AN INDUSTRIAL PERSPECTIVE ON REAL-TIME MANAGEMENT INFORMATION SYSTEMS

by

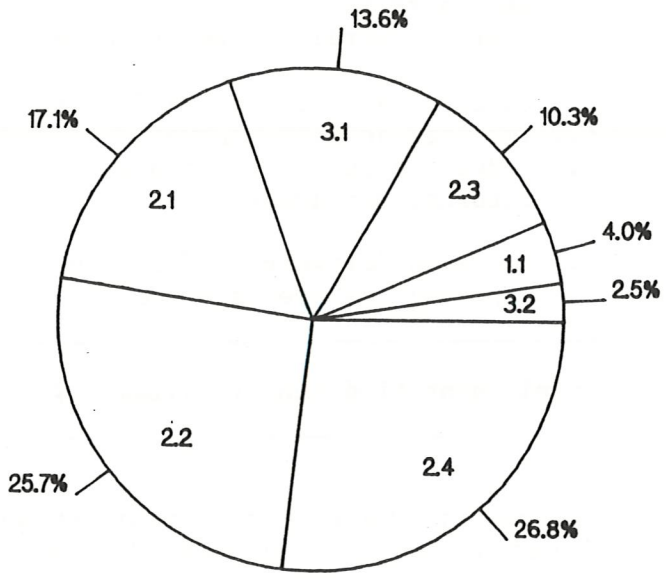
David R. Toon and David J. Tyler

Toon, D.R, and Tyler, D.J, An industrial perspective on real-time management information systems.
Hollings Apparel Industry Review. 1991, **8** (2) pp 61-72

INTRODUCTION

Developments in computerised management information systems have been very rapid during the past decade, with advances in both hardware technology and software engineering. The systems are typically modular in design, allowing a phased installation to a production unit. Data is captured at the workplace and fed to a central database where it is processed. By interrogating the system, management are able to determine quickly the state of production as it is at present, in real-time, rather than as it was yesterday or last week, as is the case with historic information systems. Although most people in industry have experience of some form of historic information system, this is not the case when it comes to real-time.

Several case studies of real-time installations have been published in recent years, including Bodenhorst (1988), Colgate (1988), and Anon (1989, 1990a, 1990b). Numerous benefits are reported from satisfied users. Although the level of benefits will vary according to the business needs of the user, typical areas of savings and benefits are identified by Scheele (1988), who has sought to quantify the benefits of real-time. The areas of saving and potential benefit are reproduced in Table 1. Figure 1 is based on the quantified data and identifies the sources of important savings.



1.1 Reduction of work-in-progress levels
2.1 Improved production control
2.2 Reduction of Direct operator clerical work
2.3 Elimination of clocking in and out
2.4 Improved operator performance
3.1 Reduction of payroll related clerical costs
3.2 Reduction in operating costs (forms)

Figure 1. Quantifiable savings with real-time systems.
(Data based on Table 1, Scheele 1988)

Benefit	Achieved by	Annual Savings
Reduced capital needs	1.1 Reduction in work-in-process levels.	$6,125
	1.2 Reduction in finished garment stock.	Not quantified
Increased profitability	2.1 Productivity increase: improved scheduling, loading and balancing.	$26,600
	2.2 Productivity increase: elimination of direct operator clerical work.	$39,900
	2.3 Productivity increase: elimination of time spent clocking in and out.	$15,925
	2.4 Productivity increase: improved operator performance.	$41,475
Reduced costs	3.1 Reduction in payroll related clerical cost	$21,000
	3.2 Reduction in operating costs (forms)	$3,850
	3.3 Reduction in shipping costs (more complete order to ship)	Not quantified
	3.4 Improved machinery utilisation and parts control	Not quantified
	3.5 Improved morale, lower turnover.	Not quantified
Reduced losses	4.1 Reduced payroll-related losses.	Not quantified
	4.2 Improved quality control	Not quantified
	4.3 Reduction in cancellations, returns, markdowns.	Not quantified
Increased Sales	5.1 Improved delivery performance	Not quantified
	5.2 Improved customer service	Not quantified
	Total Quantified Annual Savings	**$154,875**

Table 1. Saving and benefits potential with a real-time production control system (Scheele 1988).

