

The Chicken or the Egg: How Work & Money Are Interconnected



Which came first: the chicken or egg? A similar question in construction is, which comes first: *work or money*? While the owner is a source of funding, constructing a building requires plumbers and electricians. A mason can build a masterpiece, but a contractor can go bust due to productivity issues.

And although we have come a long way from the days of bartering in the street, the core interchange remains: *currency is a means to measure and transfer value*. The role of a construction financial professional (CFP) is to manage and oversee this exchange of currency at the company and project levels. While the money management itself is a challenge, linking the money to its source may be the biggest hurdle.

This article explores how work and money are tightly linked and how both need to be managed accordingly throughout a company's projects.

By looking at the behavior of work and money as leading and lagging indicators, the measurement and management of a company's vitals can be improved.

Money Measures Value Transfers

Capital plays two roles: means of commerce and means of wealth.

As a means of commerce, it is a medium of exchange for goods and services. For construction, this means transferring materials, tools, and know-how into a building or infrastructure with which the consumer pays for and is satisfied.¹

Contrary to the Lean methodology of value-added and non-value-added activities,² natural laws tell us that matter and energy are neither created nor destroyed. Since trade knowledge and experience are part of that matter and energy, the same principle applies.

For example, there is nothing to add or take away from the knowledge of a carpenter. Their experience is an expansion of their trade apprenticeship, and that knowledge and experience is transferred as a value to the final product.

So, how is that value ultimately transferred? A company's vitals are determined by how effective this transfer, in the form of work, is directly related to the flow and balance of money into and out of the project.

The Energy Balance

Just as available energy equals the sum of kinetic energy, potential energy, and entropy (losses), in construction, the energy balance is also a zero-sum equation of labor power (work and effort), capital and material (assets), and lost productivity. It's beneficial to all parties when the productivity losses are reduced.

To manage this zero-sum game, balancing the equation throughout a project is necessary. Every project starts with an estimate or budget and needs a validation of how the variables of the construction energy balance will transfer to construction energy. Furthermore, this balance must be reassessed every time the scope or plan changes.

For example, change orders are typically managed as part of the capital and material variable, but the labor power and lost productivity will need to adjust accordingly. The link between work and money always exists and must be visible and managed among the jobsite, CFP, and customer.

Here are three cases in which the linkage between work and money is faulty.

Change Orders & Productivity

Productivity has nothing to do with whether change orders are approved or paid for; rather, the labor is doing the work, then productivity needs to be measured.

Measuring productivity via ASTM E2691 requires:

- Accounting for change orders
- Adding or subtracting the budgeted labor hours associated with change orders to the job baseline labor hour budget
- Noting the reason for change orders³

Many project managers (PMs) and forepersons will explain their productivity declines are related to not having the change orders in to measure against. Any change in scope, whether paid for or not, must be tracked and measured. But without measuring them, the work and productivity is invisible.

Exhibit 1 shows an example of job productivity measurement using Job Productivity Assurance and Control (JPAC®) where the foreperson said for months that “once we get the change orders in, we’ll be okay.” Clearly, as reality settled in, they weren’t okay.⁴ The job productivity continued to decline after the change order work was added to the baseline labor hour budget.

Exhibit 1: An Example of Job Productivity Measurement Using Job Productivity Assurance & Control (JPAC®)



The same situation can happen with money, where a PM reports in their monthly work-in-progress (WIP) review that “once I get paid for the change orders, my projected profit will go up.” But because of the same root cause of lost work productivity, this does not always happen due to the construction energy imbalance.

Profit & Productivity

Work productivity has nothing to do with how the job was estimated, and even less to do with its margin on bid day. The estimate is a baseline for profitability on a project, but no matter how much the estimate was for, how the money is spent will determine the true profitability.

A highly profitable job can still lose money if resources are mismanaged, either in the form of fade from the estimated profit, or if the lost productivity is large enough, in a total loss. Similarly, a job with a tight estimate could be very profitable if work and money are managed productively.

Favors & Bartering

Favors and barters can occur on the jobsite when the trades don’t have what they need to transfer value and finish their tasks. Without access to money as means of exchange, labor can use their skills or access to other goods (e.g., tools, material, space) as a means of exchange for something in return. However, using the company’s resources (e.g., time, material, tools) without visibility to the money can deplete the construction energy.

Linking Work to Money: It Starts With the WBS

Until the industry gets beyond the management of work (i.e., step 2 of the Industrialization of Construction⁵), the trades must still be relied on to manage labor and work. Skilled trades are the best source of data about work including the plan (or in some cases, not having a plan) and work progress.

The plan is made visible through a Work Breakdown Structure (WBS)⁶ created by skilled trades, which can be the first signal about how money will be spent on the job. However, the WBS alone may not be the final form of understanding the connectivity between work and money. For example:

- Does the foreperson understand the scope of work?
- Does the foreperson see the sequence of the job and how they will sequence the work?
- Does the foreperson have a plan to optimize the build with labor power, materials, and tools and decipher who should do what, when, and where?
- Does the PM understand and agree with the plan (relative to the budget for the job)?

