**📊 SISTEM PENDUKUNG KEPUTUSAN (SPK) STOCK OPNAME**

**Advanced Decision Support System for Inventory Management**

**🎯 PROJECT OVERVIEW**

**Sistem Pendukung Keputusan Stock Opname** adalah aplikasi web berbasis React TypeScript yang mengimplementasikan standar internasional untuk manajemen inventori dengan menggunakan metodologi AHP (Analytic Hierarchy Process) untuk pengambilan keputusan strategis.

**🔧 Technology Stack**

* **Frontend**: React 19 + TypeScript
* **Build Tool**: Vite
* **Styling**: Tailwind CSS v4
* **Charts**: Recharts (dengan fallback components)
* **Data Processing**: XLSX library
* **Icons**: Lucide React
* **Language**: Bahasa Indonesia (Fully Localized)

**🌟 KEY FEATURES & ACHIEVEMENTS**

**1. 🧮 Advanced AHP (Analytic Hierarchy Process) Implementation**

**Multi-Criteria Decision Making Framework**

*// Strategic Criteria Weights (Based on Saaty Scale Analysis)*

const AHP\_STRATEGIC\_WEIGHTS = {

stockCriticality: 0.50, *// Kritisitas stok (emergency level)*

businessValue: 0.30, *// Nilai bisnis dan dampak finansial*

operationalRisk: 0.20 *// Risiko operasional (lead time, demand)*

};

**Sub-Criteria Breakdown**

* **Stock Criticality (50%)**
  + Stockout Risk (60%)
  + Current Stock Level (40%)
* **Business Value (30%)**
  + Inventory Value (70%)
  + ABC Classification (30%)
* **Operational Risk (20%)**
  + Demand Variability (50%)
  + Lead Time Risk (50%)

**Urgency Level Classification**

* **CRITICAL**: Composite Score ≥ 0.8 (Tindakan Darurat dalam 1-2 hari)
* **HIGH**: 0.6 ≤ Score < 0.8 (Tindakan Segera dalam 3-7 hari)
* **MEDIUM**: 0.4 ≤ Score < 0.6 (Tindakan Diperlukan dalam 1-2 minggu)
* **LOW**: Score < 0.4 (Pantau dan Evaluasi Rutin)

**2. 📈 International Inventory Management Standards**

**ABC Analysis (Pareto Principle)**

* **Class A**: Top 80% of inventory value (tight control)
* **Class B**: Next 15% of inventory value (moderate control)
* **Class C**: Remaining 5% of inventory value (simple control)

**Economic Order Quantity (EOQ)**

EOQ = √((2 × Annual Demand × Ordering Cost) / (Unit Cost × Holding Rate))

**Safety Stock Calculation (95% Service Level)**

Safety Stock = Daily Demand × √(Lead Time) × 1.65

**Reorder Point Optimization**

ROP = (Daily Demand × Lead Time) + Safety Stock

**Inventory Turnover Analysis**

* High turnover (>6): Fast-moving, efficient inventory
* Medium turnover (3-6): Moderate efficiency
* Low turnover (<3): Slow-moving, potential excess

**3. 📋 Comprehensive Excel Integration**

**Smart Import/Export System**

* **Template File**: Stock\_Opname\_DSS\_Template\_AHP.xlsx
* **4-Sheet Structure**:
  1. **Recommendations** - Automated action items
  2. **AHP Urgency Ranking** - Complete AHP analysis (25 columns)
  3. **Summary\_Dashboard** - Executive KPI dashboard
  4. **Data Produk** - Import-compatible product data

**AHP Excel Formulas Implementation**

* Real-time AHP calculations with 18 formulas per product
* Automatic composite scoring and ranking
* Integrated urgency level determination
* Round-trip import/export compatibility

**Data Validation & Quality Assurance**

* ✅ Header consistency verified (100% match)
* ✅ Formula accuracy validated
* ✅ Cross-reference integrity maintained
* ✅ Error handling implemented

**4. 🌐 Complete UI Localization (Bahasa Indonesia)**

**Professional Interface Translation**

* All interface elements translated to Bahasa Indonesia
* Contextual business terminology used
* Consistent messaging across all features
* Localized alert and action messages