The industrial perspective provided in this article comes from experiences gained at James Seddon Shirts, Flint. The factory manager was David Toon, who oversaw the installation. He reported on his experiences of the first three months of trials with the system at the Computers in Manufacturing Conference at NEC Birmingham on 12 October 1989. A productivity rise of 5% was achieved, and the local shop steward was quoted as saying: "Give us the motivation and we can work as hard and fast as anyone. The Far East cannot match our quality, nor our delivery now we have this shop floor data capture system".

Figures 2 and 3 reproduce data presented at the NEC Conference. The charts portray the results of an analysis of supervisory time before and after the installation of a real-time system, and show clearly that the supervisor's task is simplified. Numerous activities of administration are removed completely. Real-time frees the supervisor so that more time can be devoted to maximising the productivity of the assembly line.

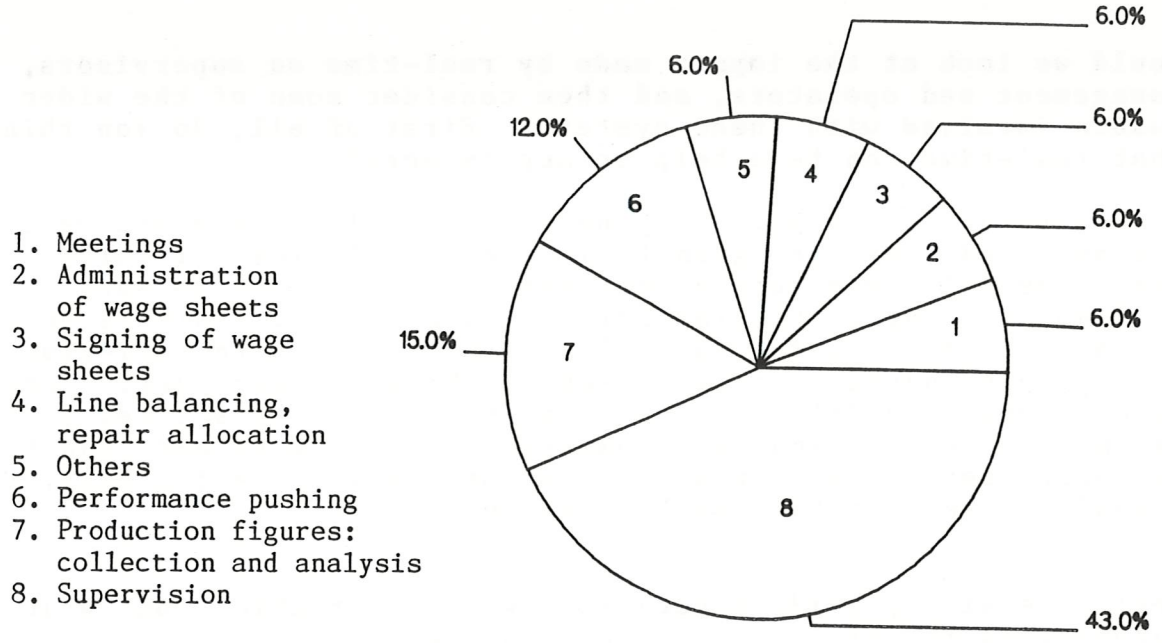


Figure 2. Analysis of supervisory time before real-time.