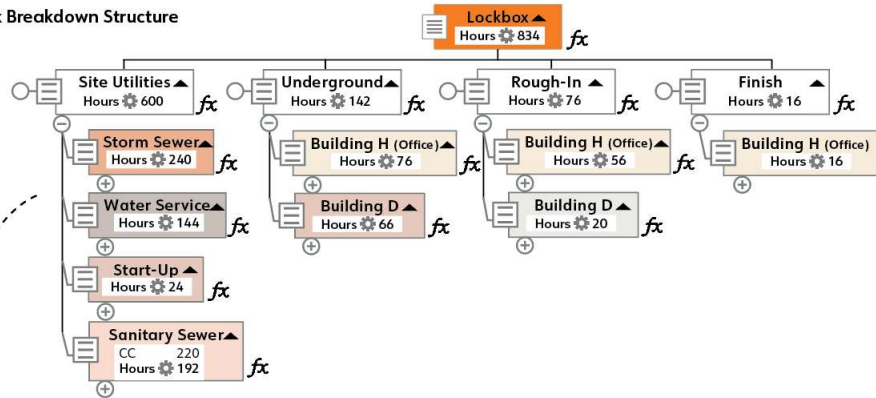
After all, the estimate or thereafter negotiated contract is as relevant as the money in the bank, linked to what the customer will measure as progress and value via the schedule of values. However, it is only a guesstimate of money without taking the previous questions into account about how the work will unfold.

If a PM gets a WBS from their foreperson, then they will have the opportunity to see the work plan, give input, adjust as needed before the boots hit the ground, and develop a plan for the money that is tightly coupled to the work.

For example, Exhibit 2 shows how a WBS can be translated into a schedule of values, so that the performance obligations can be measured and paid for in lockstep using ASTM E2691. The customer is truly paying for value transfer of the work being done effectively.

Exhibit 2: Work Breakdown Structure Translated Into a Schedule of Values

1. Work Breakdown Structure



2. Schedule of Values

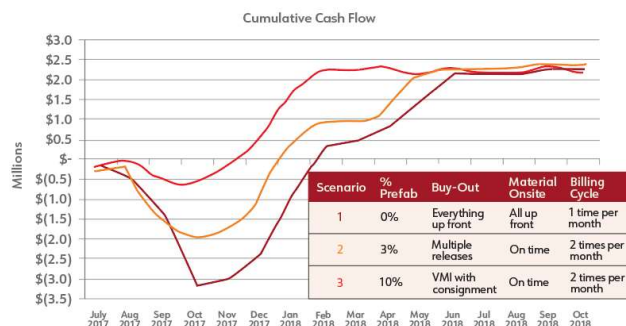
	1	2	3	4	5	6		Total Completed (JPAC® Observed % Complete)	Work Completed	Balance to Finish
	Labor Hours	Labor Cost	Equipment Cost	Material Cost	Quoted Material Cost	Tax Cost	Original Contract			
10 Start Up and Fees	24	\$ 1,080	\$ -	\$ 14,000	\$ -	\$ 980	\$ 16,060	100%	\$ 16,060	\$ -
200 Underground	240	\$ 10,800	\$ -	\$ 3,500	\$ -	\$ 245	\$ 14,545	100%	\$ 14,545	\$ -
205 Rough-In	76	\$ 3,420	\$ -	\$ -	\$ -	\$ -	\$ 3,420	75%	\$ 2,565	\$ 855
210 Finish	16	\$ 720	\$ -	\$ 7,500	\$ -	\$ 525	\$ 8,745	100%	\$ 8,745	\$ -
215 Site Storm	240	\$ 10,800	\$ -	\$ 2,500	\$ 52,966	\$ 3,883	\$ 70,149	85%	\$ 59,626	\$ 10,522
220 Site Sanctuary	192	\$ 8,640	\$ -	\$ 1,500	\$ 4,754	\$ 438	\$ 15,332	65%	\$ 9,966	\$ 5,366
225 Site Water Service	144	\$ 6,480	\$ -	\$ 1,500	\$ 7,478	\$ 628	\$ 16,086	5%	\$ 804	\$ 15,282
	932	\$ 41,940	\$ -	\$ 30,500	\$ 65,198	\$ 6,669	\$ 144,337		\$ 112,311	\$ 32,026

3. JPAC® Observed % Complete Updates

In addition to billing and revenue recognition, the WBS can be used by a PM to develop a realistic cash flow plan for the job. In one case where a PM insisted their job would not be cash positive until the end, the WBS convinced them otherwise.

Exhibit 3 shows cash planning scenarios modeled as the sequence of work with procurement options and pay cycle options to determine how a job could be cash positive at 20% complete. Again, it is a matter of balancing work, money, and time.

Exhibit 3: Cash Flow Scenarios



Discipline in Change Management

Change in construction projects almost always leads to lost productivity and is usually associated with change orders, but if recognized as *any and all changes* to a plan, then the impacts can be quantified and managed proactively.