**Key Translations**

* "Reorder Now" → "Pesan Sekarang"
* "Monitor" → "Pantau"
* "Decision Support System" → "Sistem Pendukung Keputusan"
* "Urgency Ranking" → "Peringkat Urgensi"
* "Critical Actions" → "Tindakan Kritis"

**5. 🚨 Intelligent Alert & Action System**

**Smart Status Detection**

* **Out of Stock**: Immediate emergency ordering required
* **Reorder**: Structured reorder process with EOQ guidance
* **Low Stock**: Proactive monitoring with timeline estimates
* **Overstock**: Strategic reduction recommendations

**Contextual Action Alerts**

*// Example: Emergency Alert for Out of Stock*

🚨 PESANAN DARURAT DIPERLUKAN

Produk: Samsung Galaxy S24 Ultra (ELC003)

Status: HABIS STOK - Tidak ada inventori tersedia!

Kuantitas Pesanan yang Direkomendasikan (EOQ): 85 unit

Estimasi Lead Time: 7 hari

TINDAKAN SEGERA:

1. Hubungi pemasok SEKARANG

2. Buat pesanan darurat untuk 85 unit

3. Periksa apakah pelanggan dapat menunggu

4. Pertimbangkan produk pengganti

**6. 📊 Advanced Filtering & Analytics**

**Multi-Dimensional Filtering System**

* **Search**: By product name, code, or category
* **Stock Status**: All, Normal, Low Stock, Overstock, Reorder, Out of Stock
* **ABC Class**: A (High Value), B (Medium Value), C (Low Value)
* **Category**: Electronics, Accessories, Office Supplies, etc.
* **Variance Type**: Positive, Negative, Zero, High Variance (>10%)

**Real-time Filter Results**

* Dynamic result count display
* Active filter indicators
* One-click filter reset functionality

**7. 💰 Financial Impact Analysis**

**Comprehensive Cost Tracking**

* **Total Inventory Value**: Real-time calculation
* **Variance Value Impact**: Financial implications of discrepancies
* **Cost per Unit**: Integrated pricing structure
* **Working Capital Optimization**: Through turnover analysis

**Currency Formatting (Indonesian Rupiah)**

const formatCurrency = (value: number) => {

return new Intl.NumberFormat('id-ID', {

style: 'currency',

currency: 'IDR',

minimumFractionDigits: 0,

maximumFractionDigits: 0

}).format(value);

};

**🛠️ TECHNICAL IMPLEMENTATION**

**Architecture & Performance**

* **Component-based Architecture**: Modular React components
* **Type Safety**: Full TypeScript implementation
* **State Management**: React hooks with optimized re-rendering
* **Responsive Design**: Mobile-first approach with Tailwind CSS
* **Performance Optimization**: Memoized calculations and filtering

**Data Flow & Processing**

1. **Input**: Manual entry or Excel import
2. **Processing**: Real-time AHP calculations and standard inventory formulas
3. **Analysis**: Multi-criteria scoring and ranking
4. **Output**: Visual dashboard, detailed reports, and Excel export
5. **Action**: Intelligent alerts and recommended actions

**Quality Assurance**

* **Formula Validation**: Against international standards
* **Data Integrity**: Comprehensive error handling
* **Import/Export Testing**: Round-trip compatibility verified
* **User Experience**: Intuitive interface with contextual help

**📈 BUSINESS VALUE & IMPACT**

**For Management**

1. **Strategic Decision Support**: Data-driven inventory decisions
2. **Risk Mitigation**: Proactive identification of critical situations
3. **Cost Optimization**: EOQ analysis and working capital efficiency
4. **Performance Monitoring**: Real-time KPI dashboard
5. **Compliance**: International inventory management standards

**For Operations**

1. **Automated Workflows**: Reduced manual calculation errors
2. **Priority Management**: AHP-based urgency ranking
3. **Action Guidance**: Specific, actionable recommendations
4. **Efficiency Gains**: Streamlined stock analysis processes
5. **Integration Ready**: Excel-compatible data exchange

**For Finance**

1. **Inventory Valuation**: Accurate value tracking
2. **Variance Analysis**: Financial impact assessment
3. **Budget Planning**: EOQ-based procurement planning
4. **Cost Control**: Identification of overstock situations
5. **Working Capital**: Turnover ratio optimization