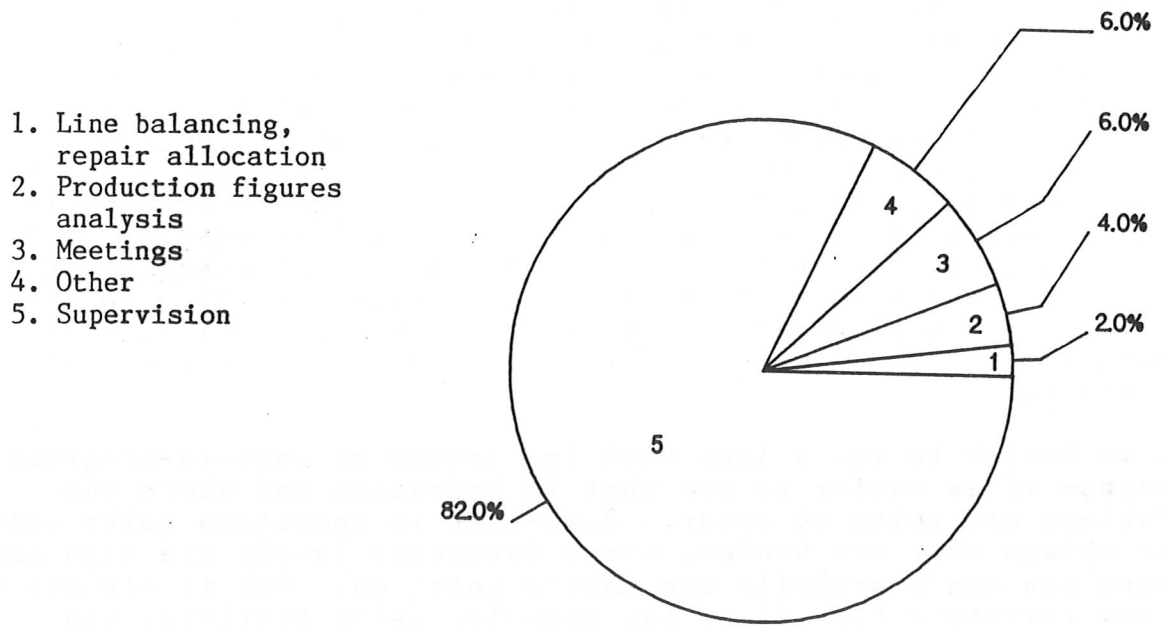


Figure 3. Analysis of supervisory time after the real-time installation.

David Toon is now Manufacturing Director of CCM Limited, a quality workwear manufacturer based in Garstang, Lancashire. In this article, he responds reflectively to questions on the lessons learned during the real-time trials.

THE INTERVIEW

Could we look at the impact made by real-time on supervisors, management and operators, and then consider some of the wider issues involved with these systems? First of all, do you think that real-time can be a help to supervisors?

Yes, I think it can be. In general, supervisors are not well trained, and they vary greatly in their abilities. I think real-time will help good supervisors, but I am not so sure it will do anything particular for bad supervisors. This is because I don't believe you can run a line exclusively with real-time: it is a people industry and you need to think on your feet. Some supervisors find difficulty putting theory into practice: they can almost believe what the computer tells them rather than think on their feet. Computerisation can be a support and a help, but I don't think it's the complete answer.

Real-time will provide supervisors with information, but what information is critical to running a line?

There are two main areas. First, it helps with line balancing; second, it can be used to build up a very accurate skills inventory database. In the case of the latter area, the system will record the last time an operator did a job, how long she was on it and what sort of performance she achieved. When the information is in people's heads, I have to run round and find it, and even then it's subjective. Real-time data is very accurate and comprehensive. It also has "what if" scenarios: if I replace operator A with operator B, who else can do B's job? The system is quite good at providing this kind of information, and I thought that the skills inventory facility was one of its strong points. Going back to line balancing, it helps because it gives a visual display of balance. It tells you which operations are out of 'sync' while people are performing: which ones are going to run out of work the quickest and which you can move people to.

