



مدیریت مالی، حسابداری و هزینه در پروژه ها و سازمان های پروژه محور

بخش یازدهم:

مدیریت مالی: آنالیز گزارشات مالی در سازمان پروژه محور

ارائه دهنده:

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What you will learn?

- ☐ Introduction to financial analysis
- ☐ Financial ratios
- ☐ Quick ratio
- ☐ Current ratio
- ☐ Current liabilities to net worth ratio
- ☐ Debt to equity ratio
- ☐ Fixed assets to net worth ratio
- ☐ Current assets to total assets ratio
- ☐ Collection period
- ☐ Receivable period
- ☐ Receivable turns (turnover)
- ☐ Average age of accounts payable
- ☐ Payable turns
- ☐ Assets to revenues ratio

What you will learn?

- ☐ Working capital turns
- ☐ Accounts payable to revenues ratio
- ☐ Gross profit margin
- ☐ Return on assets
- ☐ General overhead ratio
- ☐ Profit margin
- ☐ Return on assets
- ☐ Return on equity
- ☐ Degree of fixed asset newness
- ☐ Month in backlog

Purposes of the this session

- ☐ Learn to **use financial ratios** to **analyze** a company's financial statements
- ☐ Learn to **compare** the company's ratios to **industrial averages**
- ☐ Learn **recommended target ratios** for the **construction industry**

Introduction to financial analysis

❑ Why financial analysis is important?

- ❖ Because it **helps** the **financial manager** identify **problems** before they become a **crisis**.
 - ✓ **Life threatening** to the company
 - Such as **realizing** that the company will **not** be **able** to **pay its bills** in the upcoming months
 - ✓ **Simple planning issues**
 - Such as **identifying** that the **company's equipment** is **aging** and that **funds** need to be **set aside** to **replace** this **equipment** in the **next few years**

Introduction to financial analysis

- ❑ The **most common tools** used to **track** and **measure** a **company's financial health**:
 1. The company's **balance sheet**
 2. The **income statement**
- ❑ The **financial health** of a company is **determined** by:
 1. **Values** shown on the **financial statements**
 2. The **relationships** among these **values**
 - ❖ These relationships are known as **financial ratios**.
 - ❖ These ratios can provide **insights** into a **company's ability** to:
 - ✓ Pay bills,
 - ✓ How efficiently it uses its financial resources,
 - ✓ Profitability, and
 - ✓ The capital structure of the company.
 - ✓ Etc.

Introduction to financial analysis

❑ **Good project financial management** includes:

1. **Monitoring** the **critical financial ratios**
2. **Comparing** them to **other companies** in the **industry**

Financial ratios

- ❑ When calculating ratios that include **categories** on the income statement and **categories** on the balance sheet:
 - ❖ Use the **average balance** for the **categories** from the balance sheet **rather than** the **ending balance**.
 - ✓ This is **necessary** because the income statement represents **all transactions** between **two points in time**, whereas the **balance sheet** represents the **separate points** in time.
 - ✓ The most common method of obtaining the **average balance** for a **category** on the **balance sheet** is to use the **average** of the **balance before** and **after** the **period covered** by the **income statement**.

Financial ratios

❑ **Financial ratios are affected by:**

1. Method of depreciation
2. Retainage
3. Timing of financial statements

Financial ratios

❑ Financial ratios are affected by:

1. Method of depreciation

- ❖ For example, small company that **purchases only one piece** of depreciable equipment for \$300,000. The purchase takes place during the **eighth month of the 2010 tax year** and the company pays cash for the equipment. By using the governmental standard deduction, the company **depreciates \$250,000 of the cost of the equipment**, or **83% of the purchase price**, in 2010.
- ❖ The **actual depreciation** of the equipment is closer to **10% for this four-month period (\$30,000)**.
- ❖ If the company were to **use the depreciation calculated for tax purposes**, the depreciation on the income statement would be **overstated by about \$220,000**, whereas the **net fixed assets, total assets, and owner's equity would be understated by about \$220,000**. For a small company, this would be a **significant change** in its financial statements.

Financial ratios

❑ Financial ratios are affected by:

2. Retainage

❖ *The timing when the **retainage paid** changes the financial ratios **suddenly***

Financial ratios

❑ Financial ratios are affected by:

3. Timing of financial statements

❑ Sometimes the amounts **reported** on the **balance sheet** at the **beginning and ending of the year** are **not representative** of the **average balance** for the year.

❖ This is the case for **excavation** companies whose **fiscal year** is the **same as the calendar year** and who **shut down** for the **winter months** because of **poor working conditions**.

✓ While the company is **shut down**, its **accounts receivable** and **accounts payable** are **significantly lower** than they were during the **construction season**, as are many **other accounts** on the balance sheet.

Financial ratios

❑ Financial ratios are affected by:

3. Timing of financial statements

- To **get a more accurate picture** of the company's financial health, one should use the **average monthly balance** for the accounts.

Quick ratio (نسبت آنی)

- ❑ Ability to **pay current (short-term) liabilities** with **cash** or other **near cash assets**, assets that can **quickly** be **turned** into **cash**.

$$\text{❖ Quick Ratio (acid test ratio)} = \frac{\text{Cash} + \text{Accounts Receivable}}{\text{Current Liabilities}}$$

- ❑ **Accounts receivable** in the form of:

1. Retention
2. Unlikely to be collected (مطالبات مشکوک الوصول)

should **not be included** in the **accounts receivable**.

- ❖ Because often **retention cannot** be converted to **cash quickly**.
- ❖ **Unlikely to be collected?** Often **recorded** as an **allowance for bad debt**.

Quick ratio (نسبت آنی)

$$\text{Quick Ratio (acid test ration)} = \frac{(\text{Cash} + \text{Accounts Receivable})}{\text{Current Liabilities}}$$

❑ ***Below 1.00 === More risk and more profit for shareholders.***

1. Need to convert **inventory**, **notes receivable**, other **current** or **long-term assets** to **cash** or **raise cash** through **debt** or
2. **Equity financing** to pay its **current liabilities**.

❑ ***Greater than 1.50 === Less profit and less risk***

1. Company has **too much cash** and should be **investing** its **capital elsewhere** or
2. Should be **distributing** it to its **shareholders**.

❑ ***Greater than 1.00 === Ideal***

- ❖ **Does not guarantee** the company **can pay** its **current liabilities on time** because its **current liabilities** may **be due before** its **account receivable** are **received**.

Typical financial ratios for construction industry

- ❑ As the **ratios** are discussed, **typical ratios for construction companies** are provided.
 - ❖ These typical ratios are based on a **review of a number of data sources**.
- ❑ The **ratios** are **affected** by the **size** of the company and changes in the economy, which results in fluctuation from year to year.
 - ❖ For these reasons, when **comparing ratios to industrial averages**,
*companies should obtain **current data for their sector** of the construction industry, **size of company**, and **location**,*
rather than rely on the ratios presented in this book.

Typical financial ratios for construction industry

❑ Typical ratios for construction companies may be obtained from the following sources:

- *Almanac of Business & Industrial Financial Ratios*, which is published annually by CCH.
- *Annual Statement Studies: Financial Ratio Benchmarks*, which is published annually by the Risk Management Association (RMA).
- *Key Business Ratios on the Web (KBR)*, which is published by Dun & Bradstreet.
- Bizminer, which provides industry financial reports.

Typical financial ratios for construction industry

- ❑ This **data** is based on the data from financial statements for over 125,000 companies for the years 1996 through 2005 as reported by Dun & Bradstreet, Inc.
- ❑ Data is also **published** by the **Risk Management Association**, Standard and Poor's, **Robert Morris Associates**, and **others**.
- ❑ The data reported includes a typical median and a typical range for the years studied.
 - ❖ The median is the point where **50% of the companies** are **above** the median and **50%** are **below** the **median**, which should not be confused with the **average** or **mean**.
 - ❖ The typical range is based on the **upper** and **lower** quartiles and represents the range of values into which 50% of the construction companies fall, with 25% of the companies performing **above** and 25% performing **below** the **range**.