In data-driven project management using Digitalization, Commonization, and Interconnection (DCI Construction®), changes are categorized and quantified based on their type and impact, meaning employees no longer need to rely on jobsite walkthroughs, field notebooks, or PMs' spreadsheets to find information about changes.

Changes can originate from or impact one area or a combination of *work, effort, and time*. Additionally, the contractors will have an impact on one area or a combination of *labor power, money, and material*. Some changes originate from or result in change orders, but not all.

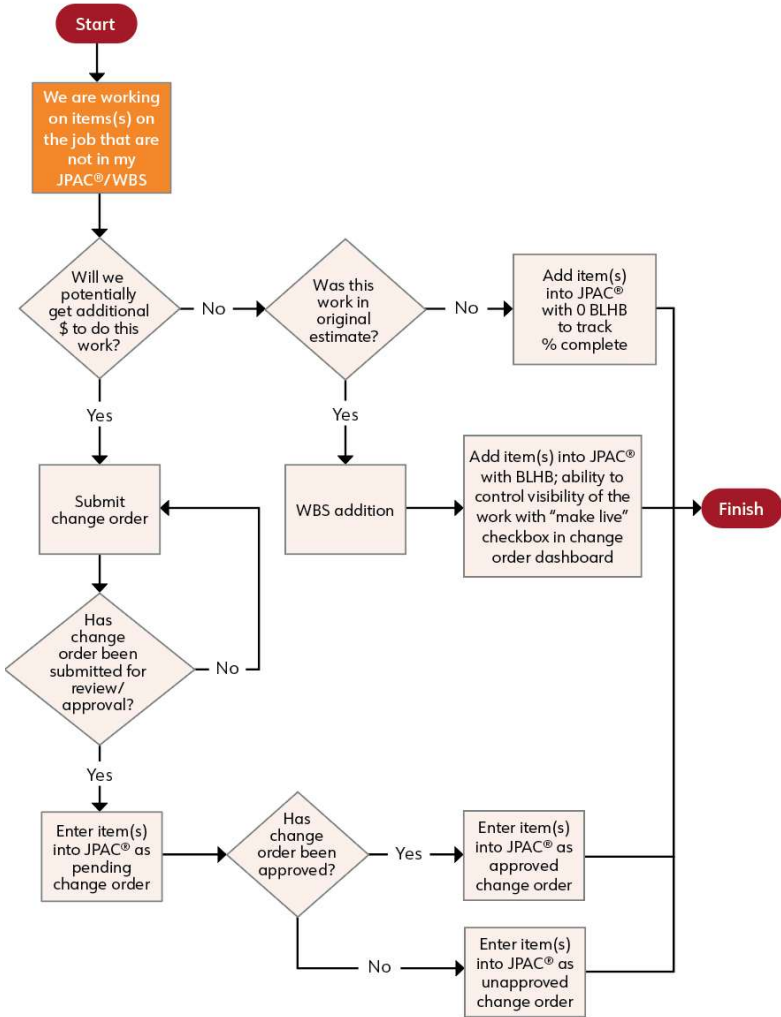
Industry-wide references can help with processing top-down change orders generated by the owner, architect, or engineer that will have an impact on construction.⁷ However, the only reference for consistent measurement of bottom-up changes of all elements of the construction energy is ASTM E2691. Each contractor must track, measure, and report on these, and the parties often go back to their street bartering roots.

When a change occurs on a project, it must be recognized immediately. Many contracts require change notices to be given to the GC within a week or less.

Change order recognition in the field is often challenging; the trades don't always see the impact of changes on labor power, money, and material. To the field, it can seem inconsequential to move a worker to another area to get something done or order a few more couplings to accommodate the extra pipe run. But it is challenging to ensure that the labor, most critically the field supervisors, recognize that this is different than the plan.

Therefore, recognizing and reporting work changes through a WBS is the best way to gain early insight into a potential change that must be translated to labor power, money, and material by them, their field supervisor, or PM. Not all WBS changes result in change orders; however, almost all change orders result in WBS changes (see Exhibit 4).

Exhibit 4: JPAC® Changes Decision Process



Because change is constant on jobsites, the discipline to manage the volume of changes is a significant challenge. Recognizing and capturing changes in the moment is very difficult, all while the project team is just trying to get the base contract work done.

Conclusion

The transfer of work to money is a closed-loop system best explained by the construction energy equation. The work done and time spent to do it will be paid to the skilled trades no matter what, but there is a finite sum of payment for that work. The effectiveness of how value is transferred from the skilled trade to the end user can be maximized with productivity.

To understand productivity losses, a feedback loop and correct measurement of losses is needed. This concept is embodied in the spirit of the FASB's Accounting Standards Codification Topic 606, with identification and progress measurement of performance obligations that transfer value to the customer and can therefore be used by the contractor to recognize revenue.⁸ Rather than paying to spend time or money, customers want to pay for work that is completed correctly.

Just like the chicken and egg, work and money are always linked in construction; but the question remains: which comes first? CFPs must have information about both to manage them effectively.

Endnotes

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