It is better to run a line with low levels of work-in-progress, because it is easier to see what is happening and where the problems are going to occur. Real-time is sometimes quite useful for things that are hidden, where inventory levels are high and where you can't actually see what's going on. But if you are in a low inventory flow line, for example, using trolleys, you should be able to see all the buildups without having to go to a computer. It's not necessary to do a physical count to assess the situation realistically.

Some problems are caused when the system takes figures and extrapolates them. You might see, for example, that operators tend to work hardest between breakfast and lunchtime. The system uses that performance to project through the day. But we all know that the last hour and a half is very slow, so you could move somebody when it's not necessary to move them. Again, the system provides information - but it needs to be interpreted properly rather than taken at its face value. The information should be a help and an assistance in running a line rather than putting yourself in a black box and running the line away from the factory floor.

Let's move on to management aspects. Does real-time help management do their work better?

Yes, but I think the information is overly complicated and too heavy. The systems that I've seen provided 1001 reports of which one would only use 2 or 3! It tends to smack of the computer guy who has played about with a model and doesn't know when to stop! It's all an exciting game to him and it's a matter of providing loads of information and little fancy charts, and I think it sometimes loses the point that what you want is very basic information, easily presented and user-friendly. Computers are, by their very nature, mathematical beasts. A figure is taken, multiplied by 7 (because there's 7 hours left), divided by another figure, and you have produced an answer. This facility is not always what you are looking for - a mathematical tool. If this were the answer to running a clothing factory, you'd have mathematicians in charge and not people-oriented managers.

In what areas can management use real-time?

The system is helpful with capacity planning and production scheduling; the skills inventory area is quite important; and there are useful applications with stock control and work-in-progress management. As a planning tool working with a historical database, it is quite good. Whether it can be used effectively for forward planning is less certain, because the base data is too mathematical. I would use it to produce the first plan, and then refine it based on my personal knowledge of what is actually happening.

Real-time is good for loading purposes. But the larger is the work-in-progress, the greater are the demands placed on the system. If you've got 26 bundles between each operation held in big skips, you do want to know that you've got a size 20 in there somewhere, and the ability to get this information is a requirement for the system. If, however, you operate with lower levels of inventory, you learn to manage things differently. You have to make sure that you load the right things on, and you put your effort into this rather than into fire-fighting. Like most systems, the simpler and more effective you make the basic rules of running a factory, the less requirement there is on the system. Most commercial software is designed to handle the worst possible scenario and to take the burden out of number-crunching, but the computer is not the solution for getting your

manufacturing systems right in the first place! If your throughput time is 2 days and you have 26 sizes to feed on, you should plan it carefully to minimise the control requirements, rather than put them all in and sort out the flow later. I think the computer can be a useful building block to getting better systems, but the real answer is to get the systems right rather than hoping that the computer will sort out your problems.

What about the operators? Do they appreciate real-time?

There are two types of system that I've seen. The captor system relies on the operator to feed in the information and is overly complicated. It takes too long to train the operators to use the system, and even then many of them are scared of it and worry about it. The bar-coded system is probably better because it saves operators pushing keys and there is less to remember. Nevertheless, there are still lots of keys to press to extract various bits of information and, in practice, only one or two keys tend to be used.

In terms of motivating operators, I think the system has a short term effect, like playing with a new toy. Operators did use it initially maybe for a day, maybe a week or maybe a month, but after that they got bored with it and stopped racing the clock. An analogy can be drawn with the guy who gets a car with a fuel computer on it. He spends the first two weeks trying to beat it, and after that he switches it off and never uses it again. There comes a point when he reaches an optimum plateau and he can get 38 miles to the gallon and there's no point trying to get 38.2. It is possible to get a dramatic improvement in performance and motivation in the short term, but then it certainly plateau's out and, although I didn't keep the system long enough, my view of it is that the benefits start to diminish. Performances may not get back to their original levels, but my argument is that growth is not sustainable. This is one of the poor selling points of real-time systems, and one can so easily be fooled during a little pilot run of 6 weeks.