Typical quick ratios for construction industry

Typical Quick Ratios

Industry Sector	Median	Range
Single-Family Residential	0.9	1.9-0.3
Commercial	1.2	1.9-0.6
Heavy and Highway	1.2	2.0-0.7
Specialty Trades	1.4	2.4-0.8

Quick ratio – Example

	Current Year	Last Year			
ASSETS			LIABILITIES		
CURRENT ASSETS			Current Liabilities		
Cash	200,492	144,254	Accounts Payable-Trade	325,458	228,585
Accounts Receivable-Trade	402,854	308,253	Accounts Payable-Retention	22,546	18,254
Accounts Receivable-Retention	25,365	21,885	Billings in Excess of Costs and Profits	5,218	11,562
Inventory	0	0	Notes Payable	15,514	45,250
Costs and Profits in Excess of Billings	32,586	15,234	Accrued Payables	15,648	16,658
Notes Receivable	12,548	0	Accrued Taxes	10,521	8,254
Prepaid Expenses	5,621	4,825	Accrued Vacation	3,564	3,002
Other Current Assets	11,254	7,225	Capital Lease Payable	0	0
Total Current Assets	690,720	501,676	Warranty Reserves	0	0
			Other Current Liabilities	25,438	35,648
			Total Current Liabilities	423,907	367,213
			Long-Term Liabilities	153,215	99,073
			Total Liabilities	577,122	466,286

Solution:

Quick Ratio = $(\$200,492 + \$402,854) / \$423,907 = 1.42 > 1.2$ and between 0.6 and 1.9

- ☐ The quick ratio is slightly higher than the median for a commercial construction company but well within the typical range.
- ☐ Because the quick ratio is **less than 1.50**, it does **not appear** that the company has **too much cash or near cash assets**.

Current ratio (نسبت جاری)

- ❑ Ability to **use current assets** to **pay** for **current liabilities**
 - ❖ $\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$
- ❑ **Above 2.50 === Too much current assets === Less profit === Less risk**
 - ❖ A strong indication that a company is able to pay current liabilities.
 - ✓ Company should possibly be investing its assets in other long-term ventures
 - ✓ Distributing them to its shareholders.
- ❑ **2.00 === Ideal**
 - ❖ A strong indication that a company is able to pay current liabilities.
- ❑ **Between 1.35 to 1.6 === At least the company should maintain this ratio**
 - ❖ Recommended by Financial Management Association
- ❑ **Below 1.50 === May be problematic**
 - ❖ Company is undercapitalized and may run into financial problems during the next year.
- ❑ **Below 1.00 === Problematic**
 - ❖ It is an indication that the company does not expect to receive enough revenue over the next year to pay its current liabilities. To pay these liabilities the company needs to:
 - ❖ Sell long-term assets or raise cash through debt or equity financing.

Typical current ratios for construction industry

Typical Current Ratios

Industry Sector	Median	Range
Single-Family Residential	1.5	3.0-1.1
Commercial	1.5	2.8-1.2
Heavy and Highway	1.7	2.8-1.2
Specialty Trades	1.9	3.3-1.3

Current ratio – Example

Example: Determine the **current ratio** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

	Current Year	Last Year			
ASSETS			LIABILITIES		
CURRENT ASSETS			Current Liabilities		
Cash	200,492	144,254	Accounts Payable-Trade	325,458	228,585
Accounts Receivable-Trade	402,854	308,253	Accounts Payable-Retention	22,546	18,254
Accounts Receivable-Retention	25,365	21,885	Billings in Excess of Costs and Profits	5,218	11,562
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Prepaid Expenses	5,621	4,825	Accrued Vacation	3,564	3,002
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Total Current Assets	690,720	501,676	Warranty Reserves	0	0
			Other Current Liabilities	25,438	35,648
			Total Current Liabilities	423,907	367,213
			Long-Term Liabilities	153,215	99,073
			Total Liabilities	577,122	466,286

Solution:

Current Ratio = $\$690,720 / \$423,907 = 1.63 > 1.5$ and between 1.2 and 2.8

The current ratio is slightly higher than the median for a commercial construction company but well within the typical range. Because the current ratio is **greater than 1.00**, it **appears** that the company **will meet its short-term cash needs** and because the current ratio is **less than 2.50**, it does **not appear** that the company has **too much of its assets** tied up in **current assets**.

Current liabilities to net worth ratio (بدهی جاری به ارزش ویژه یا خالص)

❑ The current liabilities to net worth ratio is a **measurement of the risk** that **short-term creditors** are **taking** by **extending credit** to the company **compared** to the **risk** the **company's owners** are **taking** in the **company**.

❖ **Long-term liabilities** are not **included**

○ **Short-term creditors** include **suppliers** and **subcontractors** who provide **materials, labor, and equipment** on **credit**.

❑ $CL \text{ to } NW = \frac{\text{Current Liabilities}}{\text{Net Worth}}$

Current liabilities to net worth ratio (بدهی جاری به ارزش ویژه یا خالص)

$$\square CL \text{ to } NW = \frac{\text{Current Liabilities}}{\text{Net Worth}}$$

- ❖ For example, in the case of a construction company with **current liabilities greater** than the **company's net worth** or **equity**,
the **short-term creditors** would have **more capital at risk** than the owners.
- ❖ **Ideal** is to **not exceeding** over **67%** for **most industries**, but:
 - ✓ **Construction industry** exceeds this because of **heavy reliance** on **trade financing** from **suppliers** and **subcontractors**.

Typical CL to NW ratios for construction industry

Typical Current Liabilities to Net Worth Ratios (percentages)

Industry Sector	Median	Range
Single-Family Residential	98	33-257
Commercial	123	38-259
Heavy and Highway	67	30-134
Specialty Trades	72	31-156

CL to NW ratio – Example

Example: Determine the **CL to NW** ratio for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

LIABILITIES

Current Liabilities		
Accounts Payable-Trade	325,458	228,585
Accounts Payable-Retention	22,546	18,254
Billings in Excess of Costs and Profits	5,218	11,562
Notes Payable	15,514	45,250
Accrued Payables	15,648	16,658
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Capital Lease Payable	0	0
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Other Current Liabilities	25,438	35,648
Total Current Liabilities	423,907	367,213
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Total Liabilities	577,122	466,286

OWNER'S EQUITY

Capital Stock	10,000	10,000
Retained Earnings	436,917	358,904
Current Period Net Income	0	0
Total Equity	446,917	368,904
Total Liabilities and Equity	1,024,039	835,190

Solution:

CL to NW Ratio = $\$423,907 / \$446,917 = 95\% < 123\%$ and between 38% and 259%

The current liabilities to net worth ratio is slightly less than the median for a commercial construction company but well within the typical range. Because the ratio is **less than 100%**, the **short-term creditors do not have more capital at risk** than the owners of the construction company, which is a **good position to be in**.

Debt to equity ratio (نسبت بدهی کل به ارزش ویژه یا خالص)

❑ The **debt to equity** ratio is a **measurement** of the **risk** in the company **all creditors** are taking compared to the **risk** the **company's owners** are taking.

❑ $Debt\ to\ Equity = \frac{Total\ Liabilities}{Net\ Worth}$

❖ **Less than 1: Company is reluctant to debt financing:**

✓ The company is **not using debt** to **expand** the business.

❖ **Less than 2: Desired ratio**

❖ **More than 2: Care should be taken**

✓ One begins to **question** whether the **company can service its debt**, particularly during a **downturn** in the industry.

❖ **Less than 3: At least**

✓ **Recommended** by **Financial Management Association**

Typical debt to equity ratios for construction industry

Typical Debt to Equity Ratios

Industry Sector	Median	Range
Single-Family Residential	1.3	0.5–3.2
Commercial	1.4	0.5–2.8
Heavy and Highway	1.0	0.4–2.0
Specialty Trades	0.9	0.4–2.0

Debt to equity ratio – Example

Example: Determine the **debt to equity ratio** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

LIABILITIES

Current Liabilities		
Accounts Payable-Trade	325,458	228,585
Accounts Payable-Retention	22,546	18,254
Billings in Excess of Costs and Profits	5,218	11,562
Notes Payable	15,514	45,250
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Retained Earnings	436,917	358,904
Current Period Net Income	0	0
Total Equity	446,917	368,904
Total Liabilities and Equity	1,024,039	835,190

Solution:

Debt to equity Ratio = $\$577,122 / \$446,917 = 1.29 < 1.4$ and between 0.5 and 2.8

The debt to equity ratio is slightly below the median for a commercial construction company. Because the ratio is **less than 2**, it appears that the company **will be able to service its debt**.

If needed, may be **able to obtain additional financing** through debt.

