certain musculoskeletal disorders and stress-related conditions and in two sets of questions asked to assess the frequency of these conditions in the pre and post lean periods.

[Table 5 about here]

The results are presented in Table 5. These show that overall the proportion of respondents reporting that musculoskeletal disorders such as backache, stiff neck and shoulder were experienced at least once a month had trebled under lean management systems. Significant numbers reported that these problems were now experienced daily or at least once week (particularly at BMW-UK). Wrist and hand injury associated with vibration and repetitive movements, characteristic of car assembly line work, had also increased in frequency (although there was a polarisation of experience at BMW-UK). Stress-related factors associated with the new work intensity of lean, such as physical tiredness, mental fatigue and headaches, had also increased significantly. It was notable that very large proportions of respondents at BMW-UK and GM-Poland reported physical tiredness daily or several times a week, much higher than the pre-lean period in the UK and pre-employment period at the GM-Poland. Overall, those experiencing stress itself at least once a month had trebled post-lean. This was particularly notable at GM-Poland, albeit post-lean as it refers to respondents' experiences since they began working in the plant.

Workers at the GM-Poland frequently mentioned that the high level of stress and physical tiredness were due to work intensification. They made an explicit connection between the requirements of the production system and heightened safety risks which also has an obvious health impact. Although respondents admitted that health and safety remains an important aspect of training, they also mentioned a tendency to sacrifice some important health and safety requirements for the sake of fulfilling the production plan:

In the MPC [internal transport], it's been always that the platforms which carry the material, if they break you reported it and they immediately fixed it. And at this moment, most of these platforms [...] they started to break, and there is no money for

new ones. [...]. And practically, if you go now to pick up material, you lean on it, it goes away and God forbid if a carriage is passing, you can hurt yourself

In all four plants these stress and ill-health patterns were subject to a vicious circle in a context of workplace cultures of managerial discipline and in some cases bullying. Various interviewees provided their own anecdotal experiences of bullying and harassment by managers more often than not related to failure to keep up with the work pace, or with defects, or machine downtime problems. While such incidents, normally involving public reprimand, could be demeaning and humiliating the climate of fear was underpinned by the constant threat of disciplinary procedures. For example:

People do jobs that they shouldn't do but they do it because they want an easy life, they don't want to get into trouble, they don't want to be troublemakers, but they do things over and above the minimum. But you miss one grommet and they come down on you like a ton of bricks. Eduardo a friend of ours [...h]e missed one grommet and they wanted to discipline him.

Taylor et al. (2010) have argued that the labour cost-cutting dynamic of lean and associated reductions in workforce and buffers have caused managers to re-define the parameters of workers' attendance behaviour so that what was once regarded as tolerable has now become sanctionable. In the four car plants with production staffing levels that provided no buffers or labour pools for absence cover, plant managers mobilised disciplinary threats to workers who were absent despite authorised sickness:

Basically a couple of years back I injured my shoulder in the plant. I was off for months [...]. I had a really intimidating sort of like term of absence review. I was called in to face two managers - normally it's just the one manager. Basically it was a case of bullying. I didn't really go along with that, but they really do, I think try to intimidate. (Body plant, production operator, BMW-UK).

It's worse now yes. If you go off sick, they are on the phone to you, what's the problem and how long do you think you're going to be off? [...] they're on your back, on your case. (Rectification-production operator, GM- UK)

These experiences were echoed in the survey results. Analysis of questions related to company sickness and absence procedure showed that overall, 73 percent of an aggregate of workers in the four plants felt pressurised into coming to work when unwell, 80 percent felt pressurised into returning to work soon after illness and 86 percent felt managers were more interested in productivity than the reasons given for sickness.

Management bullying was reported by 47 percent of GM-Poland workers and 26.2 per cent of the VWMP workers. They linked this to the specificity of the production system, which for the sake of meeting production targets, compromised physical and psychological well-being:

> I can say for sure that this plant is oriented to the highest profits. Managers don't even care about quality. [...]. I mean that a worker in this plant is humiliated by low salary, large workload (maximum exploitation) and it would be best if he doesn't speak and works for a bowl of rice.

Although interviews at VWMP did not reveal a high degree of management pressure and bullying, a different picture emerged from an open question in the questionnaire in which workers could anonymously raise their concerns about various forms of bullying. In total, 16 workers described examples of what they saw as bullying at the VWMP.. Here are some examples:

> Constant intimidation, moving to other workstations (worse), constant attempts to prove that I'm nobody and mentioning the lack of commitment.

> Favouring other workers, passing me over during pay raises, lack of respect for work, reproaching me for a short break in the fresh air to improve my mental state while it is allowed for other workers to go out for a cigarette on regular basis.