Could one argue that the feedback on performance would be very useful during a time of change - for example, during a product startup?

If you believe in the philosophy of electronic worktop pacers, then yes, this feedback will be useful. Whether the operators will make use of it consistently is doubtful. They might use it for the first style change, but after that the impact may be reduced.

My personal view on the worktop pacer is that they don't work on their own. Would you agree that a "people input" is also needed?

Yes, I think that is right. These devices need to be managed like everything else. We are not in an age yet where people will consult a computer and do what they are asked to do. And the pacemaker is limited: it doesn't say anything about methods, and

it treats everyone the same - as if they are robots. Yet we know that some people are not motivated by money, but they do respond well to a pat on the back. People don't always come to work to achieve 130 performance.

Did you find that operators used the system correctly?

If something went wrong the first time, I found that the operators gave up quickly and wouldn't do the work. If they moved onto another machine, they probably would not key in. If the operator before had already passed the work tickets through the terminal, they would ignore it. Because operators didn't want the hassle of sorting out difficulties, there were many opportunities for the database to get corrupt.

The system is such that if you missed keying in operation 5, when you keyed in operation 6, it threw out a warning and would refuse to accept the data. The problem came because the system did not go in very smoothly and people quickly got frustrated with it. We also had a number of technical problems which didn't help. When someone demonstrates the system, everything seems to map out perfectly, but in real life there are discrepancies, and if a report doesn't say what its meant to say, you start to lose interest. As soon as the information has lost credibility, it is very difficult to get it back.

I don't think that the management, including myself, were 100% committed to it. I have found, to my cost, that if, from the top down, there is not a total commitment to a new system, then the system will fail. You have to convince senior management that the system will work if it is managed properly. If you don't do this then weaknesses will appear and the system will get out of control.

What personnel are required to run the system?

I think we learned a lesson here. If we ever put in another computer system, we would need to give much more attention to the installation phase. Furthermore, after that we would need someone to be a system manager in the factory. This person would need to be computer literate to interface with the supplier and who would be committed to the system. If you don't have this, people will just walk away from it.

Did you find that work tickets went missing?

Yes, I did. That was one of the frustrations! It was good in a way because it highlighted a problem in our existing procedures, such that 10% of our tickets went missing. It made us redesign our trolley system so that the tickets did not go missing. Real-time forced us to identify problem areas and to improve them. It proved to be quite good as a management discipline, because the information needs to be 100% correct for the system to work. It is a major, major task to install the system; one has to throw many hours into it - far more than one anticipates

at the outset.

What causes of downtime were there?

We had faulty captor terminals at the start, which were followed by many other technical problems. After the initial pilot of 10 workstations, there were many difficulties extending the system. The updating of screens slowed down as we moved from 10 to 100 terminals, which was difficult to get used to. Because it was a first installation for the supplier, there were software problems which needed ironing out, there were hardware problems with the computer and the captor terminals, there was faulty wiring and people were often working until 10 o'clock at night trying to resolve the difficulties.

With all these problems, it sounds as though you had to run the manual system alongside real-time. Presumably you felt you could not commit yourself to the computer system?

I don't know whether it was a get-out for me because I wasn't completely committed, but I found all sorts of excuses not to use the system! It was a factory where we had significant problems and, as I've indicated before, if real-time has any place at all, it comes in as a building-block numbered 9 out of 10 in a perfect factory. It doesn't rate as a priority in place number 2. If you've got a factory with bad quality, bad systems, bad supervision, and generally not running well, you're not going to improve it with real-time.

The flexibility of the systems interests me. The software has been written by programmers who focus their attention on problems that can be solved. Is it true that the needs of management are sometimes rather different?