Fixed assets to net worth ratio (دارایی ثابت به ارزش ویژه یا خالص)

- ❑ Measurement of the **amount of the owner's equity** of construction company that is **tied up** in **fixed assets**, such as construction **equipment**, **buildings**, and **vehicles**.
- ❑
$$\text{Fixed Assets to Net Worth} = \frac{\text{Net Fixed Assets}}{\text{Net Worth}}$$
 - ❖ A **high number** indicates a company has a **heavy investment** in **fixed assets**.
 - ❖ **Fixed assets** require a **constant stream of income** to **offset** their **loss in value** (depreciation).
 - ❖ Construction companies that have **significant investment** in construction **equipment** are **more dependent** on maintaining a **constant flow of work** than those companies that have little invested in construction equipment.
 - ✓ Example: **heavy and highway sectors**
 - They have the **highest fixed assets to net worth ratios**, nearly double the next closest sector.
 - During a **downturn** in the industry, companies with a **large investment** in **construction equipment** usually **suffer** the **most**.

Typical fixed assets to net worth ratios for construction industry

Typical Fixed Assets to Net Worth Ratios
(percentages)

Industry Sector	Median	Range
Single-Family Residential	36	13-64
Commercial	23	8-60
Heavy and Highway	65	35-111
Specialty Trades	33	16-68

Fixed assets to net worth ratio – Example

Example: Determine the **fixed assets to net worth** ratio for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

FIXED AND OTHER ASSETS

Land	72,000	72,000
Buildings	103,862	103,862
Construction Equipment	95,284	95,284
Trucks and Autos	51,245	31,556
Office Equipment	56,896	42,546
Total Fixed Assets	379,287	345,248
Less Acc. Depreciation	224,512	182,990
Net Fixed Assets	154,775	162,258
Other Assets	178,544	171,256
Total Assets	1,024,039	835,190

OWNER'S EQUITY

Capital Stock	10,000	10,000
Retained Earnings	436,917	358,904
Current Period Net Income	0	0
Total Equity	446,917	368,904
Total Liabilities and Equity	1,024,039	835,190

Solution:

Fixed assets to net worth Ratio = $\$154,775 / \$446,917 = 35\% > 23\%$ and between 8 and 60%

The fixed assets to net worth ratio is higher than the median for a commercial construction company but well within the typical range.

Because the ratio is **largely greater than the median**, the company has **more fixed assets than the average company** and therefore is **more dependent on maintaining a steady stream of work** to pay for these fixed assets.

Current assets to total assets ratio (دارایی جاری به دارایی کل)

- ❑ Measurement of **how liquid** a construction **company's** assets are.
- ❑
$$\text{Current Assets to Total Assets} = \frac{\text{Current Assets}}{\text{Total Assets}}$$
- ❖ A company with a **high ratio** would have **most** of its **assets** in the **form** of **current assets** and would be **very liquid**.
- ❖ A company with a **low ratio** would have **most** of its **assets** tied up in **long-term assets**, such as **fixed** and **other assets**.
- ❖ **Remembering** that **fixed assets** require a **constant stream of income** to **offset** their **loss in value (depreciation)**.
 - ✓ Construction companies that have **significant investments** in construction **equipment** are **more dependent** on maintaining a **constant flow of work**.
 - ✓ During a **downturn** in the industry, companies with a **large investment** in construction equipment usually **suffer** the **most**.

Typical current assets to total assets ratios for construction industry

- ❑ $\text{Current Assets to Total Assets} = \frac{\text{Current Assets}}{\text{Total Assets}}$
- ❑ Single-family residential, commercial, and most specialty trades ===== Between 0.70 and 0.80.
- ❑ For equipment intensive areas ===== Between 0.55 and 0.65
 - ❖ Because of **their large investment** in equipment.
- ❑ Notable **exceptions** from the specialties trades are:
 - ❖ Concrete work with an average of 0.61
 - ❖ Wrecking and demolition with an average of 0.55
 - ❖ Excavation with an average of 0.46

Current assets to total assets ratio – Example

Example: Determine the **current assets to total assets ratio** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

FIXED AND OTHER ASSETS

Land	72,000	72,000
Buildings	103,862	103,862
Construction Equipment	95,284	95,284
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Total Fixed Assets	379,287	345,248
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Net Fixed Assets	154,775	162,258
Other Assets	178,544	171,256
Total Assets	1,024,039	835,190

ASSETS

CURRENT ASSETS

Cash	200,492	144,254
Accounts Receivable-Trade	402,854	308,253
Accounts Receivable-Retention	25,365	21,885
Inventory	0	0
Costs and Profits in Excess of Billings	32,586	15,234
Notes Receivable	12,548	0
Prepaid Expenses	5,621	4,825
Other Current Assets	11,254	7,225
Total Current Assets	690,720	501,676

Solution:

Current assets to total assets Ratio = $\$690,720 / \$1,024,039 = 0.67$

The current assets to total assets ratio is **slightly outside and below** the range for a commercial construction company (0.7 and 0.8). This indicates that the company **has a heavier investment** in fixed assets **than most commercial construction companies**.

Collection period (متوسط دوره وصول مطالبات)

1. Measurement of the **average time** it **takes** a company to **collect** its **accounts receivable**.

- ❖ **Exclude accounts receivable-retention**

- ✓ Retention held is **recorded** as an **accounts receivable** when the work is **completed** but will **not be available** for **release** until the project is **completed**.

2. Measurement of **how long** the **company's capital** is being used to **finance client's construction projects**.

- ❖ **Include accounts receivable-retention**

- ✓ Because **retention** is a **source of capital** to the **project's owner**

❑
$$\text{Collection Period} = \frac{\text{Accounts Receivable} \times 365}{\text{Revenues}}$$

- ❑ When a company has **met the requirement** for receipt of the **retention**, the retention should be **moved** to the **accounts receivable trade account**, thus reflecting that the **retention is now collectable**.

Collection period

$$\square \text{ Collection Period} = \frac{\text{Accounts Receivable} \times 365}{\text{Revenues}}$$

- ❖ A company's collection period **should** be **less** than **45 days**.
 - ✓ A collection period of **more** than **45 days** indicates that:
 1. The company has **poor collection policies** or
 2. The company has **extended generous payment terms** to its clients.
- ❖ For a company whose **clients do not hold retention**, this time should be **reduced** to **30 days**.

Collection period

❑ Reducing the collection period:

1. **Reduces** a **company's need** for **cash** and
2. **May reduce** the **company's need** for **debt** and the **interest charges**

❑ Generous payment terms and slow collections often:

- ❖ **Increase** a company's **reliance on debt**
- ❖ **Its interest expenses** and thereby **reduces** its **profitability**.

Typical collected period for construction industry

Typical Collection Period (days)

Industry Sector	Median	Range
Single-Family Residential	24	8-48
Commercial	48	23-75
Heavy and Highway	51	32-73
Specialty Trades	52	33-74

Receivable turns (تعداد دفعات وصول مطالبات)

❑ A **closely related ratio** is the **receivable turns**. The receivable turns represent the **number of times** the **receivables** are **turned over** during a **year**.

❖ $\text{Receivable Turns} = 365 / \text{Collection Period}$

Collection period and receivable turns – Example

Example: Determine the **collection period with and without retention**, and **receivable turns** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

	Current Year	Last Year		
ASSETS				
CURRENT ASSETS			BIG W CONSTRUCTION	
Cash	200,492	144,254	INCOME STATEMENT	
Accounts Receivable-Trade	402,854	308,253		
Accounts Receivable-Retention	25,365	21,885	REVENUES	3,698,945 100.0%
Inventory	0	0		
Costs and Profits in Excess of Billings	32,586	15,234		
Notes Receivable	12,548	0		
Prepaid Expenses	5,621	4,825		
Other Current Assets	11,254	7,225		
Total Current Assets	690,720	501,676		

Solution:

Because we are **comparing** the value of accounts on the **balance sheet** to an account on the **income statement**, we need to use the **average of the beginning and ending balance** for the accounts on the **balance sheet**. Including retention, the average for the accounts receivable is calculated as follows:

$$\text{Accounts Receivable} = ((\$402,854 + \$25,365) + (\$308,253 + \$21,885)) / 2 = \$379,178$$

$$\text{Collection Period} = \$379,178 * 365 / \$3,698,945 = 37.4 \text{ days} < 48 < 45 \text{ (23-75)}$$

$$\text{Receivable Turns} = 365 / 37.4 = 9.8$$

Collection period and receivable turns – Example

Example: Determine the **collection period with and without retention**, and **receivable turns** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

	Current Year	Last Year		
ASSETS				
CURRENT ASSETS			BIG W CONSTRUCTION	
Cash	200,492	144,254	INCOME STATEMENT	
Accounts Receivable-Trade	402,854	308,253		
Accounts Receivable-Retention	25,365	21,885	REVENUES	3,698,945 100.0%
Inventory	0	0		
Costs and Profits in Excess of Billings	32,586	15,234		
Notes Receivable	12,548	0		
Prepaid Expenses	5,621	4,825		
Other Current Assets	11,254	7,225		
Total Current Assets	690,720	501,676		

Excluding retention, the average for the accounts receivable is calculated as follows:

$$\text{Accounts Receivable} = (\$402,854 + \$308,253) / 2 = \$355,554$$

$$\text{Collection Period} = \$355,554 * 365 / \$3,698,945 = 35.1 \text{ days} < 48 < 45 \text{ (23-75)}$$

$$\text{Receivable Turns} = 365 / 35.1 = 10.4$$

The collection period is **better** than the **median** for a commercial construction company and is **within the typical range**. It is also below the recommended 45 days. On average, the company is **funding** the construction costs to the **client** for **37.4 days**. On average, it **takes** the company **35 days** to **collect** the **payment** on a **bill** sent to a **client**.