> Unjustified criticism, frequent suggestions that 'if you don't like it, leave the job', spreading gossip, sarcasm [...] lack of equal treatment (pay raise, bonus).

Conclusion

This article highlights the reality of forms of workplace labour regime in their extant settings. Moreover, , the *leanistas*, claim, not only workers, but also managers and firms' consultants describe the internal work and labour processes in these plants as 'lean'. If the *leanistas* believe they are witnessing successful implementation then the appellate lean is loudly proclaimed, but when it seemingly 'fails' in their managerial terms the response is invariably that management has not implemented change properly. It is the case that aspects of the headline description of the term vary, sometimes to a considerable degree: at GM it is understood as a global production and distribution system. At BMW-UK and VWMP the descriptors may be more parochial in the sense that the term for lean has its genesis in each company's managerial trajectory, but the objectives are the same: a series of management tools drives workers, sometimes to the limits of their health, and certainly for some, to the limits of their endurance. The distance between worker descriptions of their working lives and managerial narratives longing for some distant Promised Land in our view attest to the fact that management's lean narrative is a powerful ideological injunction.

This article has focussed on: work intensification; peer support and pressure and finally, workers' health. The effect on worker health derives from what we term continuous rationalisation. Specifically this has its origins in what is a conventional Taylorised notion of the capacity of management to coordinate human movement. Lean job reform was used to impose reduction both to indirect (reduced buffers) and direct (reduced line staff in determinate teams) staff. As one interviewee put it "what they do is they skim off of this man's work……they can do away with another head in this area". Of course, the argument advanced by *leanistas* is that the process is inherently rational. One of the features of this which is worth bearing in mind is that, as was pointed out, it is not always 'sound' organisationally especially where one argues that lean is not a zero sum game but a process where everyone can be a winner. As this research highlights, however it contradictory and especially in terms of work-life quality. This may be an inherent contradiction in the system, but the important thing is that labour (in the case of skilled workers) is responsible for solving (management of) labour utility problems. Lean advocates could argue that this is a good thing since it forces workers to use their initiative to solve production problems. In this sense, it is therefore indeed, arguably, both rational (for management) and irrational (for labour) although one might also argue that a system premised on minimal resources-in-production and notably living labour, spends considerable irrational time responding to the deleterious consequences of work place stress attendant on lean.

There is a distinct difference in the reports of our data by country. Though a minority, it is the case that a number of workers assumed that GM-Poland and VWMP 'lean' discourses would bear fruit were management able to fully comprehend the nature of lean agenda. This finding can be explained by a number of factors that predominate in Poland including; the relative age and generational characteristics of the work force, the local importation of neoliberal discourses, the nature of trade union interventions (including the orientation to lean production of some union representatives) and of the relatively high wage and benefits as compared to other local plants. A much broader involvement of workers and trade unions in the implementation of lean techniques at VWMP might have resulted in less criticism of some its consequences at the level of working conditions. With regards to the latter, the cases of the UK (BMW and GM) provide interesting contrasts. In both plants, which have been the subject of on-going study by (Stewart et al. 2009) since the early 1990s, the union, and many workers, have either begun with, or developed over time, a political understanding of management production strategies. At both BMW-UK and GM-UK, trade unions have also significantly intervened at important stages of the lean implementation process to affect outcomes. Both workers responses and extant organisational aspects of production bear the direct imprint of union negotiated outcomes.

Unions can make a difference in terms of the relative impact of lean and specifically in respect of the form of subordination attendant upon its implementation and practice, which we have addressed elsewhere (Stewart et al, 2009 and Stewart, 2014). However, and unfortunately, we have not encountered an instance where unions have effectively blocked lean production. Lean is perceived to be materially detrimental to workers physical and psychological experiences of employment in the sector regardless of country and company contexts. Thus, significant majorities across all four plants in both countries register deterioration with respect to the intensification of work. Additionally important in the context of the shift in social policy agendas advanced by neoliberal governments for a longer working life, very large majorities in all companies felt the nature of their work meant that working until the retirement age was unlikely. Results regarding labour intensity highlight that in very few cases is it thought by workers that it is possible to sustain quotidian activity without falling behind defined work schedules with almost one third of respondents agreeing that they had to 'work as fast as you can so you don't fall behind'.

Based upon our interview survey data, significant groups of workers are clearly experiencing deleterious working conditions in specific ways for long periods of time. This

is linked to specific and *determinate* workplace dynamics of lean, whereby it is driving enhanced labour utilisation and rationalisation in ways that clearly compromise worker health and do so in increasingly unsustainable ways.

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