**🚀 DEPLOYMENT & USAGE**

**System Requirements**

* **Runtime**: Node.js 16+ with npm/yarn
* **Browser**: Modern web browsers (Chrome, Firefox, Safari, Edge)
* **Excel**: Microsoft Excel 2016+ or compatible spreadsheet software
* **Network**: No internet required (fully offline capable)

**Installation & Setup**

*# Clone and setup*

git clone https://github.com/Sasamantiri13/StockOpname.git

cd StockOpname

npm install

npm run dev

*# Access at http://localhost:5173*

**Usage Workflow**

1. **Data Entry**: Input product data or import from Excel
2. **Analysis**: Review AHP urgency rankings and traditional metrics
3. **Action**: Implement recommended actions based on priority
4. **Export**: Generate reports for stakeholders
5. **Monitor**: Track improvements and adjust parameters

**📋 PROJECT STATUS & ACHIEVEMENTS**

**Completed Features (100%)**

* ✅ **AHP Multi-Criteria Implementation**: Full mathematical model
* ✅ **International Standards**: ABC, EOQ, Safety Stock, ROP calculations
* ✅ **UI Localization**: Complete Bahasa Indonesia translation
* ✅ **Excel Integration**: Import/export with template compatibility
* ✅ **Responsive Design**: Mobile and desktop optimized
* ✅ **Alert System**: Contextual action recommendations
* ✅ **Advanced Filtering**: Multi-dimensional search and filtering
* ✅ **Financial Analysis**: Cost tracking and variance analysis

**Technical Excellence**

* ✅ **Type Safety**: 100% TypeScript implementation
* ✅ **Code Quality**: Modular, maintainable architecture
* ✅ **Performance**: Optimized calculations and rendering
* ✅ **User Experience**: Intuitive, professional interface
* ✅ **Documentation**: Comprehensive technical documentation

**Business Impact**

* ✅ **Decision Support**: AHP-based strategic prioritization
* ✅ **Cost Optimization**: EOQ and inventory efficiency
* ✅ **Risk Management**: Proactive stock-out prevention
* ✅ **Process Automation**: Reduced manual analysis time
* ✅ **Standards Compliance**: International best practices

**🎯 UNIQUE SELLING POINTS**

**1. AHP-Powered Decision Making**

First-in-class implementation of Analytic Hierarchy Process for inventory urgency ranking, providing scientific, multi-criteria decision support beyond traditional inventory systems.

**2. Dual-Language Professional Interface**

Fully localized Bahasa Indonesia interface with professional business terminology, making it accessible for Indonesian enterprises while maintaining international standards.

**3. Seamless Excel Integration**

Bi-directional Excel compatibility with intelligent template system, enabling easy adoption and integration with existing business processes.

**4. Real-time Actionable Intelligence**

Beyond just reporting - provides specific, contextual action recommendations with timelines and business impact assessments.

**5. International Standards Compliance**

Implements globally recognized inventory management formulas (ABC Analysis, EOQ, Safety Stock) with 95% service level calculations.

**📝 CONCLUSION**

The **Sistem Pendukung Keputusan Stock Opname** represents a comprehensive, professional-grade inventory management solution that combines cutting-edge AHP methodology with established international standards.

**Key Differentiators:**

* **Scientific Approach**: AHP multi-criteria decision making
* **Professional Localization**: Complete Bahasa Indonesia interface
* **Business Integration**: Excel-compatible workflows
* **Actionable Intelligence**: Specific recommendations with timelines
* **Technical Excellence**: Modern React TypeScript architecture

This system is production-ready and provides immediate business value through automated analysis, intelligent prioritization, and actionable recommendations for inventory management decisions.

**Project Repository**: [GitHub - P-SPK-StockOpname-TSX](https://github.com/Sasamantiri13/StockOpname)  
**Technology Stack**: React 19 + TypeScript + Vite + Tailwind CSS  
**Methodology**: AHP (Analytic Hierarchy Process) + International Inventory Standards  
**Interface Language**: Bahasa Indonesia (Fully Localized)  
**Status**: Production Ready ✅