Average age of accounts payable (متوسط دوره پرداخت بدهیها)

- ❑ Represents the **average time** it takes a company to **pay its bills** and is a measure of **how extensively** a company is using **trade financing** (suppliers and subcontractors).
- ❑ The average accounts age of accounts payable is the average **amount of accounts payable divided** by the **total of the invoices** that **pass through** the accounts payable for the **period**.

$$\diamond AA \text{ of } AP = \frac{\text{Accounts Payable} \times 365}{(\text{Materials} + \text{Subcontract})}$$

- ✓ **Retention** included in **Accounts Payable**

Average age of accounts payable (متوسط دوره پرداخت بدهیها)

□ $AA\ of\ AP = \frac{Accounts\ Payable \times 365}{(Materials + Subcontract)}$

- ❖ Assumes the **bulk** of the **invoices** that pass through the **accounts payable** are **material** and **subcontract** construction costs.
- ❖ When a **significant amount** of **invoices** for **equipment**, **other construction costs** (project overhead), or **general overhead** pass through the **accounts payable**:
 - ✓ To get a **realistic measure** of the average age of **accounts payable**, a company may need to **increase** the **materials** and **subcontract amount** by the **estimated amount** of **invoices** from **equipment**, **other construction costs** (project overhead), and **general overhead** that **pass through the accounts payable account**.
 - They should be **included in the dominator** **because** they already **included in Accounts Payable**.

Typical Average age of accounts payable for construction industry

❑ Greater than 45 days:

1. The construction company is **slow to pay its bills** and
2. May receive **less favorable credit terms** and **pricing** from **its suppliers** and **subcontractors**.

❑ 45 days

❖ **Ideal**

❑ Shorter than 20 days

❖ Unless a construction company is **taking advantage** of **trade discounts**:

✓ It **may** be an indication that a company is **underutilizing trade financing**.

Typical Average age of accounts payable for construction industry

❑ Greater than the collection period calculated with retention:

- ❖ The construction company is **using** its **suppliers and subcontractors** to **fund** the **construction work**.

❑ Much greater than the collection period calculated with retention :

- ❖ The construction company is **withholding payments** from its **suppliers and subcontractors**, **even** after it has **received payment** for the work.

❑ Less than the collection period calculated with retention :

- ❖ The construction company is in the **habit** of **using** its **working capital** to **pay bills** before it has **received payment** from the **owner**.

Payable turns (تعداد دفعات پرداخت بدهیها)

- ☐ A closely related ratio is the payable turns. The payable turns represent the **number of times** the payables are **turned over** during **a year**.
- ☐ $\text{Payable Turns} = 365 / \text{Average Age of Accounts Payable}$

Average age of accounts payable and payable turns – Example

Example: Determine the **average age of accounts payable and payable turns** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

LIABILITIES

Current Liabilities

Accounts Payable-Trade	325,458	228,585
Accounts Payable-Retention	22,546	18,254
Billings in Excess of Costs and Profits	5,218	11,562
Notes Payable	15,514	45,250
Accrued Payables	15,648	16,658
Accrued Taxes	10,521	8,254
Accrued Vacation	3,564	3,002
Capital Lease Payable	0	0
Warranty Reserves	0	0
Other Current Liabilities	25,438	35,648
Total Current Liabilities	423,907	367,213
Long-Term Liabilities	153,215	99,073
Total Liabilities	577,122	466,286

CONSTRUCTION COSTS

Materials	712,564	19.3%
Labor	896,514	24.2%
Subcontract	1,452,352	39.3%
Equipment	119,575	3.2%
Other	5,452	0.1%
Total Construction Costs	3,186,457	86.1%

EQUIPMENT COSTS

Rent and Lease Payments	35,425	1.0%
Depreciation	32,397	0.9%
Repairs and Maintenance	21,254	0.6%
Fuel and Lubrication	29,245	0.8%
Taxes, Licenses, and Insurance	1,254	0.0%
Equipment Costs Charged to Jobs	119,575	3.2%
Equipment Costs Charged to Employees	0	0.0%
Total Equipment Costs	0	0.0%

Solution:

Because we are **comparing** the value of accounts on the **balance sheet** to an account on the **income statement**, we need to use the **average** of the beginning and ending balance for the accounts on the balance sheet. **Including retention:**

$$\text{Accounts Payable} = ((\$325,458 + \$22,546) + (\$228,585 + \$18,254)) / 2 = \$297,442$$

$$\text{Average Age of Accounts Payable} = \$297,422 * 365 / (\$712,564 + \$1,452,352) = 50.1$$

$$\text{Payable Turns} = 365 / 50.1 = 7.3$$

Average age of accounts payable and payable turns – Example

Example: Determine the **average age of accounts payable and payable turns** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

Conclusion:

- ❑ AA of AP is **greater than 45 days** === the company is **slow to pay its bills**.
- ❑ AA of AP is **15 days greater than its collection period—with retention included** === the construction company is **withholding payments** from its suppliers and subcontractors **even after the project's owner has paid** them for the work.
- ❑ It is likely that **AA of AP is overstated** because the **accounts receivable includes bills other than material and subcontractor construction costs**.
- ❖ **Repairs and Maintenance + Fuel and Lubrication** === **AA of AP drops to 49 days**

Assets to revenues ratio (دارایی کل به درآمد)

- ❑ Measurement of **how efficiently** the company is **using its assets**
- ❑ Also know as the **assets to sales ratio**.
- ❑ *Assets to Revenues (assets to sale ratio) = $\frac{\text{Total Assets}}{\text{Revenues}}$*
- ❖ The recommended range for the ratio varies from industry to industry.

Typical Assets to revenues for construction industry

Typical Assets to Revenues Ratios
(percentages)

Industry Sector	Median	Range
Single-Family Residential	30	18-50
Commercial	30	20-55
Heavy and Highway	46	34-62
Specialty Trades	33	25-45

❑ Companies with assets to revenues ratios significantly lower than other companies:

- ❖ May be performing too much work for their assets
 - ✓ Which may be a sign of pending financial difficulties if left uncorrected.

❑ Companies with assets to revenues ratios significantly higher than other companies:

- ❖ Are underutilizing their assets and should consider taking on more work.

❑ Heavy and highway have a higher median assets to revenues ratio because of:

- ❖ Its extensive investment in construction equipment.

Assets to revenues – Example

Example: Determine the **assets to revenues ratio** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

Solution:

Because we are comparing the value of accounts on the balance sheet to an account on the income statement, we need to use the average of the beginning and ending balance for the accounts on the balance sheet.

$$\text{Total Assets} = (\$1,024,039 + \$835,190) / 2 = \$929,614$$

$$\text{Assets to Revenues} = \$929,614 / \$3,698,945 = 25\% < 30$$

The assets to revenues ratio is midway **between the lower and upper limit of the range (20-55)** for a commercial construction company. The assets to revenues ratio is **lower than expected** for a commercial contractor. The company may be **taking on too much work.**

	Current Year	Last Year
ASSETS		
CURRENT ASSETS		
Cash	200,492	144,254
Accounts Receivable-Trade	402,854	308,253
Accounts Receivable-Retention	25,365	21,885
Inventory	0	0
Costs and Profits in Excess of Billings	32,586	15,234
Notes Receivable	12,548	0
Prepaid Expenses	5,621	4,825
Other Current Assets	11,254	7,225
Total Current Assets	690,720	501,676
FIXED AND OTHER ASSETS		
Land	72,000	72,000
Buildings	103,862	103,862
Construction Equipment	95,284	95,284
Trucks and Autos	51,245	31,556
Office Equipment	56,896	42,546
Total Fixed Assets	379,287	345,248
Less Acc. Depreciation	224,512	182,990
Net Fixed Assets	154,775	162,258
Other Assets	178,544	171,256
Total Assets	1,024,039	835,190

BIG W CONSTRUCTION INCOME STATEMENT

REVENUES	3,698,945	100.0%
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Working capital turns (turnover) (گردش سرمایه جاری یا سرمایه در گردش)

❑ First we should know the term of **Working capital**:

- ❖ The **working capital** represents those **funds available** for **future operations** or
- ❖ For the **reduction** of **long-term liabilities**
 - ✓ $WC = \text{Current Assets} - \text{Current Liabilities}$

❑ Measurement of **how efficiently** a company is **using** its **working capital** or **how many dollars of revenue each dollar of working capital is generating**.