I think there's a wide gulf between software engineering and a factory manager. There seems to be a lack of understanding of clothing factories, although a lot of software companies have taken on clothing consultants to reduce the gap. The clothing industry is not a scientific industry with scientific problems and straightforward solutions. A manager may face a thousand different problems and not have the same one twice, and it is sometimes difficult for people to understand the complexity of the clothing industry. One wonders whether it is possible to write enough scenarios for every situation that might arise. There are "56" different ways to make a garment: you can put the collar on first or put it on last; you can put the cuff on first or put it on last; you don't always have to undo the whole garment to do a repair; you can make adjustments at the end of the line; you can use 15 different types of machine to produce the same result. There are often too many variables for the system to handle.

What sort of environment is appropriate for real-time?

I don't think that real-time works well in low work-in-progress environments. The lower is the level of work-in-progress, the more vigilant does the supervisor need to be. Supervision ought to be visual, and a vigilant individual is far better than someone who keeps looking at a screen. I don't think it will work in a factory with significant problems. So the only answer is, as mentioned before, that it can be used as building block number 9 out of 10 in a high work-in-progress factory. The problem is that if you have a factory with good efficiencies, can the system be justified? It may be nice and sound good on paper, but is it necessary? I find it over-complicated, and I'm not sure what it is trying to achieve. If you are operating with Quick Response (with low inventories), there is no need for it. With conventional lines, I have to ask whether I want to know exactly where everything is at all times. How quickly do I need information? Is it on a day-to-day basis or on an hour-to-hour basis? There is no doubt that real-time can do many things, but I suspect that 70% of its capabilities would be difficult to justify.

I think generally that it's an extremely expensive system: based on one that I had previously installed and on one I looked at recently. A conventional computer system might be introduced at a fraction of the cost of real-time. We were quoted £120,000 for installing a real-time system in a 100 operator factory, but a good historic data computerised system might cost £20,000 - £30,000. I find the costs difficult to justify in my own mind.

Can real-time enable you to give a better service to your customers?

Yes, it can be used to give a better projection of when goods will be ready. However, all the system does is to provide data: the managers and supervisors have to use it to gain the benefits. If data can be used to run the factory better, this is fine. If it can be used to give a better service to customers, this is fine.

Does real-time reduce indirect costs?

I'm not convinced that it does, although the suppliers do make claims about this. Savings in clerical staff may be achieved, but these are not major. The other indirects are still needed. Paperwork can be increased, as reports are printed so readily by the system.

What advice would you give anyone considering investing in real-time?

The first point is to be very skeptical of cost justifications based largely on improvements in operator performance. Secondly, ask yourself whether there are any other alternatives for running the factory better? If the cost justification says that the system can reduce work-in-progress by 10%, ask yourself "Can I reduce work-in-progress by 10%?". When it says you can save 1% of off-standard time, ask yourself "Can I do this anyway with

better supervisory practices, by investing time and effort in my people?". You have to be skeptical of all the points and take into account a lot of technical difficulties that could occur with the system. If you do decide to go for it, don't go for it too early and don't do it to solve your problems. The motive should be to enhance efficiencies and to build on existing strengths. If you believe in it wholeheartedly, put it in when your internal systems are in place and you are slick enough. Don't try and do it if you've got a bad factory - I don't think it works.

BIBLIOGRAPHY

Anon. 1989. Real time boost for Clifford Williams production. Apparel International. 15(5), 12-15.

Anon. 1990a. Blow by blow production. Manufacturing Clothier. 71(2), 25-27.

Anon. 1990b. Levi's Scottish factory sets a new pace with real-time. Apparel International. 18(1), 2-4.

Bodenhorst, J. 1988. Real-time equals real benefits for Lebanon Apparel. Bobbin. 29(9), 118-119.

Colgate, A.I. 1988. Heritage in real-time. Bobbin. 29(6), 46-47.

Scheele, P. 1988. Real-time advances Apparel Industry Magazine. 49(11), 74-80.