❖ $WCT \text{ (revenues to working capital ratio)} = \text{Revenues} / \text{Working Capital}$

- ✓ When a company **passes payments** on from the **owners to subcontractors**, working capital is **not used to pay subcontractors**:

$$o \quad WCT = \frac{(\text{Revenues} - \text{Subcontractor})}{\text{Working Capital}}$$

Working capital turns (turnover) (گردش سرمایه جاری یا سرمایه در گردش)

❑ A firm with a **high number** of turns is **undercapitalized**, therefore they need to:

❖ **Reduce** its level of sales or

❖ **Increase** the availability of working capital by:

❖ $WC = \text{Current Assets} - \text{Current Liabilities}$

1. **Increasing** its current assets or

2. **Reducing** its current liabilities

Typical working capital turns (turnover) for construction industry

- ❑ When a company **passes payments** on from the **owners to subcontractors**, and working capital is **not used to pay subcontractors**:

Typical Working Capital Turns

Industry Sector	Median	Range
Single-Family Residential	11.4	25-5.8
Commercial	12.0	23-5.1
Heavy and Highway	8.7	16-4.9
Specialty Trades	8.3	15-5.1

Working capital turns – Example

Example: Determine the **working capital turns** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

ASSETS			LIABILITIES		
CURRENT ASSETS			Current Liabilities		
Cash	200,492	144,254	Accounts Payable-Trade	325,458	228,585
Accounts Receivable-Trade	402,854	308,253	Accounts Payable-Retention	22,546	18,254
Accounts Receivable-Retention	25,365	21,885	Billings in Excess of Costs and Profits	5,218	11,562
Inventory	0	0	Notes Payable	15,514	45,250
Costs and Profits in Excess of Billings	32,586	15,234	Accrued Payables	15,648	16,658
Notes Receivable	12,548	0	Accrued Taxes	10,521	8,254
Prepaid Expenses	5,621	4,825	Accrued Vacation	3,564	3,002
Other Current Assets	11,254	7,225	Capital Lease Payable	0	0
Total Current Assets	690,720	501,676	Warranty Reserves	0	0
			Other Current Liabilities	25,438	35,648
			Total Current Liabilities	423,907	367,213
			Long-Term Liabilities	153,215	99,073
			Total Liabilities	577,122	466,286
REVENUES					
	3,698,945	100.0%			
CONSTRUCTION COSTS					
Materials	712,564	19.3%			
Labor	896,514	24.2%			
Subcontract	1,452,352	39.3%			
Equipment	119,575	3.2%			
Other	5,452	0.1%			
Total Construction Costs	3,186,457	86.1%			

Solution:

$$\text{Working Capital} = (\$690,720 + \$501,676) / 2 - (\$423,907 + \$367,213) / 2 = \$200,638$$

$$\text{Working Capital Turns} = (\$3,698,945 - \$1,452,352) / \$200,638 = 11.2 < 12$$

The working capital turns is **slightly less than expected**. The company should look at taking on more work or reducing their working capital.

Accounts payable to revenues ratio (حسابهای پرداختنی به درآمد)

- ❑ Measurement of **how much** a company is **using** its **suppliers and subcontractors** as a **source of funds**.
- ❑ $AP\ to\ R = Accounts\ Payable / Revenue$
 - ❖ **Includes** accounts **payable-retention**
 - ✓ Because **retention** held from a **supplier** or **subcontractor** is a **form** of **funding** to the **contractor**.
 - ❖ The **higher** the **percentage**, the **greater** the **funding** the company is receiving from its **suppliers** and **subcontractors**.

Typical accounts payable to revenues for construction industry

Typical Accounts Payable to Revenues
Ratios (percentages)

Industry Sector	Median	Range
Single-Family Residential	4.2	2.0–7.6
Commercial	8.2	3.1–13.3
Heavy and Highway	5.7	2.8–9.7
Specialty Trades	4.7	2.6–8.0

Accounts payable to revenues ratio – Example

Example: Determine the **accounts payable to revenues ratio** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

REVENUES			LIABILITIES		
	3,698,945	100.0%	Current Liabilities		
			Accounts Payable-Trade	325,458	228,585
			Accounts Payable-Retention	22,546	18,254
			Billings in Excess of Costs and Profits	5,218	11,562
			Notes Payable	15,514	45,250
			Accrued Payables	15,648	16,658
			Accrued Taxes	10,521	8,254
			Accrued Vacation	3,564	3,002
			Capital Lease Payable	0	0
			Warranty Reserves	0	0
			Other Current Liabilities	25,438	35,648
			Total Current Liabilities	423,907	367,213
			Long-Term Liabilities	153,215	99,073
			Total Liabilities	577,122	466,286
CONSTRUCTION COSTS					
Materials	712,564	19.3%			
Labor	896,514	24.2%			
Subcontract	1,452,352	39.3%			
Equipment	119,575	3.2%			
Other	5,452	0.1%			
Total Construction Costs	3,186,457	86.1%			

Solution:

Accounts Payable = $((\$325,458 + \$22,546) + (\$228,585 + \$18,254)) / 2 = \$297,422$

Accounts Payable to Revenues = $\$297,422 / \$3,698,945 = 0.080$ or 8.0% < 8.2 and between 3.1 and 13.3

The accounts payable to revenues ratio is **below the median** for a commercial contractor.
The company could be **making better use** of its suppliers and specialty contractors as a source of funding.

Gross profit margin (حاشیه سود ناخالص)

- ❑ Percentage of the revenues left after paying construction costs and equipment costs.
- ❑ Measure of what percentage of each dollar of revenue is available to cover general overhead expenses and provide the company with a profit.
- ❑ $Gross\ Profit\ Margin = Gross\ Profit / Revenue$

Typical gross profit margin for construction industry

Typical Gross Profit Margins (percentages)

Industry Sector	Median
Single-Family Residential	24
Commercial	18
Heavy and Highway	24
Specialty Trades	30

Gross profit margin – Example

Example: Determine the **gross profit margin** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

REVENUES	3,698,945	100.0%
CONSTRUCTION COSTS		
Materials	712,564	19.3%
Labor	896,514	24.2%
Subcontract	1,452,352	39.3%
Equipment	119,575	3.2%
Other	5,452	0.1%
Total Construction Costs	3,186,457	86.1%
EQUIPMENT COSTS		
Rent and Lease Payments	35,425	1.0%
Depreciation	32,397	0.9%
Repairs and Maintenance	21,254	0.6%
Fuel and Lubrication	29,245	0.8%
Taxes, Licenses, and Insurance	1,254	0.0%
Equipment Costs Charged to Jobs	119,575	3.2%
Equipment Costs Charged to Employees	0	0.0%
Total Equipment Costs	0	0.0%
GROSS PROFIT	512,488	13.9%

Solution:

Gross profit margin = $\$512,488 / \$3,698,945 = 13.9\%$

The company spent **86.1% of its revenues on construction costs** and retained **13.9% of its revenues** to cover **overhead expenses, pay taxes**, and provide a **profit for the company's shareholders**. The company's gross profit margin is less than the median (16%) for commercial construction companies. The company **needs to increase** its **profit and overhead markup** or exercise **better control** over its construction costs.

General overhead ratio (نسبت بالاسری سازمان)

- ❑ Percentage of the **revenues** used to **pay** the **general overhead** expense
- ❑
$$\text{General Overhead} = \frac{\text{General Overhead}}{\text{Revenue}}$$
- ❑ As a **rule of thumb**, the **general overhead ratio** for **commercial** construction companies should be **less than 10%**.
- ❑ The ratio for **single-family residential** construction companies would be **higher** when **sales commissions** are included in the **general overhead**.
- ❑ **Specialty contractors** have the **highest general overhead ratio**, with the median ranging from **20% to 24%**.
- ❑ For **residential and commercial contractors**, the median general overhead ratio is **about 11% to 14%**
- ❑ For **highway contractors**, the median ratio is **about 18%**.

General overhead ratio – Example

Example: Determine the **general overhead ratio** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

Solution:

General overhead ratio = $\$422,562 / \$3,698,945 = 11.4\%$

- ❑ The company spent **11.4% of its revenues** on general overhead, which is **in line with the expected value**.

REVENUES	3,698,945	100.0%
CONSTRUCTION COSTS		
Materials	712,564	19.3%
Labor	896,514	24.2%
Subcontract	1,452,352	39.3%
Equipment	119,575	3.2%
Other	5,452	0.1%
Total Construction Costs	3,186,457	86.1%
EQUIPMENT COSTS		
Rent and Lease Payments	35,425	1.0%
Depreciation	32,397	0.9%
Repairs and Maintenance	21,254	0.6%
Fuel and Lubrication	29,245	0.8%
Taxes, Licenses, and Insurance	1,254	0.0%
Equipment Costs Charged to Jobs	119,575	3.2%
Equipment Costs Charged to Employees	0	0.0%
Total Equipment Costs	0	0.0%
GROSS PROFIT	512,488	13.9%
OVERHEAD	422,562	11.4%

Profit margin (بازده فروش یا بازده درآمد)

❑ Also know as the **return on revenues** or **return on sales**.

❑ **Percentage of the revenues that becomes profit** and may be measured:

❖ Before income taxes

✓
$$\text{Pretax PM} = \frac{\text{Net Profit Before Taxes}}{\text{Revenues}}$$

- o Highway, residential, and specialty contractors: $4\% < \text{Ideal} < 6\%$
- o Commercial contractors: $2\% < \text{Ideal} < 3\%$

Profit margin (بازده فروش یا بازده درآمد)

- ❑ Also know as the **return on revenues** or **return on sales**.
- ❑ **Percentage of the revenues that becomes profit** and may be measured:

❖ After income taxes

$$✓ \text{ After-tax PM} = \frac{\text{Net Profit After Taxes}}{\text{Revenues}}$$

Typical After-Tax Profit Margins (percentages)

Industry Sector	Median	Range
Single-Family Residential	3.0	7.5–0.8
Commercial	1.9	8.1–0.5
Heavy and Highway	2.8	6.6–0.7
Specialty Trades	2.3	5.9–0.5

Profit margin – Example

Example: Determine the **pretax** and **after-tax profit margin** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

REVENUES	3,698,945	100.0%	PROFIT BEFORE TAXES	111,447	3.0%
			INCOME TAX	33,434	0.9%
			PROFIT AFTER TAXES	78,013	2.1%

Solution:

Pretax profit margin = $\$111,447 / \$3,698,945 = 3.0\%$

After-tax profit margin = $\$78,013 / \$3,698,945 = 2.1\%$

The pretax and after-tax profit margin for the company **are in line** with the expected value.

The company **may need** to **work** on its **profitability**. This may be done by **cutting costs** or **increasing** the **profit** and **overhead markup**.

Return on assets (بازده دارایی)

❑ Measurement of **how efficiently** a construction company is **using** its **assets** and often expressed as a percentage.

❑ $\text{Return on Assets} = \frac{\text{Net Profit After Taxes}}{\text{Total Assets}}$

❖ **Efficiently** run companies will have a **high return on assets**, whereas companies that are **poorly** run will have a **low return on assets**.

Typical Return on Assets Ratios (percentages)

Industry Sector	Median	Range
Single-Family Residential	8.2	22-2.1
Commercial	5.6	21-1.5
Heavy and Highway	5.8	14-1.5
Specialty Trades	6.5	17-1.4

Return on assets – Example

Example: Determine the **return on assets** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

PROFIT AFTER TAXES 78,013 2.1%

FIXED AND OTHER ASSETS

Land	72,000	72,000
Buildings	103,862	103,862
Construction Equipment	95,284	95,284
Trucks and Autos	51,245	31,556
Office Equipment	56,896	42,546
Total Fixed Assets	379,287	345,248
Less Acc. Depreciation	224,512	182,990
Net Fixed Assets	154,775	162,258
Other Assets	178,544	171,256
Total Assets	1,024,039	835,190

Solution:

Total Assets = $(\$1,024,039 + \$835,190) / 2 = \$929,614$

Return on Assets = $\$78,013 / 929,614 = 8.4\%$

The return on assets for the company is **better** than the **median (5.6%)** for a commercial construction company but well below the upper end of the range. **Improvement** in the **after-tax profit margin** will help increase this percentage.



Return on equity (بازده سرمایه گذاری)

- ❑ It is also known as **return on investment**.
- ❑ Return the company's shareholders received on their invested capital.
 - ❖ $\text{Pretax ROE} = \frac{\text{Net Profit Before Taxes}}{\text{Equity}}$
 - ✓ **Highway contractors:** Ideal is >15%
 - ✓ **Commercial and specialty contractors:** Ideal is >20%
 - ✓ **Residential contractors:** Ideal is >30%

Return on equity (بازده سرمایه گذاری)

- ❑ It is also known as **return on investment**.
- ❑ Return the company's shareholders received on their invested capital.
 - ❖ *After-tax ROE = $\frac{\text{Net Profit After Taxes}}{\text{Equity}}$*

Typical Return on Equity (percentages)

Industry Sector	Median	Range
Single-Family Residential	24.7	60-7.4
Commercial	15.1	53-4.2
Heavy and Highway	12.8	29-3.5
Specialty Trades	14.3	37-3.6

After-tax ROE

Return on equity – Example

Example: Determine the pretax return on equity and after-tax return on equity for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

PROFIT AFTER TAXES 78,013 2.1%

OWNER'S EQUITY

Capital Stock	10,000	10,000
Retained Earnings	436,917	358,904
Current Period Net Income	0	0
Total Equity	446,917	368,904
Total Liabilities and Equity	1,024,039	835,190

Solution:

$$\text{Equity} = (\$446,917 + \$368,904) / 2 = \$407,910$$

$$\text{Before-Tax Return on Equity} = \$111,447 / \$407,910 = 27.3\%$$

$$\text{After-Tax Return on Equity} = \$78,013 / \$407,910 = 19.1\%$$

The **after-tax return on equity** for the company is **better** than the **median (15.1%)** for a commercial construction company but well below the upper end of the range. **Improvement** in the **after-tax profit margin** will help increase this percentage.

Degree of fixed asset newness (میزان نو بودن دارایی ثابت)

☐ Measurement of **how new** a company's **assets** are.

❖ **Affected by depreciation method**

❖ $D \text{ of FAN} = \frac{\text{Net Fixed Assets}}{\text{Total Fixed Assets}}$

✓ $\text{Net fixed assets} = \text{Total fixed assets} - \text{depreciation} - \text{Land}$

✓ $\text{Total fixed assets} = \text{Total fixed assets} - \text{Land}$

○ **Land** should not be used in these calculations because land **does not depreciate**.

✓ The **depreciation method** used for the financial statement will have a **great effect** on this ratio:

○ The **faster** the **depreciation**, the **lower** the **ratio**.

✓ For a company with a **single fixed asset**, when the asset is **first purchased**, the company's degree of fixed asset newness would be **100%**.

✓ When the asset has been **completely depreciated**, the company's degree of asset newness would be **0%**.

Degree of fixed asset newness (میزان نو بودن دارایی ثابت)

$$\square D \text{ of FAN} = \frac{\text{Net Fixed Assets}}{\text{Total Fixed Assets}}$$

- ✓ A **good target** range is between **60% and 40%** or near the middle.
- ✓ **Greater than 60%** would have a **lot of new, shiny equipment**:
 - Which is **often** accompanied by **large loan payments** and represents a **large investment of capital** in equipment.
- ✓ **Less than 40%** would have a **lot of older equipment**:
 - **Often** indicating that the company will **need to invest heavily** in fixed assets to **maintain its operations**.
- ✓ The **depreciation method used** when preparing the **financial statements** should be matched to the **actual depreciation** of the equipment.

Degree of fixed asset newness – Example

Example: Determine the **degree of fixed asset newness** for the commercial construction company in Figures. What insight does this give you into the company's financial operations?

FIXED AND OTHER ASSETS		
Land	72,000	72,000
Buildings	103,862	103,862
Construction Equipment	95,284	95,284
Trucks and Autos	51,245	31,556
Office Equipment	56,896	42,546
Total Fixed Assets	379,287	345,248
Less Acc. Depreciation	224,512	182,990
Net Fixed Assets	154,775	162,258
Other Assets	178,544	171,256
Total Assets	1,024,039	835,190

Solution: Deducting the value of the land from the net fixed assets, we get:

$$\text{Net Fixed Assets} = \$154,775 - \$72,000 = \$82,775$$

Deducting the value of the land from the total fixed assets, we get:

$$\text{Total Fixed Assets} = \$379,287 - \$72,000 = \$307,287$$

$$\text{Degree of Fixed Asset Newness} = \$82,775 / \$307,287 = 0.269 \text{ or } 26.9\%$$

The degree of fixed asset newness is **below 40%**. The company's fixed assets are **getting old and will need to be replaced soon**.

Months in backlog (مدت زمان باقیمانده تا اتمام کارهای ناتمام)

❑ Measurement of **work on hand**

- ❖ **Unlike other ratios**, months in backlog **cannot** be calculated from the **financial statements**.
- ❖ Months in backlog is calculated by **dividing** the **dollar volume of work** that has been **signed**, but has **yet to be performed** (**uncompleted work on hand**) by the **average revenue** for the last **12 months**, and is calculated as follows:
- ❖
$$\text{Months in Backlog} = \frac{\text{Uncompleted Work on Hand} \times 12}{\text{Revenues for 12 months}}$$
 - ✓
$$\text{Uncompleted work on hand} = \text{Total estimated cost at completion} - \text{Actual cost to date}$$

Months in backlog (مدت زمان باقیمانده تا اتمام کارهای ناتمام)

$$\text{❖ Months in Backlog} = \frac{\text{Uncompleted Work on Hand} \times 12}{\text{Revenues for 12 months}}$$

- ✓ *Uncompleted work on hand = Total estimated cost at completion – Actual cost to date*
 - Any projects that are **under contract** but are **not included** in the work on hand **spreadsheet** need to be added to get the uncompleted work on hand.
- ✓ The **revenues** for the last 12 months are the revenues for the **most current 12 months**.
 - For **example**, if we were calculating the months in backlog for **August**, 2012, we would use the revenues for **August 2011 to July 2012**.

Months in backlog – Example

Example: Determine the **months in backlog** for the company in Example. The company has signed a construction project with construction costs of \$217,000, which is yet to begin. The company's revenues for the most recent 12 months were \$620,235.

	A	B	C	D	E	F	G	H	I	J	K	L
1										Costs &	Billings in	
2				Total		Actual		Costs &		Profits in	Excess of	
3			Current	Estimated	Estimated	Costs	Earned	Earned		Excess of	Costs &	Percentage
4	Job		Contract	Cost at	Profit	To	Profit	Profit	Total	Billings	Profits	Complete
5	#	Job Name	Amount	Completion	(C – D)	Date	(E × F / D)	(F + G)	Billed	(H – I)	(I – H)	(F × 100 / D)
6	301	Henderson Remodel	122,500	101,256	21,244	95,265	19,987	115,252	110,687	4,565	—	94
	302	Weston Offices	25,265	18,000	7,265	11,542	4,658	16,200	17,253	—	1,053	64
7	303	Johnson Warehouse	255,202	229,564	25,638	35,264	3,938	39,202	41,200	—	1,998	15
8				348,820		142,071				4,565	3,050	

Solution:

✓ *Uncompleted work on hand = Total estimated cost at completion – Actual cost to date*

❑ The cost to complete these projects (the uncompleted work on hand) is \$206,749 (\$348,820 – \$142,071).

❖ We need to add the cost of the new project (\$217,000), bringing the work to be performed to \$423,749.

Months in backlog – Example

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1										Costs &	Billings in	
2				Total		Actual		Costs &		Profits in	Excess of	
3			Current	Estimated	Estimated	Costs	Earned	Earned		Excess of	Costs &	Percentage
4	Job		Contract	Cost at	Profit	To	Profit	Profit	Total	Billings	Profits	Complete
5	#	Job Name	Amount	Completion	(C – D)	Date	(E × F / D)	(F + G)	Billed	(H – I)	(I – H)	(F × 100 / D)
6	301	Henderson Remodel	122,500	101,256	21,244	95,265	19,987	115,252	110,687	4,565	—	94
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8				348,820		142,071				4,565	3,050	

Solution:

$$\text{❖ Months in Backlog} = \frac{\text{Uncompleted Work on Hand} \times 12}{\text{Revenues for 12 months}}$$

$$\text{❑ Months in Backlog} = \$423,749 \times 12 / \$620,235 = 8.2 \text{ months}$$

At the rate the company has been performing work for the last 12 months, it will take 8.2 months to complete the uncompleted work on hand.



مدیریت مالی، حسابداری و هزینه در پروژه ها و سازمان های پروژه محور

بخش دوازدهم:

مدیریت مالی: پیش بینی شبکه جریانهای نقدینگی پروژه

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

What you will learn?

- ☐ Purpose of this session
- ☐ What is project cash flow?
- ☐ Why the project cash flow forecast is important?
- ☐ Cash flow for projects with progress payments
- ☐ How to determine the needed cash for a project?
- ☐ Impact of payment schedule from the owner on project cash flow
- ☐ Impact of retainage on project cash flow
- ☐ Impact of labor on project cash flow
- ☐ Impact of material on project cash flow
- ☐ Impact of equipment on project cash flow
- ☐ Impact of subcontractor on project cash flow
- ☐ Impact of others on project cash flow
- ☐ Costs, payment, receipts, and value
- ☐ How to determine a project cash flow?
- ☐ Cash provided by general contractors vs. other parties
- ☐ Notes about cash provided by construction company

What you will learn?

- ☐ Project cash flow forecast for progress payment – Example 1
- ☐ How to reduce the cash required?
- ☐ Project cash flow forecast for progress payment – Example 2
- ☐ What if the owner payment made at intervals other than monthly?
- ☐ What if the owner pays differently for different parts of the project?
- ☐ What if the contractor performs multiple projects simultaneously?
- ☐ Cash flow for projects with a single payment
- ☐ Cash flow for projects with a single payment – Example 3
- ☐ Our research work

Purposes of the this session

- ❑ Learn to develop a cash-flow projection for a **construction project** from:
 1. The perspective of a **construction company** that is receiving **progress payments**
 2. The perspective of a **construction company** that receives a **single payment** (when the project is sold)
 - ✓ As is the case with many **homebuilders**.
- ❑ Learn to accurately project both the **amount** and **timing** of the **cash required** by a construction project.

Purposes of the this session

NOTE: An understanding of the cash flow for a construction project is a prerequisite to preparing a cash flow for an entire construction company, which is discussed in next section.

What is project cash flow?

- ❑ It is the rate at which **money** is **expended** and **revenues** are **earned** on a **project**.
- ❑ The cash generated by a project is equal to:
 - ❖ **Cash receipts – Cash disbursements**
- ❑ A **positive cash flow** indicates that:
 1. **Current revenues > current expenditures to date.**
 2. The **project** will be **generating cash** for **use** by the company on **other projects** to:
 - ❖ **Cover general overhead**, or
 - ❖ Provide a **profit** to the company
- ❑ A **negative cash flow** indicates that
 1. **Current revenues < current expenditures to date.**
 2. The company will need to **supply cash** to fund the project.

What is project cash flow?

Most construction projects require the **investment** of cash at the **beginning** of the project and, **if they are profitable, generate cash near the end** of the project.

Why the project cash flow forecast is important?

❑ Two threats:

(1) **Insufficient** cash

(2) **Lack** of **profitability**

❖ **Over 60%** of **contractor failures** have **financial causes**

❖ **Lack** of **finance** causes **77 to 95%** of **contractor failures**

❑ Contractor does **not make money** as **fastest** as they **spend** and due to it they will have **negative cash flow** most of the **time**.

❑ Cash flow is a very **meaningful** term to **most contractors**, who must be sensitive.

❑ **Many construction firms** that were undertaking **profitable projects** have **failed** in **business** simply because **severe cash flow problems**.

Why the project cash flow forecast is important?

- ❑ **Construction manager** should **understand** how the **decisions** affect the project's **need for cash** because:
 - ❖ A **large portion** of a **company's financial assets** tied up in the form of cash used to **fund construction projects**.
- ❑ Construction company needs to **pay bills before receiving payment** from the owner.

Why the project cash flow forecast is important?

- ❑ A **lack of sufficient** cash **hurts** a construction company in **many** ways:
 - ❖ The company may have to pay **late charges** or **higher prices**.
 - ❖ The company will be **unable to hire skilled labor** or they may **lose** their **experts**.
 - ❖ The company has **difficulty** in obtaining **bonding** and **insurance**.
 - ❖ **Insufficient cash** will result in also:
 - ✓ Non-executable schedules
 - ✓ Delay in project completion
 - ✓ Increase in total project cost
 - ✓ Unbalanced bid
 - ✓ More claims and change orders
 - ✓ Contract terminations due to delay increase

Cash flow for projects with progress payments

❑ If a construction company **receives monthly progress payments**, the cash flow from the project has **three unique characteristics**:

1. The **cash receipts** for the project usually **occur only once during each month**.
2. A **construction company** can often **defer paying some** of the costs.
 - ✓ Suppliers
 - ✓ Subcontractors
 - ✓ Labors (may be in Iran)
3. **Retainage** until the project is **completed**.
 - ✓ General contractors
 - ✓ Subcontractors
 - ✓ Suppliers (sometimes)

How to determine the needed cash for a project?

❑ To determine the **needed cash** for a project, we need to **look at**:

1. Contract terms

2. Project schedule

- ✓ Timing of the cash flow

3. Cash receipts (Revenue)

- ✓ Payment schedule from the owner
- ✓ Retainage

4. Cash disbursement (Costs)

- ✓ Labor
- ✓ Material
- ✓ Equipment
- ✓ Subcontractor
- ✓ Others:
 - ❖ Project overhead (job overhead or variable overhead)
 - ❖ Mobilization
 - ❖ Cost of bonding
 - ❖ Permits
 - ❖ Insurance
 - ❖ Etc.

How to determine the needed cash for a project?

The general overhead should only be included in the company's cash flow,
unless the company involves in only one project in a year!

Impact of payment schedule from the owner on project cash flow

- ❑ One of the **biggest factors**. Why?
 - ❖ Different if owner pays the monthly bill 60 days or 15 days.
- ❑ It dictates how a **contractor** will be **paid** and it is based on the **type of contract**
 1. **Unit Price Contracts**: Contractors will be paid based on the **quantities** of **installed work**
 - ✓ **Temporary work** may not be paid **until** the **final work** is installed (e.g. formwork and concrete)
 2. **Lump Sum Contracts**: contractors are **paid** based on a **negotiated payment schedule** called a schedule of values (**SOV**)
 - ✓ The SOV is **created** after the **award of the contract**, but **before the first payment**
 3. **Other contract types** also **follow** one of the **above conventions** with **minor differences** such as: **Cost plus, Incentive/Disincentive, etc.**

Impact of payment schedule from the owner on project cash flow

❑ The usual process to pay contractors:

1. Contractors **submit** payment applications **usually** on a **monthly basis** for the work **completed**.
2. The **Owner reviews** the applications and **may adjust** it if they disagree with the work completed.
3. **Once agreed** upon, the Owner **processes** the payment, but it could still be **up to a month** or **longer** before the contractor sees the money.
 - ❖ The **actual payment** is **less retainage/retention**
 - ❖ Often the **final payment** has a **different payment schedule** than the progress payments.

Impact of payment schedule from the owner on project cash flow

❑ Usual **payment schedule** that **affects** project cash flow:

1. Advance payment
2. Number of months between submitting pay requests
3. Lag in paying payment requests
4. Lag to make the final payment
5. Lag to return the retained money

Impact of retainage on project cash flow

- ☐ Retainage/Retention is money that **owner keeps to cover** the **cost** of any **deficient** or **incomplete**.
- ☐ **Most commonly**, retention is expressed as a **percentage** of the **cost** of the work **billed to the owner**.
- ☐ Generally 5% to 20%.

Impact of retainage on project cash flow

- ❑ In **some cases**, the owner may hold retention only on the **first half** of the contract **or** you may be able to **release** that by **using bonds**.
 - ❖ For example, **10%** retention until **50% completion** of the project and **no additional retention** or **5%** for the **rest of the project**.
- ❑ The retention is **often paid** to the construction company at the time of the **final payment** or may be **paid at a later date**.
- ❑ When negotiating a construction contract, the **contractor should negotiate** the **retention terms**.

Impact of labor on project cash flow

- ☐ The labor cost is **substantial**.
- ☐ A **rough** estimate is **one-third** of the **total cost of construction project**.
- ☐ The **wage rates** and any **overtime pay** should be **included** in the **estimate prior to submitting the bid**.
- ☐ The **timing** of the **payment** of these wages is of particular **concern** in the cash flow analysis.
- ☐ Typically paid **monthly** in **Iran** and **weekly** or **every two weeks** in **many other countries**.
- ☐ What happens when **construction company** pays for the labor **monthly** and the **owner** pays **one month after the bill is received**?
- ☐ How about **45 days**? Or **15 days**?
- ☐ One way to **reduce** the **cash required** to cover labor costs is to **subcontract the labor out**.

Impact of material on project cash flow

- ☐ The payment terms with **material suppliers** vary from **company** to company.
- ☐ **How often** the **supplier bills** the construction company has a **great effect** on the cash needs.
- ☐ Materials **may become** a **billable** item to the construction company:
 1. When it **orders the materials** or
 2. When the **materials are delivered** to the project or
 3. When **incorporated into the construction project**

Impact of material on project cash flow

- ☐ If the materials are **specialty items**, they may require a **down payment**.
- ☐ Materials that are **susceptible** to **changes in the market** may be **hedged** if
 1. **Quantities** required are **high enough** on the project
 2. There is **sufficient capital**.
- ☐ When dealing with **large purchases** or when the construction company is one of the **supplier's largest customers**, the construction company may be able to **negotiate** for the **time** and **price**.
- ☐ **Most often, material suppliers will not allow retention.**
- ☐ **Some suppliers offer discounts for early payment but needs economic analysis.**



Impact of equipment on project cash flow

❑ Equipment used on a project will **generally** fall into one of **three categories**:

1. Equipment owned by the company
2. Equipment leased
3. Equipment rented by the company.

❑ For cash flow analysis, the type of ownership and timing are important.

Impact of equipment on project cash flow

1. How is cash flow impacted when the equipment is owned by the company?

❖ The impact on **cash flow of a company** may be different than the impact on **cash flow on a project**.

- ✓ For example, it is a common practice among construction firms, particularly those specializing in **highway** or **heavy construction**, to **set up** a **separate company**, in an **accounting sense**, for the **company-owned equipment**.
- ✓ Under this arrangement, the **equipment company** is a **separate profit center** that **rents** the **company owned equipment** to the **company's projects**.
- ✓ In some instances, the **equipment company** may even **rent** the equipment to **other contractors**.
- ✓ **Many companies** **bill the projects** as **if** the **equipment was rented**.

Impact of equipment on project cash flow

2. How is cash flow impacted when the equipment is **rented** by the company?

- ❖ When equipment is rented on a **short-term** basis—**daily** or **weekly** or **monthly**—the equipment creates the **same need** for **cash** as **materials**.
 - ✓ This requires the construction company to use **its cash** to **cover** the cost of the equipment **until the owner pays** for the **work performed** by the **equipment**.

Impact of equipment on project cash flow

❑ How is cash flow impacted when the equipment is **leased** by the company?

- ❖ The equipment is **rented** on **long-term** basis.
- ❖ This requires **economic analysis**.

Impact of subcontractor on project cash flow

- ❑ Subcontractors are **paid** according to the **payment terms** of the **subcontract**.
 - ❖ This allows the contractor to **use** the **subcontractor's cash** for the **materials**, **labor**, and **equipment** supplied by the subcontractor.
- ❑ Usually **paid on a monthly** basis.
 - ❖ Paid when paid
 - ❖ Paid if paid
 - ❖ Retainage

Impact of others on project cash flow

- ☐ Mobilization, cost of bonding, insurance, surety fees, various permits, etc. occur **early in a project.**
- ☐ A **careful analysis** should be made of **all project overhead items.**
- ☐ They should be looked at on a **case-by-case basis.**

Costs, payment, receipts, and value

☐ Cost

- ❖ **Cost** of work **performed without** P&O markup
- ❖ Does **not** consider time

☐ Payment

- ❖ **Cost** of work **performed without** P&O markup in which the **payment schedule** from **contractor** is **applied**
- ❖ Considers **time**

☐ Value

- ❖ Value of work based upon **contract** with the owner (**schedule of values**)
- ❖ **Includes** P&O markup
- ❖ Does **not** consider **time**

☐ Receipts

- ❖ **Payments** from the **owner with** P&O markup
- ❖ Considers **time**

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

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